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Review

Refining the link between psychopathy, antisocial behavior, and empathy: A meta-analytical approach across different conceptual frameworks

Carlos Campos [a,b,c,1,*], Rita Pasion [a,d,1], Andreia Azeredo [a], Eduarda Ramião [a], Prune Mazer [a,b,e], Inês Macedo [a], Fernando Barbosa [a]

[a] Laboratory of Neuropsychophysiology, Faculty of Psychology and Educational Sciences, University of Porto, Rua Alfredo Allen, 4200-135 Porto, Portugal
[b] Faculty of Medicine, University of Porto, Alameda Prof. Hernâni Monteiro, 4200-319 Porto, Portugal
[c] Neurocognition Group | LabRP, Center for Rehabilitation Research, School of Health, Polytechnic Institute of Porto, Rua Dr. António Bernardino de Almeida 400, 4200-072 Porto, Portugal
[d] HEI-LAB, Lusófona University, Portugal
[e] School of Health, Polytechnic Institute of Porto, Rua Dr. António Bernardino de Almeida 400, 4200-072 Porto, Portugal

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ABSTRACT

The current meta-analysis includes 477 records (N = 142,692) and comprehensively explores the complex interplay between psychopathy, antisocial behavior, and empathy. First, empathy domains (cognitive and affective) were used to dissociate antisocial behavior from psychopathy. Cognitive empathy was more impaired in antisocial groups ($g_{cognitive}$ = −0.43; $g_{affective}$ = −0.11), while samples scoring higher in psychopathy displayed larger deficits in affective empathy ($g_{affective}$ = −0.40; $g_{cognitive}$ = −0.22). Secondly, the specific associations between empathy domains and psychopathy dimensions were evaluated. Most effect sizes pertaining to psychopathy traits closely related to antisocial behavior were mild for both empathy domains (r = −0.03 to −0.21). Callous-affective traits were largely correlated with affective empathy (r = −0.34 to −0.46) and moderately correlated to cognitive empathy (r = −0.26 to −0.27). Diverging results were found for the interpersonal dimension, as boldness-adaptive manifestations were unrelated to cognitive empathy (r = 0.03), while non-adaptive interpersonal traits were negatively associated with both empathy domains ($r_{cognitive}$ = −0.16; $r_{affective}$ = −0.25). Overall, these findings suggest that: (1) psychopathy and antisocial behavior display distinct empathic profiles; (2) psychopathy dimensions are differentially associated with cognitive and affective empathy; (3) the interaction between interpersonal traits and empathy domains is different across the conceptual models of psychopathy.

1. Introduction

Psychopathy can be broadly defined as a multidimensional, heterogeneous personality structure that clusters together a constellation of traits that are likely to interact and reflect on different phenotypic manifestations (Lilienfeld, 2018; Sellbom & Drislane, 2021).

Cleckley (1941,1988) was one of the first authors to provide a complex, fine-grained conceptualization of psychopathy based on his work in psychiatric settings. According to Cleckley, psychopathy encompasses not only the more evident disruptive features (e.g., lack of remorse/shame, untruthfulness, pathological egocentricity, and antisocial behavior), but also adaptive traits for everyday functioning (e.g., superficial charm, absence of nervousness, and good intelligence). Nevertheless, other pioneering researchers in the field provided descriptions of psychopathy that mostly addressed its maladaptive features, proposing that psychopathy is closely linked to antisocial and criminal behavior (Karpman, 1941; McCord & McCord, 1964).

Antisocial behavior refers to a wide set of actions that defeats the

Abbreviations: APSD, Antisocial Process Screening Device; ICU, Inventory of Callous-Unemotional; LSRP, Levenson Self-Report Psychopathy; PCL, Psychopathy Checklist; PPI, Psychopathic Personality Inventory; SRP, Self-Report Psychopathy Scale; TriPM, Triarchic Psychopathy Measure; YPI, Youth Psychopathic Traits Inventory.

