European Journal of Personality
Eur. J. Pers. **23**: 531–565 (2009)
Published online 15 June 2009 in Wiley InterScience
(www.interscience.wiley.com) **DOI**: 10.1002/per.729

A Meta-Analysis of Psychopathy-, Antisocial PD- and FFM Associations

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Abstract

This research meta-analytically summarizes the relationships of the Five-Factor Model (FFM) with psychopathy and Antisocial Personality Disorder (APD). Effect sizes of the associations between psychopathy, APD and the FFM were compiled from 26 independent samples (N = 6913) for psychopathy and 57 independent samples (N = 16 424) for APD. The results revealed predominantly points of similarity and some differences in the FFM associations of both disorders. Symptoms of psychopathy and APD were negatively associated with Conscientiousness and Agreeableness facets and positively with scores on Angry–Hostility (N2), Impulsiveness (N5), Excitement Seeking (E5) and negatively with Warmth (E1). Only psychopathy had a small negative association with Anxiety (N1) and was characterized by stronger negative associations with Agreeableness and Straightforwardness (A2), Compliance (A4) and Modesty (A5) compared to APD. The moderator analyses showed that sample type, use of the NEO-PI-R and APD instrument moderated the APD FFM associations, while psychopathy instrument and age group were moderators in the psychopathy MA. Implications of this research for the assessment of APD and psychopathy relying on dimensional models of personality pathology are discussed.

Key words: meta-analysis; FFM; psychopathy; antisocial personality disorder

A META-ANALYSIS OF PSYCHOPATHY-, ANTISOCIAL PD- AND FFM ASSOCIATIONS

There is a long clinical and research tradition focusing on the construct of psychopathy. Despite earlier general descriptions of psychopathy, it was only when Cleckley's book 'The Mask of Sanity' was published in 1941 that specific traits of this disorder were proposed. Cleckley identified 16 characteristic personality traits capturing the essence of the

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Received 14 November 2008
Revised 17 April 2009
Accepted 17 April 2009

psychopathic personality. Ever since Cleckley (1941), researchers and clinicians have been quite consistent in the description of psychopathy (Lynam & Widiger, 2007). Behaviourally, the psychopath is considered as an impulsive risk-taker involved in a variety of criminal activities. Interpersonally, the psychopath has been described as grandiose, egocentric, manipulative, forceful and cold-hearted. Affectively, the psychopath shows shallow emotions, is unable to maintain close relationships, and lacks empathy, anxiety and remorse. The Psychopathy Checklist-Revised (PCL-R; Hare, 2003) is considered as the gold standard to assess psychopathy and factor analysis of the PCL-R items yielded two stable, correlated factors. Factor 1 is composed of items that assess the interpersonal and affective traits of psychopathy; Factor 2 reflects the chronically unstable and socially deviant lifestyle associated with psychopathy (Hare, Hart, & Harpur, 1991).

Psychopathy has been consistently reported to covary with the antisocial personality disorder (APD) described in the DSM-IV (APA, 1994). APD is characterized as 'a pervasive pattern of disregard for and violation of the rights of others'. There has been a considerable amount of research on the diagnostic co-occurrence of psychopathy and APD (Edens, Poythress, & Watkins, 2001; Lilienfeld & Andrews, 1996; Salekin, Rogers, & Sewell, 1997). The DSM-IV (APA, 1994) proposes seven criteria for the APD including failure to conform to social norms, deceitfulness, impulsivity or failure to plan ahead, irritability and aggressiveness, reckless disregard for the safety of oneself and others, consistent irresponsibility and lack of remorse. The PCL-R (Hare, 2003) identifies 20 criteria for psychopathy as described by glibness/superficial charm, grandiose sense of self-worth, need for stimulation, pathological lying, conning/manipulative, lack of remorse or guilt, shallow affect, callous/lack of empathy, parasitic lifestyle, poor behaviour controls, promiscuous sexual behaviour, early behavioural problems, lack of realistic long-term goals, impulsivity, irresponsibility, many short marital relationships, juvenile delinquency, revocation of conditional release and criminal versatility. DSM-IV antisocial and PCL-R psychopathy constructs do overlap substantially (Hicklin & Widiger, 2005) and most of the PCL-R diagnostic criteria are represented within the DSM-IV criteria of APD (Widiger & Corbitt, 1995). However, also differences between the two criterion sets have been well demonstrated. The PCL-R criteria lack of empathy, glibness, superficial charm, grandiose sense of self-worth and shallow affect are considered absent from—or at least not explicitly included in—the DSM-IV antisocial criteria set (Hare et al., 1991; Hicklin & Widiger, 2005).

Despite a similar conceptual focus (Widiger, 2005), research shows that APD and psychopathy are distinct constructs from an empirical point of view. In forensic populations, the prevalence of APD is two or three times higher than the prevalence of psychopathy (Hare & Neumann, 2006). Research has generally suggested an asymmetric association between the PCL-R and APD, indicating that most cases of psychopathy diagnosed within prison or other forensic settings will meet the DSM-IV criteria for APD, whereas only 25 per cent to half of the cases of APD will meet PCL-R criteria of psychopathy (Hare, 1996, 2003). In addition, the APD criterion set is strongly associated with Factor 2 (chronically unstable and antisocial lifestyle) but only weakly with Factor 1 (selfish, callous and remorseless use of others) of psychopathy, suggesting that APD is not identifying the core personality features of psychopathy and identifies simply the tendency to be aimless, impulsive, irresponsible and delinquent (Hare, 1996). A number of studies (e.g. Derefinko & Lynam, 2007; Hare, 2003; Skeem & Mulvey, 2001) also report divergent relations between psychopathy and APD on the one hand and internalizing problems and violence on the other hand. Some researchers have argued that the asymmetric relationship

DOI: 10.1002/per

and the different correlates with the PCL-R factors are a result of the more behaviourally-based criteria of the APD, compared to the more personality-based descriptors of psychopathy (Andrade, 2008; Ogloff, 2006), although this appears to be less true in the most recent edition of the DSM. Widiger (2005) even concludes that DSM-IV APD and PCL-R psychopathy criterion sets do not appear to be identifying different disorders, but are instead quite similar despite alternative efforts at identifying the same personality disorder (Hare et al., 1991). Although the term psychopathy was not present in the DSM-III-R (APA, 1987), the DSM-IV (APA, 1994) also indicates that the terms psychopathy, sociopathy and dissocial personality disorder are synonymous of APD. In this regard, another possibility for the empirical differences between both disorders is that the differential base rates are a result of the different thresholds required for diagnosis. Whereas the PCL-R requires a score of 30 out of 40 (75%), the DSM-IV only requires three out of seven (43%) criteria. Skilling et al. (2002) suggested that the empirical differences between APD and psychopathy and lower correlations between measures of both disorders could be artefacts due to the use of suboptimal, nonempirical, diagnostic cutoffs.

General personality traits and psychopathy and APD

One way to examine whether APD and psychopathy are assessing the same or different constructs is to study the associations with general personality traits. Many personality psychologists nowadays agree that general personality can be best described in terms of the dimensions and facets of the Five-Factor Model (FFM; Costa & McCrae, 1992b; Digman, 1990). The FFM provides a dimensional description of individual differences on five broad factors; labelled as Neuroticism, Extraversion, Openness to Experience, Agreeableness and Conscientiousness. In the NEO Personality Inventory Revised (NEO-PI-R; McCrae & Costa, 1990), these five domains consist of six specific facets enabling a more fine-grained personality description. A substantial body of literature has examined the relationship between the FFM dimensions and personality pathology (Costa & Widiger, 1994; Widiger & Costa, 2002), and psychopathy (Derefinko & Lynam, 2007; Lynam, 2002; Miller, Lynam, Widiger, & Leukefeld, 2001; Widiger & Lynam, 1998). From a dimensional point of view, the FFM is hypothesized to be closely associated with PDs, as each PD can be characterized by maladaptive variants of general personality traits that lead to impairment (Widiger & Trull, 1992). There are also alternative dimensional models of personality structure that have been associated conceptually with personality pathology, such as the three-factor model of Tellegen, as assessed by the Multidimensional Personality Questionnaire (MPQ; Tellegen, 1982), the seven factor model of Cloninger, as assessed by the Temperament and Character Inventory (TCI; Cloninger, Przybeck, Svrakic, & Wetzel, 1994) and the six polarity model of Millon, as assessed by the Millon Index of Personality Styles (MIPS; Millon, Weiss, & Millon, 2004).

Miller and Lynam (2001) argued that the understanding of the relations between the basic dimensions of personality on the one hand and psychopathy and APD/antisocial behaviour on the other hand can make a substantial contribution to the field of criminology. One benefit of this approach is the ability to resolve several important issues in the psychopathy literature such as the patterns of comorbidity surrounding psychopathy (Miller & Lynam, 2003), the diversity of putative psychopathic deficits and the variety of conceptions of 'successful' psychopathy (Lynam & Widiger, 2007). Additionally, Lynam and colleagues (Lynam, 2002; Lynam & Derefinko, 2006) suggested that using the FFM to

DOI: 10.1002/per

conceptualize psychopathy will foster basic research on the etiology, course and treatment of psychopathy.