* Corresponding author at: Laboratory of Neuropsychophysiology, Faculty of Psychology and Educational Sciences, University of Porto, Rua Alfredo Allen, 4200-135 Porto, Portugal.
E-mail address: carlosm.martins.campos@gmail.com (C. Campos).

[1] Carlos Campos and Rita Pasion contributed equally to this manuscript (co-first authorship)

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interests of the social order (e.g., aggression and rules violation) and its link with psychopathy has been a controversial topic of discussion for decades (Burt, 2012; Burt, Donnellan, & Tackett, 2012; Skeem & Cooke, 2010). Some scholars argue that antisocial behavior is a core component of psychopathy. The prevalence of psychopathy in forensic samples has been reported to oscillate between 15 and 25% (Woodworth & Porter, 2002) and estimates indicate that individuals with high psychopathy traits are responsible for about 50% of the most serious crimes (Hare, 1999) - and despite constituting only 1% of the general population (Neumann & Hare, 2008). However, other authors argue that antisocial behavior is just a possible outcome of psychopathy that should be interpreted within the context of several other risk factors (Skeem & Cooke, 2010; Steinert, Lishner, Vitacco, & Hong, 2017). Actually, recent studies describe that about 50% of inmates display low levels of psychopathy, with only 7% exhibiting the full spectrum of psychopathic traits - a finding that is proximal to what is reported in student samples (Boduszek et al., 2019; Boduszek, Debowska, & Willmott, 2017). This raises the possibility that the personalistic features of psychopathy can be generally distributed among the population, while the behavioral maladaptive features may be inflated in forensic settings simply due to criminal recording (Pasion et al., 2018a).

There are still no definitive answers for this longstanding debate, especially considering that the main conceptual frameworks in the field weigh differentially on maladaptive and adaptive features of psychopathy. These frameworks will be discussed in the following sections.

1.1. The classical criminocentric view of psychopathy

The most influential framework of psychopathy was driven by the extensive theoretical and empirical work produced by Hare, who advocated for a 2-factorial model encompassing both interpersonal-affective (Factor 1) and impulsive-antisocial features (Factor 2; Hare et al., 1990; Hare & Neumann, 2008). The interpersonal-affective factor includes the more prototypical/primary psychopathic traits of manipulation, superficial charm, shallow affect, lack of remorse, and callousness, and can be distinguished from the impulsive-antisocial factor, which taps into secondary psychopathic traits associated with impulsivity, poor behavior control, recidivism, and criminal versatility (Blackburn & Coid, 1998; Hare & Neumann, 2008; Hemphill, Hare, & Wong, 1998; Levenson, Kiehl, & Fitzpatrick, 1995; Skilling, Harris, Rice, & Quinsey, 2002). Thus, psychopathic manifestations were historically conceived as a coherent part of the antisocial spectrum, and forensic samples were naturally expected to include these individuals (Hare & Neumann, 2008). Even nowadays, both psychopathy and antisocial behavior can be clustered within the antagonistic externalizing spectrum since they can be mainly characterized by low consciousness and agreeableness (Kotov et al., 2017; Vachon, 2019). Furthermore, descriptions around Factor 2 comprise impulsive traits that are inherently connected to the disinhibited externalizing spectrum, a dimension that also interplays with the antagonism spectrum to explain antisocial behavior (Kotov et al., 2017).

These two broad factors in Hare's model can be further decomposed into four more specific facets (facet 1: interpersonal traits, facet 2: affective traits, facet 3: impulsive lifestyle, facet 4: antisocial behavior) without losing model fit (Hare & Neumann, 2008). The 2-factors and 4-facets models (see Fig. 1) were initially operationalized by the Psychopathy Checklist-Revised (PCL-R; Hare, 2003), which is the most widely used instrument to evaluate psychopathy. Across the years, several alternative measures based on PCL were developed for adults (e.g., Self-Report Psychopathy Scale (SRP), Paulhus, Neumann, & Hare, 2016; Levenson Self-Report Psychopathy Scale (LSRPS), Levenson et al., 1995) and younger samples (e.g., Psychopathy Checklist: Youth Version; Forth, Kosson, & Hare, 1994, Antisocial Process Screening Device (ASPD); Frick & Hare, 2001).

Considering the central role of criminal behavior in PCL-based factorial approaches (i.e., 2-factors and 4-facets models), other psychopathic personality traits are assumed to be intimately tied - not only psychometrically, but also genetically and longitudinally - to antisocial conducts (for a review see Hare & Neumann, 2008). Notably, the first steps on the assessment of psychopathy based on these models revived the research on the construct and antisocial phenomena, namely by emphasizing the personality features that may help to explain patterns of persistent deviant behavior and resistance to treatment. The interpersonal-affective features of psychopathy proposed here reflect

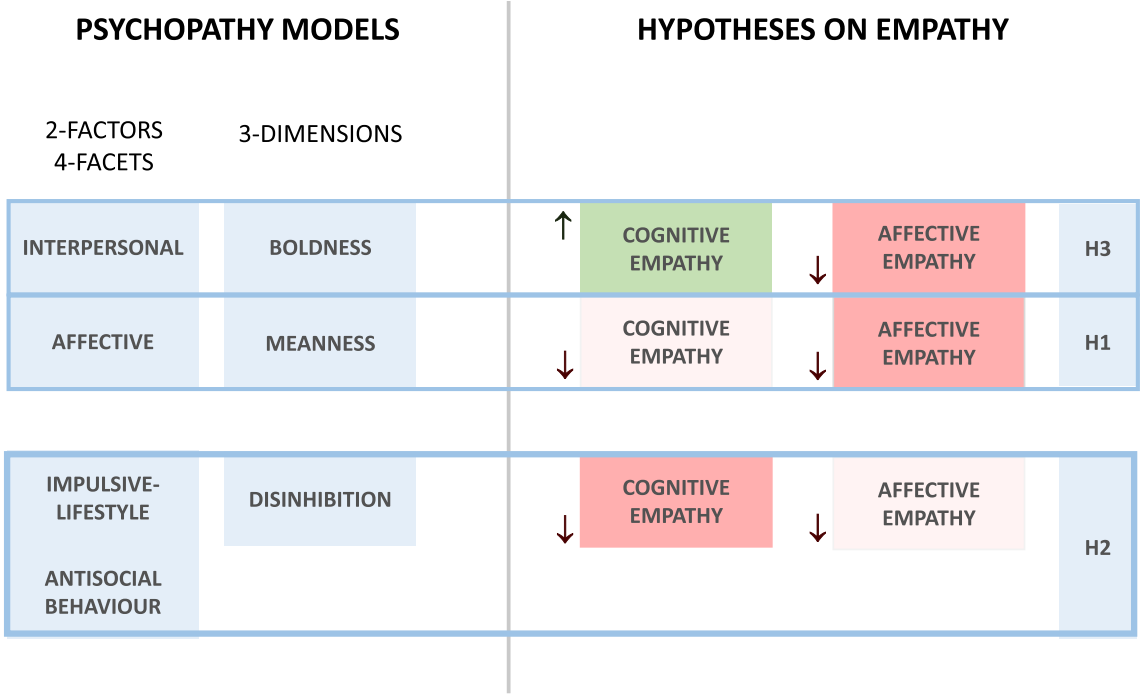


Fig. 1. Conceptual Frameworks and Hypotheses.

much of the notion of a complex personality type that strongly relates with Cleckley's (1941, 1988) influential descriptions and that goes beyond the behavioral criteria used for diagnosing Antisocial Personality Disorder.

As such, this operationalization boosted the first inputs on basic research aiming to understand the etiological roots of psychopathy and set the foundations for translational studies addressing the implications of psychopathy in psychiatry and criminal justice systems, namely in what pertains to recidivism, violence, and treatment outcomes (Hare et al., 1990; Hare & Neumann, 2008; Woodworth & Porter, 2002). Of note, most of this research took advantage of using total and cut-off clinical scores to study psychopaths as a homogenous group. Neumann, Hare, and Newman (2007) asserted that PCL factors and facets can be accommodated within a single super-ordinate factor capturing something essential that spans across the lower-order factors – the variance in social deviance. Considering that all the dimensions of psychopathy are inherently tied to a cohesive antisocial super-ordinate factor, psychopaths were seen as a homogeneous taxonomic group fundamentally distinct from non-psychopaths regarding the expression of antisocial tendencies (Hare & Neumann, 2008; Neumann et al., 2007).