In terms of personality pathology comorbidity, psychopathy will co-occur with other PDs to the extent that they share common FFM dimensions or facets. Based on the facet overlap, psychopathy is expected to be highly comorbid with APD (Lynam & Widiger, 2001). Widiger and Lynam (1998) and Widiger, Trull, Clarkin, Sanderson, and Costa (2002) translated the diagnostic criteria of psychopathy and APD respectively into the language of the FFM on an item-by-item basis. The 20 items of the PCL-R were translated into 16 facets of the FFM. The FFM translation of the seven DSM-IV APD criteria resulted in a FFM profile consisting of extreme positions on nine facets. The FFM descriptions of psychopathy and APD are represented in Table 1. A comparison of both profiles shows that

Table 1. Comparison of the FFM descriptions of APD and PP

	PP	APD
Neuroticism		
N1: Anxiety		
N2: Angry hostility	H	H
N3: Depression		
N4: Self-consciousness	L	
N5: Impulsiveness	H	
N6: Vulnerability		
Extraversion		
E1: Warmth	L	
E2: Gregariousness		
E3: Assertiveness		
E4: Activity		
E5: Excitement-seeking	H	H
E6: Positive emotions	L	
Openness to experience		
O1: Fantasy		
O2: Aesthetics		
O3: Feelings		
O4: Actions		
O5: Ideas		
O6: Values		
Agreeableness		
A1: Trust		
A2: Straightforwardness	L	L
A3: Altruism	L	L
A4: Compliance	L	L
A5: Modesty	L	
A6: Tender-mindedness	L	L
Conscientiousness		
C1: Competence	L	
C2: Order		
C3: Dutifulness	L	L
C4: Achievement striving	L	
C5: Self-discipline	L	L
C6: Deliberation	L	L

Note: H, L = high, low, respectively. Predictions for PP are from Widiger and Lynam (1998) and predictions for APD are from Widiger et al. (2002).

DOI: 10.1002/per

the FFM psychopathy description of Widiger and Lynam (1998) includes all facets of the FFM APD description provided by Widiger et al. (2002), with additionally low Self-Consciousness (N4), high Impulsiveness (N5), low Warmth (E1), low Positive Emotions (E6), low Modesty (A5), low Competence (C1) and low Achievement Striving (C4). Absent from the FFM psychopathy description are the low scores on Anxiety (N1) and Vulnerability (N6), which perhaps would have been included if this description had been based on the original description of psychopathy by Cleckley (1941) or Lykken (1995) rather than the PCL-R alone (Hicklin & Widiger, 2005). Miller et al. (2001) included these additional facets in the FFM psychopathy description, based on FFM profiles of a prototypic psychopath provided by 15 nationally known psychopathy researchers.

Hicklin and Widiger (2005) already conducted an empirical study on the similarities and differences between self-reports of the antisocial and psychopathy patterns from the perspective of general personality structure. The FFM, as assessed with the NEO-PI-R, appeared to be quite effective in identifying fundamental commonalities and differences among six inventories of psychopathy and APD. The FFM included not only what is common to measures of both disorders but also what is relatively unique to psychopathy, such as glib charm, arrogance and callousness and even the low Anxiety that was recognized by Cleckley (1941) but not included in a number of measures of psychopathy. However, this study was restricted to 206 undergraduate students from introductory psychology classes (60.19% female) using self-reports.

Meta-analytic findings

Divergences across empirical studies continue to obscure to what extent these two severe impairing antisocial conditions have common, but also unique 'roots' in general personality dimensions. The large number of single studies on FFM-APD and FFM-psychopathy relationships calls for a meta-analytic summary. Meta-analysis (MA) is a statistical technique used to quantitatively summarize findings described in various empirical studies. In short, its procedure involves three steps. First, a sample of eligible studies is collected. Second, quantitative findings of each study are coded together with specific sample and study characteristics. Finally, in the third step, the resulting database is analysed using adaptations of conventional statistical techniques, like regression or ANOVA, in order to search for moderators (Lipsey & Wilson, 2001). The use of meta-analytic procedures results in enhanced power and further makes it possible to draw more accurate conclusions than those inferred from individual studies (Durlak & Lipsey, 1991). Furthermore, a MA makes it possible to discover consistencies in the face of apparently inconsistent research findings, by focusing on the direction and magnitude of effects across studies. Finally, a MA enables to examine moderators of the examined associations, evaluating the impact of sample and study characteristics. Previous work, both theoretical and meta-analytic, has consolidated personality pathology by means of the FFM (e.g. Malouff, Thorsteinsson, & Schutte, 2005; Ruiz, Pincus, & Schinka, 2008; Samuel & Widiger, 2008b; Saulsman & Page, 2004; Widiger & Costa, 2002). Saulsman and Page (2004) were the first to conduct a MA on the relationships between the FFM dimensions and personality pathology. Saulsman and Page's MA focused only on associations at the FFM domain-level, while an investigation at the facet-level would provide more detailed and discriminating information. Recently, Samuel and Widiger (2008b) replicated and extended the work of Saulsman and Page (2004) through a domain and facet-level analysis that provides a more specific and nuanced description of each DSM-IV-TR PD.

DOI: 10.1002/per

The meta-analytic results showed that the generated FFM profiles were generally congruent with hypothesized FFM translations of the PDs, but some of the findings were instrument specific. However, both meta-analytic studies were restricted to the 10 Axis II PDs enclosed in the DSM-IV, so psychopathy was not included.

Ruiz et al. (2008) focused explicitly on the FFM characteristics of externalizing disorders in their meta-analysis. They identified shared and unique personality features of APD and Substance Use Disorders both at the domain and facet-level of the FFM. Only the APD studies ($k = 35$) were tested for moderation resulting from the assessment of psychopathy versus the assessment of APD at the domain-level. Results showed that samples assessed for psychopathy had a significantly lower level of Agreeableness compared to samples assessed for APD. Differences between APD and psychopathy at the facet-level were not examined in Ruiz et al.'s (2008) MA.

Purpose of the meta-analysis

To our knowledge, the present study is the first meta-analysis summarizing FFM associations with APD and psychopathy at the facet-level, to identify shared and unique personality traits across disorders. Additionally, we investigated how sample and method characteristics affected the distribution of effect sizes and functioned as moderators of the associations between FFM traits and these two disorders. More specifically, moderating effects were examined for the following methodological characteristics: (a) nature of the sample (population versus referred), (b) age group (adolescence, young adulthood and adulthood), (c) sex composition (mixed-sex vs. males-only), (d) inventory versus interview to assess psychopathy or APD, (e) same versus different informant to assess FFM traits and personality pathology, (f) informant of psychopathy or APD, (g) informant of FFM traits, (h) whether a NEO inventory (NEO-FFI(-R) or NEO-PI(-R)) or a different inventory was used to assess FFM traits, (i) geographic location of the study (North-American, European and other) and (j) instrument used to assess psychopathy or APD. In order to categorize the APD or psychopathy instrument, separate effect sizes were calculated for each instrument that was administered in at least four samples, with the exception of the Levenson Self-Report Psychopath Scale (LSRP; Levenson, Kiehl, & Fitzpatrick, 1995) with 3 samples, but this instrument was included based on the results of the Hicklin and Widiger (2005) study.

METHOD

Literature search and included studies

The primary search method involved the inspection of the computerized database ISI Web of Science for studies published in journal articles between 1972 and 2009. Keywords for the FFM search included: 'Five Factor Model', 'FFM', 'NEO', 'NEO-PI-R', 'personality', 'big five', 'adaptive trait' and 'personality trait', whereas 'personality disorders', 'Axis II-disorders', 'antisocial personality disorder', 'antisocial' and 'psychopathy' served as psychopathy/APD keywords. The search terms were used separately and in different combinations for the database searches. Additional studies were identified by inspecting the references' sections of the obtained studies and relevant narrative reviews (also known as the 'ancestry method'). We also inspected the reference lists from two meta-analytic

DOI: 10.1002/per

studies on the FFM associations of personality disorders (Ruiz et al., 2008; Samuel & Widiger, 2008b). Because journals may be selective in publishing results that are characterized by lower *p* values and larger effect sizes (Rosenthal, 1995), we also attempted to add non-published studies to the MA-database. These studies were retrieved by contacting experts in the field and by including ongoing research from our own research group.

Studies had to meet several conditions to be incorporated in the MA. First, the study had to rely on FFM measures in combination with a measure of APD or psychopathy. Additionally, personality had to be operationalized in a manner consistent with the five-factor framework as proposed by Costa and McCrae (1995) or Goldberg (1990). Consequently, only studies were included that assessed at least one of the five personality dimensions with well-validated instruments designed within the FFM or big five tradition. As for the pathology variables, measures were retained that clearly started from the definition of APD given by the DSM-IV (APA, 2000) or DSM-III-R (APA, 1987) or were derived from Hare's/Cleckley's psychopathy description. To achieve the highest consistency across research findings on the associations between FFM traits and psychopathy, only studies that reported correlations with 'total psychopathy' were included. As a result, the study of Otter and Egan (2007), only reporting correlations between the FFM and primary and secondary psychopathy as assessed by the LSRP (Levenson et al., 1995), was not included. Secondly, single studies had to provide information on the correlations between FFM facets- and/or domain-levels and APD or psychopathy, or authors were contacted to obtain these correlations. Thirdly, a clear sample description, together with sufficient information for calculating effect sizes had to be available. Finally, all samples included in the meta-analysis had to be statistically independent, implying that every study in the meta-analysis consisted of participants who were not enclosed in other studies (Cooper & Hedges, 1998). When studies were identified to be dependent, the oldest, original study was included in the analysis.