1.2. Contemporary models: Encompassing adaptive and maladaptive expressions of psychopathy

More recently, a few criticisms on the interplay between psychopathy and antisocial conducts have been set forward with some authors arguing against the centrality of criminal behavior to psychopathy (e.g., Skeem & Cooke, 2010). First, impulsive and antisocial tendencies (Factor 2, facet 3 and 4) seem to co-occur with other externalizing disorders to predict criminal behavior and are not unique to psychopathy (Cleckley, 1941, 1988; Gao & Raine, 2010; Kennealy, Skeem, Walters, & Camp, 2010; Krueger et al., 2002; Krueger, Markon, Patrick, Benning, & Kramer, 2007; Nelson & Foell, 2018; Patrick, Hicks, Krueger, & Lang, 2005). Secondly, behavioral outcomes comprised in Factor 2 have more weight than the personalistic characteristics included in Factor 1 (Hare & Neumann, 2008). This means that individuals are more likely to be classified as psychopaths merely by scoring high in PCL Factor 2, even when the core interpersonal-affective personality traits of PCL Factor 1 are scored fairly low (Cooke & Michie, 2001; Patrick, 2006; Venables, Hall, & Patrick, 2014). This can lead to an overdiagnosis of some non-psychopathic people (e.g., recidivists with a long history of substance abuse). Lastly, one should bear in mind that constructs have explanatory power but measures do not, as they are only a way to operationalize a given construct in a given population (Skeem & Cooke, 2010). The formulation of PCL items was undertaken in criminal samples, which produced a selection bias towards maladaptive characteristics (Cooke & Michie, 2001; Patrick, 2006; Patrick, Fowles, & Krueger, 2009; Skeem, Polaschek, Patrick, & Lilienfeld, 2011). Several positive adjustment indicators were discarded in PCL as they only explained 7% of the variance and did not correlate with global psychopathy scores (Hare, 1980). This biased the ability of PCL to include adaptive content and possibly lead to the underinclusion of some psychopathic people (Skeem & Cooke, 2010) namely among those who are still able to maintain relatively successful lives and occupying high-risk and/or high-power positions (Babiak, Neumann, & Hare, 2010; Bronchain, Chabrol, & Raynal, 2019; Costello, Unterberger, Watts, & Lilienfeld, 2018; Gao, Schug, Huang, & Raine, 2020; Lilienfeld et al., 2012; Mathieu, Babiak, & Hare, 2020; Patton, Smith, & Lilienfeld, 2018; Smith, Lilienfeld, Coffey, & Dabbs, 2013).

From this standpoint, 3-dimensional models of psychopathy (see Fig. 1) excluded direct operationalizations of antisocial behavior and claimed for a hierarchical organization of the psychopathic personality structure, in which deficits in personality (i.e., interpersonal-affective features) can be (or not) a risk factor for behavioral outcomes (i.e., impulsive-antisocial; Cooke & Michie, 2001; Cooke, Michie, & Hart, 2006; Patrick, 2006; Skeem et al., 2011). Behavioral conducts (e.g., an act resulting in a criminal conviction) and personality traits (e.g., a callous disposition to commit crime) should not be confused according to Skeem and Cooke (2010). Antisocial tendencies are expected to covary with psychopathy, but this association is merely probabilistic and not linearly determined, as other individual and contextual risk factors (e.g., deficits in cognitive functioning and the lack of care experiences in infancy) are expected to moderate this association (Cooke & Michie, 2001; Pasion et al., 2018a; Patrick, 2006; Patrick et al., 2009). In this view, antisocial behavior does not constitute a core feature of psychopathy per se and is best conceived as a possible second-order outcome (among others) of primary deficits in interpersonal and affective dimensions.