Our literature search yielded 50 studies that addressed the association between FFM and APD, including two studies (Duijsens & Diekstra, 1996; Rossier & Rigozzi, 2008) that reported correlations of two independent samples; one study of Costa and McCrae (1990) consisting of three independent samples and one study of Mullins-Sweatt et al. (Mullins-Sweatt, Jamerson, Samuel, Olson, & Widiger, 2006) reporting correlations of four independent samples. Twenty-two studies described the linkage between FFM and psychopathy, including three studies (Harpur, Hart, & Hare, 2002; Lynam, Caspi, Moffitt, Raine, Loeber, & Stouthamer-Loeber, 2005; Salekin, Leistico, Trobst, Schrum, & Lochman, 2005) with two independent samples. One study describing the relationship between FFM and psychopathy was excluded because no total score of psychopathy was provided (Otter & Egan, 2007). A detailed list of the 50 included studies ($N = 16\,426$, $M = 288.14$; $SD = 373.89$) for the relationship between APD and FFM is provided in Table 2. Most of these studies were published between 1990 and 2009. We also included four unpublished studies and two raw data sets (Cant & De Fruyt, 2006; Carlson & Furr, 2007; Decuyper, 2007; Samuel, 2005; Samuel & Widiger, 2009; Vieth, 1999). Table 3 describes the 22 studies ($N = 6913$, $M = 265.88$, $SD = 205.64$) reporting the associations between psychopathy and the FFM, which were all conducted or published between 1998 and 2009. We also included one unpublished data set (Decuyper, 2007) and correlations of two unpublished dissertations (Knap, 1999; Preston, 1998). Taking the studies into account that included two or three independent samples, and hence reported multiple correlations between APD/psychopathy and the FFM, the number of independent samples for the meta-

DOI: 10.1002/per

Table 2. Summary statistics for analysis APD and FFM

	Analysis	*N*	Sample	Instrument APD	Instrument FFM	*r* factor N	*r* factor E	*r* factor O	*r* factor A	*r* factor C
1	Aluja et al. (2007)	674	Non-referred adults	MCMI-III	NEO-FFI-R	.16	.14	.04	−.40	−.45
2	Axelrod et al. (1997)	81	Non-referred students	MMPI PD	NEO-PI-R					
3	Bagby et al. (2005a)	115	Referred adults	SCID	NEO-PI-R	.10	.07	.12	−.29	−.14
4	Bagby et al. (2005b)	121	Non-referred adults	SCID-II	NEO-PI-R	.26	.12	−.01	−.38	−.28
5	Ball et al. (1997)	370	Referred adults	SCID	NEO-FFI	.13	.07	−.04	−.32	−.19
6	Blais (1997)	100	Referred adults	Clinical ratings DSM-IV PD markers	Clinical ratings FFM markers	−.05	.19	−.22	−.31	−.42
7	Cant and De Fruyt (2006)	20	Referred adolescents	ADP-IV	HiPIC	−.04	.37	.15	−.61	−.31
8	Carlson & Furr (2007)	228	Non-referred adults	MCMI-III	NEO-PI-R	.34	−.03	.05	−.55	−.48
9	Cloninger and Svrakic (1994)	136	Referred adults	SIDP-R	NEO-PI	.16	.02	.00	−.41	.46
10	Coolidge et al. (1994)	180	Non-referred adults	CATI	NEO-PI	.31	−.13	.01	−.59	−.38
11a	Costa and McCrae (1990)	274	Non-referred adults	MMPI PD	NEO-PI	.13	.07	.18	−.35	−.42
11b	Costa and McCrae (1990)	207	Non-referred adults	MCMI-I	NEO-PI	−.27	.12	.22	−.49	.17
11c	Costa and McCrae (1990)	62	Non-referred adults	MCMI-II	NEO-PI	.15	.21	.08	−.42	−.40
12	De Clercq and De Fruyt (2003)	419	Non-referred adolescents	ADP-IV	NEO-PI-R	.15	−.02	−.16	−.49	−.42
13	De Clercq et al. (2006)	453	Non-referred adolescents	ADP-IV	NEO-PI-R	.28	−.05	−.10	−.36	−.41
14	Decuyper (2007)	357	Non-referred adults	ADP-IV	NEO-PI-R	.34	.02	.07	−.49	−.47
15	Decuyper et al. (2008)	49	Referred adults	ADP-IV	NEO-PI-R	.52	.06	.01	−.46	−.46
16	De Fruyt et al. (2006)	130	Referred adults	ADP-IV	NEO-PI-R	.13	.14	.18	−.36	−.41
17	Dickinson and Pincus (2003)[b]	86	Non-referred adults	PDI-IV	NEO-FFI	.04	−.04	.09	−.44	−.33
18a	Duijsens and Diekstra (1996)	168	Non-referred adults	VKP	23BB5	.06	−.07	.13	−.08	−.33
18b	Duijsens and Diekstra (1996)	210	Non-referred adults	VKP	5PFT	.17	.11	.10	−.19	−.23
19	Dyce and O'Connor (1998)	614	Non-referred adults	MCMI-III	NEO-PI-R	.12	−.01	.05	−.46	−.36
20	Egan et al. (2003)	155	Referred adults	IPDE-SQ	NEO-FFI	.34	−.16	−.03	−.54	−.35
21	Furnham and Crump (2005)	431	Non-referred adults	HDS	NEO-PI	.09	.40	.34	−.24	−.05

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22	Haigler and Widiger (2001)	86	Referred adults	PDQ-4	NEO-PI-R	.31	.05	.13	−.46	−.31
23	Hicklin and Widiger (2005)	206	Non-referred adults	PDQ-4	NEO-PI-R	.11	.08		−.31	−.30
24	Huprich (2003)	51	Referred adults	SCID-II SR	NEO-PI-R					
25	Hyer et al. (1994)	80	Referred adults	MCMI-II	NEO-PI	−.05	.22	.25	.09	−.01
26	Jacob et al. (2007)[a]	767	Referred adults	SCID-II	NEO-PI-R	.03	.08	−.01	−.20	−.07
27	Lehne (2002)	99	Referred adults	MCMI	NEO-PI	.09	.13	−.05	−.49	−.01
28	Lynam et al. (2003) & Flory et al. (2002)	481	Non-referred adults	DIS-IV	NEO-PI-R	.17	−.04	−.06	−.45	−.28
30	Madsen et al. (2006)	44	Referred adults	SCID	NEO-PI-R	.19	.22	−.40	−.44	−.11
31	Martin and Sher (1994)	468	Non-referred adults	DIS-III-R	NEO-FFI	.12	−.14		−.31	−.23
32	Miller et al. (2003)	292	Non-referred adults	DIS-IV	NEO-PI-R					
33	Miller et al. (2004)	94	Referred adults	SIDP-IV	NEO-PI-R	.08	.19	.01	−.19	−.31
34	Miller et al. (2005)	69	Referred adults	SCID	NEO-PI	.10	.16	−.19	−.31	−.12
35	Morey (2007)	92	Non-referred adolescents	PAI-A	NEO-FFI	.05	−.01	−.08	−.30	−.18
36	Morey et al. (2000)[a]	90	Referred adults	DIP-R	NEO-FFI	.11	.05	.08	−.25	−.08
37a	Mullins-Sweatt et al. (2006)	146	Non referred adults	PDQ-4	FFMRF					
37b	Mullins-Sweatt et al. (2006)	189	Non-referred adults	SNAP	FFMRF					
37c	Mullins-Sweatt et al. (2006)	133	Non-referred adults	OMNI	FFMRF					
37d	Mullins-Sweatt et al. (2006)	75	Non-referred adults	SNAP	FFMRF					
38	Mullins-Sweatt and Widiger (2007a)	94	Non-referred adults	SWAP-200	NEO-PI-R	−.07	.33	−.18	−.71	−.41
39	Mullins-Sweatt and Widiger (2007b)	204	Non-referred adults	MCMI-III	NEO-PI-R					
40	Quirk et al. (2003)	689	Referred adults	SCID	NEO-PI-R	.20	−.05	.04	−.27	−.16
41a	Rossier and Rigozzi (2008)	2022	Non-referred adults	IPDE	NEO-PI-R	.32	.03	.06	−.41	−.38
41b	Rossier and Rigozzi (2008)	697	Non-referred adults	IPDE	NEO-PI-R	.16	.07	.05	−.45	−.30
42	Samuel (2005)	244	Non-referred adults	SNAP	NEO-PI-R	.19	−.10	−.03	−.36	−.47
43	Samuel and Widiger (2008a)	147	Non-referred adults	SNAP	NEO-PI-R	.26	−.12	−.05	−.56	−.50
44	Samuel and Widiger (2009)	74	Referred adults	SNAP	NEO-PI-R	.14	.05	.01	−.40	−.35
45	Soldz et al. (1993)	102	Referred adults	MCMI-II	50-BSRS	.25	.27	.19	−.18	−.22
46	Trull (1992)	54	Referred adults	PDQ-R	NEO-PI	.25	−.16	.14	−.38	−.37
47	Trull et al. (2001)	232	Non-referred adults	PDQ-R	SIFFM	.18	.02	.15	−.27	−.24

(*Continues*)

DOI: 10.1002/per

Table 2. (Continued)

	Analysis	*N*	Sample	Instrument APD	Instrument FFM	*r* factor N	*r* factor E	*r* factor O	*r* factor A	*r* factor C
48	Vieth (1999)[b]	149	Non-referred adults	PDI-IV	SIFFM	.38	.04	.34	−.22	−.53
49	Yang et al. (2002)	1909	Referred adults	PDQ-4+	NEO-PI-R	.18	.08	.06	−.22	−.21
50	Yeung et al. (1993)	224	Non-referred adults	SIDP	NEO-FFI	.05	−.09	−.09	−.20	−.19

Note: Instruments used to describe APD included: ADP-IV = assessment of DSM-IV personality disorders (Schotte & De Doncker, 1994), CATI = Coolidge axis II inventory (Coolidge, 1984; Coolidge & Merwin, 1992), DIPD-R = diagnostic interview for DSM-IV personality disorders—revised (Zanarini, Frankenburg, Chauncey, & Gunderson, 1987), DIS-III-R = diagnostic interview schedule, version III, revised (Robins, Helzer, Cottler, & Goldring, 1989), DIS-IV = diagnostic interview schedule for the DSM-IV (Robins, Cottler, Bucholz, & Compton, 1997), HDS = Hogan development survey (Hogan & Hogan, 1997), IDPE = international personality disorder examination (World Health Organization, 1995), IDPE-SQ = international personality disorder examination screening questionnaire (Loranger, 1999), MMPI-PD = Minnesota multiphasic personality inventory personality disorder scales (Morey, Waugh, & Blashfield, 1985), MCMI-I = Millon clinical multiaxial inventory (Millon, 1983), MCM-II = Million clinical multiaxial inventory, 2nd edition (Millon, 1987), MCMI-III = Millon clinical multiacial inventory, 3rd edition (Millon, 1994), PAI-A = personality assessment inventory—adolescent (Morey, 2007), PDI-IV = personality disorder interview-IV (Widiger, Mangine, Corbitt, Ellis, & Thomas, 1995), PDQ-R = personality diagnostic questionnaire-revised (Hyler & Rieder, 1987) PDQ-4 = personality diagnostic questionnaire-4 (Hyler, 1994a), PDQ-4+ = personality diagnostic questionnaire 4+ (Hyler, 1994b), OMNI = OMNI personality inventory (Loranger, 2001), SCID = structured clinical interview for DSM-III-R (Spitzer, Williams, & First, 1990), SCID-II = Structured clinical interview for DSM-IV Axis II personality disorders (First, Gibbon, Spitzer, Williams, & Benjamin, 1997a), SCID-II SR = structured clinical interview for DSM-IV axis II personality disorders self-report (First, Gibbon, Spitzer, Williams, & Benjamin, 1997b), SIDP = structured interview for DSM-III personality (Pfohl, Stangl, & Zimmerman, 1982), SIDP-R = structured interview for DSM-III-R personality (Pfohl, Blum, Zimmerman, & Stangl, 1989), SIDP-IV = structured interview for DSM-IV personality (Pfohl, Blum, & Zimmerman, 1997), SNAP = schedule for nonadaptive and adaptive personality (Clark, 1993), SWAP-200 = Shedler and Westen assessment procedure (Shedler & Westen, 2004) and VKP = questionnaire on personality traits (Duijsens, Haringsma, & EurelingsBontekoe, 1999).

Instruments used to describe the FFM traits include: FFMRF = five-factor model rating form Mullins-Sweatt et al. (2006), HiPIC = hierarchical personality inventory for children (Mervielde & De Fruyt, 1999), NEO-FFI = NEO five factor inventory (Costa & McCrae, 1992b), NEO-FFI-R = NEO five factor inventory-revised (McCrae & Costa, 2004), NEO-PI = NEO personality inventory (Costa & McCrae, 1985); NEO-PI-R = NEO personality inventory-revised (Costa & McCrae, 1992b), SIFFM = structured interview for the five-factor model of personality (Trull & Widiger, 1997), 5 PFT = five personality factor test (Elshout & Akkerman, 1975); 23 BB5 = 23 bipolar big five (Duijsens & Diekstra, 1995); 50-BSRS = 50 bipolar self-rating scale (Goldberg, 1992).

Independent samples from the same study are indicated as a, b & c.

The study of Axelrod et al. (1997) and the study of Miller et al. (2003) only reported correlations at the facet-level. Therefore correlations with the FFM domains are missing in this table.

[a]These correlations are not reported in the study of Jacob et al. (2007) and Morey et al. (2000), but were obtained by contacting the first author.

[b]The correlations used in the present analyses were based on the reported correlations in the study of Ruiz et al. (2008). Ruiz et al. (2008) obtained these correlations via secondary analyses on the data set used in this study.

DOI: 10.1002/per

Table 3. Summary statistics for analysis PP and FFM

	Analysis	*N*	Sample	Instrument psychopathy	Instrument FFM	*r* factor N	*r* factor E	*r* factor O	*r* factor A	*r* factor C
1	Blackburn et al. (2005)	160	Referred adults	PCL-R	NEO-FFI	−.03	.06	.00	−.13	.06
2	Decuyper (2007)	310	Non-referred adults	PPI	NEO-PI-R	.07	.34	.29	−.56	−.40
3	Decuyper et al. (2008)	49	Referred adults	PCL-R	NEO-PI-R	.15	−.09	−.09	−.22	−.14
4	Derefinko and Lynam (2006)	346	Non-referred adults	SRP	NEO-PI-R	−.04	.10	.11	−.62	−.34
5a	Harpur et al. (2002)	28	Referred adults	PCL	NEO-PI	.14	.07	−.13	−.47	−.12
5b	Harpur et al. (2002)	47	Non-referred adults	PCL	NEO-PI	.10	.05	.19	−.26	−.38
6	Hicklin and Widiger (2005)	206	Non-referred adults	SRP-II	NEO-PI-R	−.31	.21		−.60	−.08
7	Jackson and Richards (2007)	309	Referred adults	PCL-R	NEO-PI-R	.05	.05	.03	−.28	−.08
8	Jakobwitz and Egan (2006)	82	Non-referred adults	LSRP	NEO-FFI-R	.30	.08	−.21	−.43	−.21
9	Knap (1999)[a]	132	Referred adults	PCL-R	NEO-PI-R	.17	.15	.05	−.49	−.31
10	Lee and Ashton (2005)	164	Non-referred adults	16 item-primary psychopathy scale	BFI	−.01	−.05	−.15	−.39	−.19
11	Lilienfeld and Widows (2005)	98	Non-referred adults	PPI-R	NEO-FFI	−.04	.04	.26	−.58	−.30
12	Lynam et al. (1999)	658	Non-referred adults	LSRP	BFI	.12	−.12	−.07	−.48	−.39
13	Lynam (2002)	481	Non-referred adults	LSRP	NEO-PI-R					
14a	Lynam et al. (2005)	405	Non-referred adolescents	CPS	CCQ	.28	−.03	−.25	−.65	−.51
14b	Lynam et al. (2005)	435	Non-referred adolescents	CPS	CCQ	.63	−.28	−.30	−.69	−.77
15	Paulhus and Williams (2002)	245	Non-referred adults	SRP-III	BFI	−.34	.34	.24	−.25	−.24
16	Patrick et al. (2007)	593	Referred adults	PCL-R	NEO-FFI	.17	.07	−.04	−.33	−.19
17	Preston (1998)[a]	130	Mixed (students/ corrections)	PPI	NEO-PI-R	.20	.28	.16	−.63	−.35
18	Ross et al. (2004) [b]	476	Non-referred sample	LSRP	NEO-PI-R	.17	−.02	−.17	−.71	−.30
19	Ross et al. (2009) [b]	293	Mixed (students/ corrections)	PPI	NEO-PI-R	.04	.16	.02	−.67	−.39
20a	Salekin et al. (2005)	79	Referred adolescents	CPS	IASR-B5	.33	−.06	−.43	−.79	−.73

(*Continues*)

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DOI: 10.1002/per

Table 3. (Continued)

	Analysis	*N*	Sample	Instrument psychopathy	Instrument FFM	*r* factor N	*r* factor E	*r* factor O	*r* factor A	*r* factor C
20b	Salekin et al. (2005)	34	Referred adolescents	CPS	IASR-B5	.20	.05	−.13	−.47	−.47
21	Skeem et al. (2005)	769	Non-referred adults	PCL: SV	NEO-FFI	.05	.02	−.09	−.40	−.13
22	Williams and Paulhus (2004)	289	Non-referred adults	SRP-II	BFI	−.34	.38	.25	−.30	−.15

Note: To operationalize psychopathy, the following instruments were used: LSRP = Levenson self-report psychopathy scale (Levenson et al., 1995), PCL-R = psychopathy checklist-revised (Hare, 1991, 2003), PCL: SV = psychopathy checklist: Screening version (Forth, Kosson, & Hare, 2003), PPI = psychopathic personality inventory (Lilienfeld & Andrews, 1996), PPI-R = psychopathic personality inventory-revised (Lilienfeld & Widows, 2005), SRP = Hare self-report psychopathy scale (Hare, Harpur, & Hemphill, 1989), SRP-II = Hare self-report psychopathy scale-II (Hare et al., 1989), SRP-III = Hare Self-report psychopathy scale-III (Paulhus, Hemphill, & Hare, in press), 16-item primary psychopathy scale (Levenson et al., 1995) and CPS = child psychopathy scale (Lynam, 1997).

Instruments used to describe the FFM traits include: BFI = big five inventory (John, 1995), CCQ = California child Q-set (Block & Block, 1980), IASR-B5 = interpersonal adjective scales revised-big 5 (Trapnell & Wiggins, 1990), NEO-FFI = NEO five factor inventory (Costa & McCrae, 1992b), NEO-FFI-R = NEO five factor inventory-revised (McCrae & Costa, 2004), NEO-PI = NEO personality inventory (Costa & McCrae, 1985); NEO-PI-R = NEO personality inventory-revised (Costa & McCrae, 1992b)

Independent samples included in the same study are indicated with a & b. The study of Lynam (2002) only reported facet-level correlations; therefore correlations with the FFM domains are missing in this table.

[a]These correlations were obtained via the meta-analysis of Ruiz et al. (2008). [b]These correlations were not reported in the study of Ross et al. (2004; 2009) but were obtained by contacting the first author.

DOI: 10.1002/per

analysis on the relationship between APD and FFM was 57 ($k = 57$) and 26 for the association between psychopathy and the FFM ($k = 26$). All studies provided the necessary data for the calculation of effect sizes (i.e. Pearson correlations and sample sizes).

Coding the studies

Every study was coded for specific design and sample characteristics. The following design characteristics were included: sample size, instruments used to assess the FFM, APD or psychopathy, the methods (interview or inventory) and informants (self, peer/observer, mother or clinician) to assess FFM traits and personality pathology, and whether the same or different informants were used to describe FFM traits and psychopathology. As sample characteristics, age group (adolescents, young adults and adults), sample type (clinical versus general population), sex composition (mixed-sex or males-only) and geographic location of the study (North-American, European, and other) were registered. Two raters independently coded the study characteristics, and no disagreements were reported.

Meta-analytic decisions

Pearson product-moment correlation coefficients between the FFM and psychopathy/APD were used as effect size estimates. A number of studies examined the association between the FFM and multiple instruments of APD or psychopathy. However, in order to meet statistical requirements of independent effect sizes (Lipsey & Wilson, 2001), the correlations between the FFM and only one, randomly chosen, pathology measure, were retained. In a similar way, we dealt with studies that reported other multiple correlations such as associations between the FFM and both self and observer ratings. In one case, two studies were included that relied on the same sample, since one study reported domain-level correlations (Lynam, Leukefeld, & Clayton, 2003), whereas the other study described exclusively correlations at the facet-level (Flory, Lynam, Milich, Leukefeld, & Clayton, 2002).