Therefore, 3-dimensional models do not attempt to replace the criminal conceptualizations of psychopathy; alternatively, these models aim to extend the existing knowledge in the field by simultaneously accommodating risk factors for antisocial behavior and protective factors related to adaptive expressions of psychopathy (e.g., Triarchic Model of Psychopathy; Patrick et al., 2009). The 3-dimensional models include in their conceptualization (Cooke & Michie, 2001; Patrick, 2006; Patrick et al., 2009; Skeem et al., 2011): (1) boldness-fearlessness traits, a dimension which maps several of Cleckley's (1941, 1988) positive adjustment indicators that were initially excluded from psychopathy measures (e.g., low reactivity to stress, resilience, persuasion); (2) meanness/cold-heartedness traits, encompassing attributes related to cruelty, insensitivity, deficient empathy, and disdain for close attachments with others; (3) disinhibition, referring to behavioral deficits in impulse control and impulsivity. Hence, these models exclude direct referents of antisocial behavior, but left two dimensions that are seen as proximal attributes of antisocial expressions, i.e., meanness/cold-heartedness and disinhibition.

The operationalization conveyed by 3-dimensional models may be found across several inventories such as Triarchic Psychopathy Measure (TRiPM, Patrick, 2010), Psychopathic Personality Inventory (PPI, Lilienfeld & Andrews, 1996) and Youth Psychopathic Traits Inventory (YPI, Andershed, Kerr, Stattin, & Levander, 2002).

1.3. Integrating theoretical frameworks of psychopathic personality

The evolution of the frameworks of psychopathic personality described above has been an intricate process for over 30 years. The current meta-analysis aims to examine how empathic deficits in psychopathy can be characterized in light of the main models in the field, mainly addressing points of contact between the classical PCL-based 2-Factors /4-Facets models and the recent triarchic/3-dimensional approaches.

At this point, one should acknowledge that the first 3-dimensional conceptualization of psychopathy was developed by Cooke and Michie (2001). The authors' proposal can be interpreted as a direct reorganization of the 4-facets model since it only excluded the antisocial component (i.e., facet 4) from the psychopathic personality construct. Nevertheless, this represented a reorganization of the nuclear features of psychopathy and rescued an old idea byCleckley (1941, 1988) - that psychopathy is not essentially linked to antisocial behavior. Thus, Cooke and Michie's (2001) proposal represented a major change in PCL-based assumptions and was just the first step for rethinking 3-dimensional models as currently known. Cooke and Michie (2001) opened the door for researchers to recover the positive adjustment indicators that were excluded from PCL operationalizations and, since then, several authors gradually produced new evidence towards the idea that psychopathic traits are continuously distributed in the population and, more importantly, that adaptive manifestations needed to be included in newly developed questionnaires (Benning, Patrick, Blonigen, Hicks, & Iacono, 2005; Blagov, Patrick, Oost, Goodman, & Pugh, 2015; Brislin et al., 2017; Copestake, Gray, & Snowden, 2011; Drislane et al., 2015; Drislane, Patrick, & Arsal, 2014; Evans & Tully, 2016; Patrick, 2010;

Patrick et al., 2009; Patrick & Drislane, 2015; Poythress, Edens, & Lilienfeld, 1998; Venables et al., 2014; Wall, Wygant, & Sellbom, 2015). As such, although the 3-dimensional and 4-facets models show a similar coverage of psychopathy dimensions (see Fig. 1), they show nowadays fundamental differences in their operationalization of psychopathic traits, mainly regarding the interpersonal dimension.