Statistical analysis

Before computing combined effect sizes, Pearson correlations were transformed using Fisher's r to z transformation. Fisher's z-coefficients were then combined using the SPSS macro 'Mean ES', as described by Lipsey and Wilson (2001). This macro calculated the mean effect sizes weighted for sample size and the 95% confidence intervals for each factor and facet of the FFM. To examine the overall FFM associations of psychopathy and APD, we applied a random effects model (Lipsey & Wilson, 2001). The traditional fixed effects model assumes that an effect size observed in a study estimates the corresponding population effect with random error that stems only from the chance factors associated with subject-sampling error in that study. In contrast to the fixed effects model, the random effects model assumes that each observed effect size differs from the population mean by subject-level sampling error plus a value that represents other sources of variability assumed to be randomly distributed. These random differences that cannot be modelled account for the variability or the heterogeneity of the effect sizes (Hedges & Olkin, 1985). Using Q-statistics (Hedges & Olkin, 1985), the heterogeneity of the effect sizes was investigated. A significant Q-value rejects the null hypothesis of homogeneity and means

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that the variability across effect sizes is greater than expected from sampling error alone and indicates that effect sizes are heterogeneous.

To examine whether methodological characteristics influenced the effect size distributions, we specified for each MA a mixed effects model which assumes that a portion of the heterogeneity across studies is systematic and can be statistically modelled. Moderator tests were performed using categorical testing procedures as described by Lipsey and Wilson (2001). These procedures are analogous to an analysis of variance. Categorical testing yields two homogeneity estimates, a within-groups Q (Q_w) and a between-groups Q (Q_b). A significant Q_w indicates that the effect sizes within each moderator category are heterogeneous. A significant Q_b denotes that the subgroups of the effect sizes are significantly different from each other.

However, simple grouping variables may not be sufficient to account fully for the between-studies heterogeneity (Durlak & Lipsey, 1991). Therefore, when allowed by the ratio of predictors to studies, we also used a multiple regression format, using the meta-regression procedure described by Lipsey and Wilson (2001). These procedures are analogous to multiple regressions. In the regression analysis, moderators that were identified as significant (effect sizes with completely non-overlapping confidence intervals) in the categorical testing procedure were entered as predictor variables to test whether they accounted for unique variance in the (unbiased) effect size *r*.

Due to the rather small number of studies (especially in the MA of the FFM associations of psychopathy), moderator analyses were only conducted at the domain-level.

RESULTS

Domain and facet-level analyses

Table 4 reports the combined effect sizes for the relationships between APD and the FFM (left part) and psychopathy (right part) and the FFM across all studies included in the two meta-analyses. Effect sizes from each study were weighted by the study sample size. Weighted mean correlations were considered significant when the respective 95% confidence intervals did not include zero. However, correlations of a very small magnitude (|.01| to |.10|) were not considered substantive (Cohen, 1988)[1]. The proportion of overlap in the confidence intervals was used to identify substantive differences in the FFM associations of psychopathy and APD, with completely non-overlapping intervals reflecting a conservative significance level (approximately $p < .01$) in light of the number of comparisons being made (Cumming & Finch, 2005).

At the domain-level, low levels of Agreeableness and Conscientiousness were substantive features in both meta-analyses, but psychopathy was characterized by a significantly lower level of Agreeableness, compared to APD (non-overlapping confidence intervals). Agreeableness correlated moderately negative in the APD MA ($r = -.38$) while a large negative effect size was found for psychopathy ($r = -.55$). Additionally, the meta-analyses showed that both APD and psychopathy were unrelated to the domains of Extraversion and Openness to Experience. Only APD was significantly positively associated with Neuroticism ($r = .16$), but the overlapping confidence intervals of the effect

[1]In line with Cohen (1988) effect size indicator $r \leq |.29|$ is considered small, $r = |.30|$ to $|.49|$ is considered medium and $r \geq |.50|$ is considered large.

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Table 4. Meta-analysis summary statistics for APD, PP and the FFM

	Antisocial PD				Psychopathy			
	r	(95%CI)	*k*	*Q*	*r*	(95%CI)	*k*	*Q*
Neuroticism	.16	(.13, .20)	48	193.57***	.08	(−.01, .18)	25	370.71***
N1: Anxiety	.02	(−.02, .06)	27	62.44***	−.15	(−.25, −.05)	10	52.22**
N2: Angry-Hostility	.30	(.26, .34)	27	57.86***	.29	(.18, .40)	10	61.18***
N3: Depression	.14	(.10, .18)	27	60.88***	.05	(−.08, .17)	10	74.46***
N4: Self-Consciousness	.03	(−.01, .07)	27	65.85***	−.09	(−.21, .03)	10	69.69***
N5: Impulsiveness	.26	(.23, .29)	27	46.92**	.24	(.16, .33)	10	35.83***
N6: Vulnerability	.09	(.05, .13)	27	65.46***	.00	(−.11, .10)	10	56.07***
Extraversion	.05	(.01, .08)	48	168.64***	.09	(.01, .16)	25	186.53***
E1: Warmth	−.13	(−.17, −.09)	26	59.36***	−.20	(−.32, −.07)	10	80.01***
E2: Gregariousness	.00	(−.04, 04)	26	59.05***	.03	(−.05, .11)	10	31.61***
E3: Assertiveness	.06	(.02, .09)	26	55.22***	.16	(.05, .27)	10	58.80***
E4: Activity	.04	(.00, .07)	26	40.81*	.07	(−.01, .15)	10	30.93***
E5: Excitement Seeking	.25	(.19, .30)	26	116.21***	.31	(.20, .41)	10	54.46***
E6: Positive Emotions	−.08	(−.13,.03)	26	114.28***	−.10	(−.22, .03)	10	81.75***
Openness	.04	(.01, .08)	46	155.45***	−.02	(−.09, .06)	24	186.67***
O1: Fantasy	.09	(.05, .13)	25	54.95***	.05	(−.07, .17)	9	57.75***
O2: Aesthetics	−.02	(−.05, .02)	25	42.93**	−.01	(−.11, .08)	9	37.49***
O3: Feelings	.00	(−.05, .05)	25	77.42***	−.10	(−.20, .00)	9	41.03***
O4: Actions	.06	(.02, .10)	25	49.70**	.09	(−.01, .19)	9	37.79***
O5: Ideas	.01	(−.03, .05)	25	56.72***	.03	(−.07, .12)	9	35.19***
O6: Values	−.01	(−.06, .05)	25	97.59***	.00	(−.06, .06)	9	13.69
Agreeableness	−.38	(−.43, −.34)	49	280.24***	−.55	(−.64, −.45)	25	309.60***
A1: Trust	−.24	(−.28, −.21)	27	47.22***	−.34	(−.44, −.24)	8	39.71***
A2: Straightforwardness	−.39	(−.45, −.34)	26	124.29***	−.61	(−.74, −.48)	8	71.90***
A3: Altruism	−.25	(−.30, −.20)	27	97.00***	−.41	(−.53, −.30)	8	52.35***
A4: Compliance	−.33	(−.37, −.29)	26	65.41***	−.48	(−.58, −.38)	8	43.64***
A5:Modesty	−.15	(−.19, −.10)	26	78.35***	−.32	(−.44, −.20)	8	60.38***
A6: Tender-Mindedness	−.20	(−.25, −.14)	26	124.26***	−.31	(−.38, −.25)	8	16.65*
Conscientiousness	−.30	(−.35, −.26)	48	316.75***	−.34	(−.44, −.23)	25	388.42***
C1:Competence	−.24	(−.28, −.20)	25	65.71***	−.17	(−.29, −.06)	8	55.78***
C2: Order	−.18	(−.23, −.14)	26	88.42***	−.17	(−.26, −.08)	8	33.90***
C3: Dutifulness	−.33	(−.37, −.28)	26	76.00***	−.32	(−.42, −.21)	8	47.67***
C4: Achievement Striving	−.19	(−.23, −.16)	26	45.53**	−.11	(−.22, .01)	8	53.59***
C5: Self-Discipline	−.25	(−.30, −.19)	26	123.30***	−.22	(−.30, −.14)	8	28.03***
C6: Deliberation	−.37	(−.42, −.31)	25	119.50***	−.38	(−.48, −.29)	8	36.81***

Note: k = number of independent samples, $Q = Q$-statistics (Hedges & Olkin, 1985), (95%CI): 95% confidence interval.

*$p < .05$; **$p < .01$; ***$p < .001$.

sizes of APD (.13, .20) and psychopathy ($r = .08$, (−.01, .18)) showed that the difference between both effect sizes was not substantive.

Facet-level analyses revealed additional points of similarity and showed some differences in the FFM associations of APD and psychopathy. Both externalizing disorders were negatively associated with all Agreeableness and Conscientiousness facets. The

DOI: 10.1002/per

confidence intervals revealed that psychopathy was more negatively associated with Straightforwardness (A2; $r = -.61$), Compliance (A4; $r = -.48$) and Modesty (A5; $r = -.32$) compared to APD (with rs of $-.39$, $-.33$ and $-.15$ for A2, A4 and A5, respectively).

Similarities in the associations with Neuroticism and Extraversion facets were the small to moderate positive associations with Angry-Hostility (N2) and Excitement Seeking (E5), the small positive association with Impulsiveness (N5); and finally the small negative relation with Warmth (E1). Only psychopathy was found to have a small significantly negative association with Anxiety (N1) and a small positive association with Assertiveness (E3), but these were not significantly different from the associations reported for APD. Finally, there was a small positive association between APD and Depression (N3), but again this difference between the FFM associations of both disorders was not substantive.

The homogeneity analyses suggested that the effect sizes of both meta-analyses were heterogeneous, warranting the use of random effects models. These models produce larger confidence intervals than fixed effect models, leading to more conservative conclusions about significant differences. One exception was the homogeneous effect size for the association between Openness to values (O6) for the meta-analysis of psychopathy ($Q = 13.69$, $p = .09$), indicating that this effect size estimate is not influenced by moderator variables.

Moderating effects

As the set of all but one effect sizes proved to be heterogeneous, it was important to conduct moderator analyses in order to explain the variation in effect sizes among studies. Ten variables were examined as moderators of APD and psychopathy, and FFM relationships and results are reported in Tables 5 and 6, respectively. In order to correct for multiple comparisons, thereby preventing Type I errors caused by inflated α levels, we only considered the moderators as significant when the confidence intervals of the effect sizes were completely non-overlapping. This is in line with the comparison of the FFM associations of psychopathy and APD in the previous analyses, and again reflects a conservative significance level decision strategy.

Mixed effects model APD

As can be derived from Table 5, three moderators were significant in the APD meta-analysis: sample type, use of a NEO inventory, and the instrument used to assess APD. Only the APD associations with Agreeableness or Conscientiousness were moderated by these variables.

Sample type

As indicated by the non-overlapping confidence intervals of the effect sizes, sample type was a significant moderator for Agreeableness, with larger negative values in population samples ($r = -.43$) compared to referred samples ($r = -.31$).

NEO inventory

Use of a NEO inventory to assess FFM traits significantly moderated the association between Agreeableness and APD, with more negative associations observed for this personality inventory ($r = -.41$ vs. $-.23$).

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Table 5. Moderator analysis, mixed effects model analysis for antisocial PD

Moderator		*N*		*E*		*O*		*A*		*C*	
	k	Q_b	*r* (95%CI)	Q_b	*r* (95%CI)	Q_b	*r*(95%CI)	Q_b	*r*(95%CI)	Q_b	*r*(95%CI)
APD											
Clinical		.70		.44		.77		10.80***		7.49**	
Population	26								−.43 (−.48; −.39)		−.35 (−.41; −.30)
Referred	23								−.31 (−.37; −.25)		−.25 (−.30; −.18)
Age group		1.22		1.15		.18		.77		1.67	
Adolescence	4										
Young adults	14										
Adults	30										
Both sexes		.86		.74		.32		.06		.09	
No, only male	6										
Yes	41										
Inventory ADP		.88		1.27		1.48		4.29*		5.32*	
Interview	14								−.31 (−.39; −.24)		−.23 (−.31; −.15)
Inventory	35								−.41(−.46; −.36)		−.34 (−.39; −.29)
Same source		.38		4.34*		3.69		3.54		2.48	
No	10				−.01 (−.08; .06)						
Yes	35				.07 (.04; .11)						
APD informant		2.29		.44		3.66		3.86*			
Clinician	15								−.31(−.39; −.24)		
Self	32								−.40 (−.45; −.35)		
FFM informant		.13		.36		5.79		5.07		3.32	
Clinician	3										
Self	42										
Other	2										
NEO inventory		.00		.96		3.69		7.26**		.39	
No	7								−.23 (−.35; −.12)		
Yes	41								−.41 (−.45; −.36)		
Culture		3.07		1.24		.09		.33		.50	

(*Continues*)

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DOI: 10.1002/per

Table 5. (Continued)

Moderator		*N*		*E*		*O*		*A*		*C*	
	k	Q_b	*r* (95%CI)	Q_b	*r* (95%CI)	Q_b	*r*(95%CI)	Q_b	*r*(95%CI)	Q_b	*r*(95%CI)
European	14										
American	30										
Other	2										
APD instrument		5.50		2.74		5.69		6.43		16.33**	
MCMI	8										−.26(−.36;−.16)
PDQ	6										−.28(−.40;−.16)
SCID	6										−.14(−.25;−.02)
ADP-IV	6										−.46(−.57;−.34)
Other	22										−.33(−.39;−.27)

Note: k = number of studies; Q_b = homogeneity statistic between classes (Hedges & Olkin, 1985), (95%CI): 95% confidence interval.
$^{*}p < .05$; $^{**}p < .01$; $^{***}p < .001$.

DOI: 10.1002/per

Table 6. Moderator analysis, mixed effects model analysis for psychopathy

		N		*E*		*O*		*A*		C	
Moderator	*k*	Q_b	*r* (95%CI)	Q_b	*r* (95%CI)	Q_b	*r* (95%CI)	Q_b	*r* (95%CI)	Q_b	*r* (95%CI)
PP											
Clinical		.50		.42		1.14		2.44		1.37	
Population	23										
Referred	9										
Age group		19.31***		5.63		14.40***		7.51*		28.48***	
Adolescence	4		.43(.23; .62)				−.30(−.46; −.14)		−.82(−1.04; −.61)		−.78(−.96; −.60)
Young adults	8		−.09(−.22.04)				.05(−.06; .16)		−.52 (−.66; −.38)		−.26(−.38; −.15)
Adults	13		.09(.01; .20)				.03(−.06; .12)		−.49 (−.60; −.37)		−.25(−.35; −.16)
Both sexes		6.19*		.86		1.47		.05		1.52	
No, only male	10		.22 (.08; .36)								
Yes	15		−.01(−.13; .11)								
Inventory PP		.03		.37		.01		12.76***		6.32*	
Interview	8								−.34 (−.47; −.20)		−.16(−.33; .01)
Inventory	17								−.64 (−.73; −.55)		−.41(−.52; −.31)
Same source		.19		.20		.03		5.78*		2.96	
No	7								−.37 (−.53; −.21)		
Yes	17								−.60 (−.70; −.50)		
PP informant		7.95*		2.42		4.28		13.26***		27.51***	
Clinician	8		.10 (−.06; .25)						−.34 (−.47; −.20)		−.16(−.28; −.03)
Other	3		.37 (.13; .60)						−.73 (−.94; −.52)		−.75(−.93; −.56)
Self	13		.00 (−.12; .11)						−.61 (−.71; −.51)		−.33(−.43; −.24)
FFM informant		11.84**		5.11		6.18*		9.04*			
Clinician	2		.01(−.26; .28)				.02(−.21;.24)		−.21(−.49; .07)		
Mother	2		.52(.24; .78)				−.28(−.50; −.07)		−.81(−1.08; −.54)		
Self	19		.02(−.07; .12)				.00(−.07; .08)		−.55(−.64; −.45)		
NEO inventory		.22		1.19		2.48		.29		5.63*	
No	8										−.50(−.66; −.34)
Yes	17										−.26(−.37; −.15)
Culture		.08		.22		.20		2.48		1.53	

(*Continues*)

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Table 6. (Continued)

		N		*E*		*O*		*A*		C	
Moderator	*k*	Q_b	*r* (95%CI)	Q_b	*r* (95%CI)	Q_b	*r* (95%CI)	Q_b	*r* (95%CI)	Q_b	*r* (95%CI)
European	4										
American	21										
PP instrument		24.09***		23.32***		58.18***		16.72**		26.79***	
LSRP	3		.19(−.01; .39)		−.04(−.18; .10)		−.13(−.24; −.03)		−.63(−.84; −.43)		−.32(−.52;−.12)
PCL-R	8		.09 (−.04; .23)		.05(−.04; .15)		−.02(−.09; .06)		−.34(−.47; −.20)		−.16(−.29;−.03)
PPI	4		.07 (−.11; .24)		.22(.10; .35)		.18 (.08; .28)		−.71(−.90; −.53)		−.38(−.56;−.21)
SRP	4		−.27(−.43; −.10)		.27 (.15; .38)		.20(.09; .31)		−.50(−.67;−.32)		−.21(−.38;−.04)
Other	6		.28(.13; .43)		−.05(−.16; .06)		−.23(−.32; −.14)		−.70(−.86;−.54)		−.65(−.80; −.50)

Note: k = number of studies; Q_b = homogeneity statistic between classes (Hedges & Olkin, 1985), (95%CI): 95% confidence interval.
$^{*}p < .05$; $^{**}p < .01$; $^{***}p < .00$.

DOI: 10.1002/per

APD instrument

Also the instrument used to asses APD significantly moderated the association with Conscientiousness. APD instruments were organized in five categories: Millon Clinical Multiaxial Inventory (MCMI; $k = 8$), Personality Diagnostic Questionnaire (PDQ; $k = 6$), Structured Clinical Interview for DSM (SCID; $k = 6$), Assessment of DSM-IV Personality Disorders (ADP-IV; $k = 6$) and 'other' ($k = 22$). Inspection of the confidence intervals reveals that studies using the SCID reported smaller negative associations with Conscientiousness compared with studies using the ADP-IV($r = -.14$ vs. $-.46$) and the category 'other inventories' ($r = -14$ vs. $-.33$). Pairwise comparison of the confidence intervals of the r effect sizes for the other inventories were overlapping.

Other moderator variables

Age group, sex composition of the sample, inventory versus interview to assess APD, same versus different informant to assess FFM traits and APD, FFM informant, APD informant and Culture did not moderate the APD-FFM associations.

Regression analysis

To test whether the identified moderators accounting for differences in effect sizes were confounded, we performed a multiple regression analysis. Only moderators with effect sizes with completely non-overlapping intervals were entered as predictors. For the MA on the FFM associations with APD, multiple significant moderators were only identified for Agreeableness. Sample type (population vs. referred) and NEO inventory versus another instrument to assess FFM traits were entered as predictors and both emerged as unique moderators of the relation between APD and Agreeableness, accounting for 26% of the variance, revealing a significant relationship of sample type ($b = .12$, SE $= .04$, $p < .001$) and use of a NEO inventory ($b = -.17$, SE $= .05$, $p < .01$). These results showed stronger negative associations in population samples and in samples using a NEO inventory to assess FFM traits.

Mixed effects model psychopathy

Regarding the FFM associations of psychopathy, five significant moderators could be detected: age group, inventory/interview, psychopathy informant, personality informant and psychopathy instrument (See Table 6).