2-factors and 4-facets models remained closely linked to PCL-like formulations (both in self-reports and interviews) and tend to focus on maladaptive features of psychopathy, even in the interpersonal facet 1. Conversely, 3-dimensional models as currently known (e.g., Triarchic Model of Psychopathy) encompass adaptive manifestations of psychopathy by including low-anxiety, stress resilience, social dominance, boldness and fearlessness-related indicators. As a result, interpersonal traits (facet 1) and boldness represent core distinctive features of both models, which is not divorced from the debate around to what extent psychopathy is essentially about antisocial behavior, or if alternatively, it comprises adaptive features that allow these individuals to successfully navigate in the social world. The extent to which operationalizations of psychopathy leverage and converge with boldness and related positive indicators is indeed a determinant aspect for differentiating the main approaches in the field: PCL-criminogenic or boldness-adaptive approaches.

Empirical data can help us to clarify how the available psychopathy measures can be framed into both approaches. Overall, questionnaires inspired by the PCL-R structure do not represent adequately boldness-related features.

The SRP is a direct operationalization of the PCL 4-facets model (Williams, Nathanson, Delroy, & Paulhus, 2003). Its Interpersonal Manipulation subscale (facet 1) does not yield specific associations with boldness or fearless dominance as operationalized by TriPM (Patrick, 2010) and PPI (Lilienfeld & Andrews, 1996). This reveals that interpersonal conceptualizations of psychopathy differ across 3-dimensional and 4-facets models. Nevertheless, boldness might not be purely adaptive and can partially capture some interpersonal features indexed by facet 1. Research shows only inconsistent links between both dimensions. A correlation between boldness and PCL facet 1 was observed in male prisoners, but not in female offenders (Brislin et al., 2017). Facet 1 was significantly associated with boldness, although it displayed a larger association with antisocial personality disorder symptoms (Wall et al., 2015).

The LSRP reproduces two PCL factors: primary and secondary psychopathy (Levenson et al., 1995). LSRP subscales are unrelated to boldness - despite correlations between meanness/primary psychopathy and disinhibition/secondary psychopathy (Drislane et al., 2014). Even when using 3-factorial solutions including interpersonal egocentricity, boldness relates to neither LSRP subscale (Brinkley, Diamond, Magaletta, & Heigel, 2008; Sellbom, 2011; Somma, Fossati, Patrick, Maffei, & Borroni, 2014). Egocentricity is indeed mostly associated with meanness (Sellbom & Phillips, 2013).

The APSD was developed to be a childhood extension of the PCL-R, even if items pertaining to antisocial behavior were removed or modified (Frick et al., 1994; Frick and Hare, 2001). The APSD is mainly employed with a 2-factorial solution (callous-unemotional and impulsivity-conduct problems). A new dimension of narcissism was added later by Frick et al. (2000), but even this presumably interpersonal dimension did not correlate with boldness (Drislane et al., 2014; Sellbom & Phillips, 2013). In fact, narcissism and callous-unemotional traits are equally related to both PCL factors (Vitacco et al., 2003).

Summing it up, psychopathy measures stemming from the PCL operationalization do not seem to adequately leverage adaptive interpersonal traits included in the boldness-like dimensions. Boldness traits of the 3-dimensional conceptualizations mirror in some aspects PCL's facet 1 but reduce the focus on its disruptive features by further covering positive adjustment indicators. Therefore, boldness features tend to not correlate systematically with 2-factors and 4-facets models (Factor 1 and facet 1, respectively), while meanness (Factor 1 and facet 2) and disinhibition (Factor 2 and facet 3) converge more closely with PCL-based approaches. For instance, these dimensions were left in 3-dimensional models to better apprehend maladaptive expressions of psychopathy.