Age group

In adolescence, psychopathy was positively associated with Neuroticism ($r = .43$), and significantly negatively associated with Openness to Experience ($r = -.30$), while these associations were not significant in (young) adulthood. Moreover, in this age group the negative associations with Agreeableness and Conscientiousness were significantly stronger compared to adults for Agreeableness and compared to young adults and adults for Conscientiousness.

Inventory/Interview psychopathy

The combined effect size for the 17 studies using an inventory to assess psychopathy ($r = -.64$) was larger than the combined effect size for the eight studies using an interview ($r = -.34$), indicating a stronger negative association with Agreeableness when an inventory was used to assess psychopathy.

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Informant of psychopathy

Informant of psychopathic traits was a significant moderator of Neuroticism, Agreeableness and Conscientiousness associations. Neuroticism was significantly positively associated with psychopathy only in studies where *other* informants (i.e. mother or peer) rated psychopathic traits ($r = .37$). The confidence intervals showed that effect sizes in studies using *other* (mother and peer) reports were significantly higher than the effect sizes for studies with self-rated psychopathic traits ($r = .00$). The combined effect sizes for Agreeableness in studies using self- and *other* rated psychopathy ($r = -.61$ and $r = -.73$, respectively) were significantly stronger than the effect size for the studies using clinician ratings of psychopathy ($r = -.34$). *Other* rated psychopathy traits were more negatively correlated with Conscientiousness ($r = -.75$) compared to self- and clinician ratings of psychopathy ($r = -.33$ and $r = -.16$).

Informant of FFM

Informant of FFM traits significantly moderated the associations of psychopathy with Neuroticism and Agreeableness. In studies using maternal personality ratings, a significant positive association was identified between psychopathy and Neuroticism ($r = .52$), whereas this association was not significant in studies using self- ($r = .02$) and clinician ratings ($r = .01$). For Agreeableness, the moderator analyses showed a stronger negative association in studies using the mother as informant of FFM dimensions ($r = -.81$) compared to studies with the clinician as informant ($r = -.21$). There was no significant difference between the effect sizes of studies using self-rated personality ($r = -.55$) and studies with the mother or a clinician as informants of personality.

Psychopathy instrument

The instrument that was used to assess psychopathy was a significant moderator of the associations with all FFM dimensions. This moderator was organized in five categories: LSRP ($k = 3$), PCL-R ($k = 8$), Psychopathic Personality Inventory (PPI; $k = 4$), Hare Self-Report Psychopathy Scale (SRP; $k = 4$) and 'other' ($k = 6$). No significant association with Neuroticism was found in studies using the LSRP, PCL-R or PPI. In studies using the SRP, a significant negative effect size was found between Neuroticism and psychopathy ($r = -.27$) whereas a significant positive effect size was reported with Neuroticism in the 'other' category ($r = .28$; instruments: Child Psychopathy Scale (CPS), Shedler and Westen Assessment Procedure (SWAP) and 16 primary psychopathy scales). Inspection of the confidence intervals revealed a significantly different effect size in the SRP studies compared to the effect sizes in studies using the LSRP, PCL-R and other category, while the confidence interval of the 'other' category was overlapping with the confidence intervals of studies using the LSRP, PPI and PCL-R.

For Extraversion, studies using the PPI and SRP reported a small positive effect size ($r = .22$ and $r = .27$, respectively) while the associations for studies using the LSRP, PCL or 'other instruments' were not significant. Further inspection of the confidence intervals showed that the effect size of studies using the SRP was significantly higher than in studies using the LSRP and 'other instruments', while the difference with the effect size in studies using the PCL or PPI were not significant. The effect size in studies using the PPI was only significantly higher than the 'other' category.

Although the overall association between Openness to Experience and psychopathy was not significant, studies using the PPI and SRP reported a significantly positive association with this personality dimension, whereas studies using the LSRP or 'other instrument'

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reported a significantly negative association. Studies with the PCL-R reported no significant association with Openness to Experience.

For Agreeableness, the effect sizes for the studies using the LSRP, PPI, SRP and other instruments were large, whereas the effect size in studies using the PCL-R was moderate. Additionally the confidence interval of the combined effect size for PCL-R studies was not overlapping with studies using the PPI or another instrument.

The negative association between Conscientiousness and psychopathy was significant in all studies. In studies using 'another instrument', the effect size was large ($r = -.65$), and in studies using the LSRP and the PPI there was a medium effect size ($r = -.32$ and $r = -.38$, respectively), while a small effect size was found in studies using the PCL. Inspection of the confidence intervals showed that studies using 'other instruments' to assess psychopathy reported a significantly stronger association with Conscientiousness when compared to studies using the PCL and the SRP.

Other moderator variables

Nature of the sample, sex composition, same versus different informant to assess FFM traits and psychopathy, use of a NEO-inventory and culture did not moderate the FFM-psychopathy associations.

Regression analysis

Multiple significant moderators were identified for all FFM dimensions, except for Extraversion. Discrete variables such as psychopathy and FFM informant, age group and psychopathy instrument were made suitable for regression analyses by means of dummy coding (Tabachnick & Fidell, 2001). Concerning Neuroticism, age group, psychopathy informant, personality informant and psychopathy instrument were significant moderators. These moderators were first dummy coded in adolescence versus (young) adulthood (age group), self- versus observer (other- and clinician) rated psychopathy (psychopathy informant), maternal ratings versus other (self and clinician) FFM ratings (personality informant) and finally psychopathy instrument was coded into two dummy variables: SRP versus LSRP, PCL-R, PPI and 'other', and 'other instrument' versus LSRP, PCL, PPI and SRP. Given the ratio of number of predictors to number of studies it was required to select moderators and this selection was based on the non-overlapping confidence intervals of the effect sizes (reported in Table 6). These moderators accounted for 78% of the variance, only revealing a significant relationship of psychopathy instrument (use of SRP; $b = -.36$, $SE = .08$, $p < .0001$), whereas the other predictors did not remain significant, indicating that effects of age group, informant of psychopathy or FFM traits were artefacts.

For Openness to Experience, age group and psychopathy instrument were significant moderators and the following dummy coded variables were entered in the multiple regression analysis: adolescence, LSRP, PPI, SRP and 'other instrument'. These variables accounted for 81% of the variance, revealing a significant effect for adolescence ($b = -.22$, $SE = .09$, $p < .05$), PPI ($b = .20$, $SE = .06$, $p < .001$) and SRP ($b = .22$, $SE = .06$, $p < .001$), whereas the relationships of the LSRP and 'other instrument' dummies did not remain significant ($b = -.11$, $SE = .06$, $p = .07$ and $b = -.06$, $SE = .08$, $p = .46$, respectively).

Age group, inventory versus interview to assess psychopathy, psychopathy informant, FFM informant and psychopathy instruments significantly moderated the association between psychopathy and Agreeableness. Inspection of the effect sizes, confidence intervals and the number and nature of studies available for the moderators 'inventory versus interview to assess psychopathy', 'clinician as informant of psychopathy' and PCL-R, revealed that

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these moderators categorized identical studies. Therefore 'inventory versus interview to assess psychopathy' and 'informant of psychopathy' were omitted in the multiple regression analysis. The remaining predictors accounted for 51% of the variance, only showing a significant effect for PCL-R ($b = .27$, SE $= .09$, $p < .01$), whereas adolescence and informant of FFM traits were no longer significant ($b = -.27$, SE $= .16$, $p = .10$; $b = .03$, SE $= .20$, $p = .86$ and $b = .21$, SE $= .20$, $p = .29$, respectively).

Finally, three significant moderators were identified for the association with Conscientiousness: age group, psychopathy informant and psychopathy instrument. The following dummies were entered in the regression analysis: adolescence (vs. young adulthood and adulthood), other informant of psychopathy (vs. self and clinician), SRP (vs. all other instruments), PCL-R (versus all other instruments) and other psychopathy instrument (vs. LRSP, PCL-R, PPI and SRP) and accounted for 68% of the variance. Only adolescence remained a significant predictor ($b = -.37$, SE $= .15$, $p < .05$), showing a stronger negative association with Conscientiousness compared to young adults and adults.

DISCUSSION

The present study meta-analytically described FFM-APD and FFM-psychopathy relationships to examine communalities and differences in the associations of two impairing antisocial conditions with FFM traits. This MA corroborated on the meta-analytic studies of Saulsman and Page (2004), Samuel and Widiger (2008b) and Ruiz et al. (2008), focusing on the FFM associations of psychopathy and APD, extending the description of differences and similarities to the more fine-grained FFM facet-level. The current MA included the most recently published research, providing a more comprehensive review and enabling the study of a large number of moderator variables. The present findings are helpful for an early differentiation between different antisocial symptoms, and may further contribute to the discussion on the personality pathologies that should be represented in the next edition of the DSM.

FFM associations of APD and psychopathy

The present study revealed predominantly points of similarity but also some differences in the FFM associations of both disorders. In general, the meta-analyses showed that symptoms of psychopathy and APD were negatively associated with Agreeableness and Conscientiousness facets and positively with scores on Angry-Hostility (N2), Impulsiveness (N5), Excitement-seeking (E5) and negatively with Warmth (E1). Only psychopathy was found to have a small negative association with Anxiety (N1).

All nine FFM predictions for APD suggested by Widiger et al. (2002) were confirmed and most of the psychopathy predictions based on Widiger and Lynam (2008) were supported in the present MA. For psychopathy, only the presumed lower scores on Self-consciousness (N4) and Positive Emotions (E6) were not supported. Based on the initial description of psychopathy by Cleckley (1941, 1964), the expert-based NEO-PI-R descriptions of psychopathy (Miller et al., 2001), and the study of Hicklin and Widiger (2005), it was additionally expected that the FFM description of psychopathy would typically involve negative associations with Anxiety (N1) and Vulnerability (N6). Taken together, differences in the FFM associations of both disorders were expected on Anxiety (N1), Self-consciousness (N4), Impulsiveness (N5), Warmth (E1), Positive Emotions (E6),

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Modesty (A5), Competence (C1) and Achievement Striving (C4). Only the difference on Anxiety (N1) was confirmed in the present meta-analytic review.

The current MA showed that low levels of Agreeableness and Conscientiousness were substantive features of both disorders, but psychopathy was characterized by a significantly lower level of Agreeableness and lower scores on Straightforwardness (A2), Compliance (A4) and Modesty (A5). This significantly lower score on Agreeableness in psychopathy studies was consistent with the findings of Ruiz et al. (2008) and the results of Hicklin and Widiger (2005), showing that psychopathy measures were associated with lower Agreeableness levels than APD measures. Lower levels of Modesty (A5) are in line with the grandiosity and arrogance reflected in psychopathy descriptions. Although this characteristic is not included in the DSM-IV APD, our results showed also a low score on Modesty (A5) but this effect size was significantly weaker compared to the association reported for psychopathy. These results suggest that psychopathy may reflect stronger interpersonal antagonism relative to APD, suggesting differences in degree rather than nature.

The FFM is considered by many to provide a reasonable comprehensive coverage of personality structure (McCrae & Costa, 1999) and this view is supported by the present meta-analytic results. The model appears to be quite effective in identifying fundamental similarities and subtle differences among psychopathy and APD. Associations with the FFM were represented by medium to large effect sizes, indicating that the FFM explains a considerable amount of variance of both APD and psychopathy. The meta-analytic results showed that several common and unique characteristics of APD and psychopathy were represented within this FFM framework. Although the low score on Anxiety recognized by Cleckley (1941), was not included in a number of key measures of psychopathy such as the PCL-R (Hare, 1991), this lack of fear/anxiety was recognized in the FFM conceptualization of this disorder. Moreover, differences in degree on the Agreeableness domain and facets capture the presumed higher interpersonal antagonism of psychopathy, underscoring the FFM's effectiveness to compare alternative personality disorder constructs (Hicklin & Widiger, 2005; Ozer & Reise, 1994).

Moderators

The homogeneity analyses encouraged to examine potential moderators of the FFM-APD/psychopathy relationships, including a variety of sample and methodological characteristics.

For APD, only the association with the FFM Agreeableness dimension was moderated by two unique moderators, these are sample type and use of a NEO inventory to assess FFM traits. Contrary to expectations, but in line with the results of Ruiz et al. (2008), APD showed stronger negative associations with Agreeableness in community compared to referred samples. Given the significant resistance to treatment associated with antisocial pathology (Reid & Gacono, 2000), a possible explanation for this result is that individuals who accept treatment in clinical settings demonstrate or report less severe pathology than antisocial individuals in the community (Ruiz et al., 2008). FFM-APD studies using a NEO inventory to assess FFM traits also reported stronger negative associations with Agreeableness. Both moderator effects may be also (partly) due to range restriction, operating differentially within moderator categories at the side of the FFM and/or the APD measure. The negative association between APD and Conscientiousness was only

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moderated by APD instrument, underscoring the importance of the measure that is used for APD assessment for clinical diagnosis and description.

For psychopathy, associations with FFM dimensions were moderated by two unique moderators, these are age and/or psychopathy instrument. The associations with Neuroticism, Extraversion, Openness to Experience and Agreeableness were moderated by the psychopathy instrument that was used. The variation in results across instruments is in line with Hicklin and Widiger (2005), underscoring the importance of the measure that is used to assess psychopathy. Rather than arguing for the validity of one particular inventory over another, more research on the FFM and psychopathy instrumentation is clearly needed. Age group turned out to be an unconfounded moderator of the relationship with Openness to Experience and Conscientiousness. Psychopathic traits in adolescence are more strongly negatively associated with Conscientiousness and Openness to Experience relative to (young) adulthood. The observed higher correlations for Neuroticism and Agreeableness, however, disappeared when simultaneously examining different moderators, suggesting that these latter observations are artefacts. Both cross-sectional and longitudinal studies (Helson, Jones, & Kwan, 2002; Roberts, Walton, & Viechtbauer, 2006) show, that from adolescence to adulthood, people show decreased Openness and increased Conscientiousness scores. Another possible explanation is that psychopathic traits level off with increasing age, as aggressive and impulsive behaviours tend to decline with age (Paris, 2003). There is less empirical support for the role of Openness in the description of personality pathology, but the present MA shows that Openness is negatively associated with psychopathic traits in adolescence. Costa and McCrae (1992a) suggested that low scores on Openness might be reflected in dogmatic thinking and/or an inability to adapt to changing social conditions.

In sum, the moderator analyses, in combination with the regression approach in cases where multiple moderators were identified, have clearly underscored the necessity to take moderators into account when describing FFM-APD and especially FFM-psychopathy relationships. Due to its comprehensive sampling character, the present MA could consider a broad range of moderators and was hence in a position to examine these simultaneously and identify artificial effects. Method biases, such as stronger effects when both FFM and APD/psychopathy are assessed with self-reports, do not explain the moderating effects that are reported in the present study, as same source (same vs. different informant to assess FFM traits and personality pathology) did not moderate any of the FFM associations with APD and psychopathy.

Strenghts and limitations

The present study has a number of strengths such as the inclusion of unpublished samples and raw data sets (Cant & De Fruyt, 2006; Carlson & Furr, 2007; Decuyper, 2007; Samuel, 2005; Samuel and Widiger, 2009; Vieth, 1999) to overcome the file drawer problem. Moreover, the meta-analysis was restricted to a limited set of FFM measures and APD and psychopathy scales. This restraint was installed to avoid problems of misclassification or heterogeneity within meta-analytic classification categories. The addition of correlation coefficients derived from studies using alternative personality and personality pathology measures may have led to divergent results. The variability among the different measures of APD and psychopathy, which was demonstrated in the student sample of Hicklin and Widiger (2005), was replicated at the domain-level using a meta-analytic design. Potential limitations are related to the smaller number of studies at the facet-level and the unequal

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number of studies across diagnostic categories, for example comparing adolescents versus (young) adults. Moderator analyses were only conducted at the domain-level due to the small number of studies available at the facet-level, making it impossible to examine for example the effect of instrumentation at the facet-level.

Theoretical and applied implications

It has long been recognized that it is difficult to represent the complex personality traits that constitute a PD in terms of a small set of behaviourally specific criteria and the existing criterion sets are considered as an inconsistent mixture of specific behaviours and general personality traits (Clark, 1992). The present MA has demonstrated substantial associations between APD and psychopathy with major FFM dimensions, identifying both communality and more unique aspects. The diagnostic criteria of both APD and psychopathy seem to be included in the comprehensive description provided by the FFM, also capturing the characteristic lack of anxiety in psychopathic individuals and their presumed more severe interpersonal antagonistic traits. These findings are in line with proposals to replace current DSM-IV categorical Axis-II pathology by dimensional representations of maladaptive personality functioning, and further shows how both categorically conceived PDs are to be represented within the FFM (Widiger & Trull, 2008).

From an applied assessment perspective, these results imply that a FFM instrument can be used for descriptive purposes and a first screening of APD and psychopathy. Adopting the FFM may further provide insight in the strengths and more adaptive characteristics of a person, advancing our understanding of the personality structure of individuals exhibiting externalizing pathology (Samuel & Widiger, 2006). In this respect it is important to underscore that the current MA did not find a moderator effect of the FFM measure that was used to describe personality traits, suggesting that all FFM inventories enclosed in Table 3 can be used.

Personality pathology begins early in life, but symptoms in children and adolescents are not the same as those in adults. Indeed, precursors of adult (personality) disorders usually consist of trait profiles that are not by themselves pathological (Paris, 2003), but are often strongly anchored in temperament and general personality traits (De Clercq & De Fruyt, 2007; De Clercq, De Fruyt, & Widiger, 2009; De Pauw, Mervielde, De Clercq, De Fruyt, Tremmery, & Deboulte, in press; Widiger, De Clercq & De Fruyt, in press). Inclusion of age as a moderator showed that Openness to Experience was negatively associated with psychopathy in adolescence and that Conscientiousness was more negatively correlated with psychopathy relative to (young) adulthood. The stronger association with Conscientiousness, complemented with the association with a broader set of FFM dimensions including Agreeableness, Conscientiousness and Openness to Experience, suggests that psychopathic core features are more strongly intertwined with FFM traits in adolescence than in adulthood. Relying on the results of this MA, adolescents at risk could be described as low on Agreeableness, very low on Conscientiousness, and as being low on Openness to Experience. Recent research (De Fruyt, De Bolle, McCrae, Terracciano, Costa, & 39 collaborators of the Adolescent Personality Profiles of Cultures Project, in press) has convincingly demonstrated that the NEO-PI-R and its more readable version the NEO-PI-3 can be reliably and validly administered in adolescence in a wide variety of cultures, opening interesting perspectives to screen for psychopathy personality features in adolescence. From a research point of view, this implies that the same FFM

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instrument can be used in longitudinal studies from adolescence into adulthood to investigate the developmental pathways of impairing externalizing disorders.

In sum, the present meta-analysis showed that the FFM appeared to be quite effective in identifying fundamental similarities and subtle differences among psychopathy and APD. Moreover, the FFM dimensions demonstrated significant and meaningful relationship with both disorders, reflected in moderate to large effect sizes. Subtle differences between psychopathy and APD were identified with regard to Anxiety (N1) and the significantly stronger effect sizes for Agreeableness and its facets in the psychopathy MA. In addition, differential associations between FFM dimensions and psychopathy were described for adolescents versus adults. The results of this meta-analytic study supported the opinion that the FFM provides a reasonably comprehensive coverage of personality structure and underlined the comprehensive nature of the FFM to describe personality pathology. The moderator analyses provided a clear indication that much work remains to be done to resolve or improve the issues of instrumentation and age trends. The current MA relied primarily on cross-sectional results and the moderating effect of age underscored the need of longitudinal studies investigating the developmental pathways of these externalizing disorders across the lifespan.

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DOI: 10.1002/per