In contrast to PCL-driven measures, other psychopathy inventories cover into a greater extent adaptive boldness traits. The PPI was developed to assess a broad array of psychopathy manifestations, stemming from a comprehensive literature review which included Cleckley's (1941, 1988) and Lykken's (1995) formulations (Lilienfeld & Andrews, 1996). This allowed for recovering adaptive adjustment features of psychopathy that were initially retrieved from PCL such as superficial charm, lack of anxiety, and fearlessness. PPI displays two broader factors routed in the etiological paths of psychopathy - fearless dominance and self-centered impulsivity. The cold-heartedness domain did not load on either subfactor and can thus be used as a stand-alone subscale (e.g., Benning, Patrick, Hicks, Blonigen, & Krueger, 2003). Evidence suggests that PPI adequately represents the 3-dimensional phenotypes, including the adaptive boldness traits (Drislane et al., 2014; Sellbom & Phillips, 2013; Stanley, Wygant, & Sellbom, 2013). PPI fearless dominance and TriPM boldness converge themselves in community and criminal samples, while the PPI cold-heartedness subscale is uniquely related to TriPM meanness. PPI self-centered impulsivity has been mostly associated with disinhibition, although meanness can further predict this dimension (e.g., Blagov et al., 2015; Drislane et al., 2014; Fanti, Kyranides, Drislane, Colins, & Andershed, 2016; Stanley et al., 2013). It is likely to be due to covariance between meanness and disinhibition through machiavellian egocentricity (Drislane et al., 2014). The content evaluation conducted by Hall et al. (2014) demonstrated that TriPM meanness blend PPI coldheartedness and machiavellian egocentricity. Regardless, empirical data strongly indicates that the most commonly reported factorial solution of PPI (fearless dominance, coldheartedness, and self-centered impulsivity) is an adequate operationalization of boldness, meanness, and disinhibition as intended by 3-dimensional models.

Finally, it is also important to address the YPI, which was developed to overcome problems when measuring psychopathy in youth community samples. Andershed et al. (2002) refer that YPI was conceived to evaluate the core personality traits of psychopathy rather than its behavioral expressions, as suggested by Cooke and Michie (2001). Actually, the authors consulted both Hare's Psychopathy Checklist and Cleckley's descriptions and reached a 3-factorial solution (grandiose-manipulate, affective, impulsive-irresponsible) which presumably encompasses views from both authors. As such, the concrete referent of YPI might not be clear, especially when considering that its interpersonal dimension targets charm and grandiosity but also lying and manipulation (Andershed et al., 2002). Nonetheless, Drislane et al. (2014) reported that most of the interpersonal YPI subscales were positively associated with boldness – and although grandiose-manipulate traits were also associated with either meanness or disinhibition. In the same vein, Andershed, Hodgins, and Tengström (2007) observed that even though the 3-factors of YPI and PCL-Youth Version were moderately correlated, most grandiose-manipulate subscales of the YPI were not significantly correlated with the conceptually corresponding PCL-Youth items. Thus, YPI grandiose-manipulate traits seem to be inconsistently associated with both boldness-related traits and the non-adaptive interpersonal facet 1. For the purposes of this study, it is argued that YPI is a closer conceptualization of a 3-dimensional model because of two main conceptual reasons: (1) YPI items were developed to be considered positive or admirable by individuals scoring high in psychopathy (e.g., “I usually feel calm when other people are scared”, “I can get almost anyone to believe anything”), thus enhancing the likelihood of the grandiose-manipulate to index, at least partially, more adaptive interpersonal traits; (2) a revised triarchic structure of the YPI was developed through content evaluation, indicating that several grandiose-manipulate items effectively represent boldness (Drislane et al., 2015). This newly proposed structure of the YPI was more

effective in discriminating triarchic dimensions than PCL-based facets. Even so, as most available studies using the YPI do not compute these triarchic YPI scores, additional control analysis will be conducted in the current work encompassing YPI in the 4-facets model as well.

1.4. Dissociating psychopathy dimensions and antisocial behavior: What can empathy teach us?

Empathy is a fundamental process underpinning human interactions and is considered a hallmark of psychopathy. Although numerous definitions of empathy exist (for a comprehensive review see Hall & Schwartz, 2019), empathy is widely regarded nowadays as a multidimensional construct (Eklund & Meranius, 2020). It is less consensual, however, what are its specific subdomains (Blair, 2005; de Waal & Preston, 2017; Dvash & Shamay-Tsoory, 2014; Jolliffe & Farrington, 2006; Reniers, Corcoran, Drake, Shryane, & Völlm, 2011; Zaki & Ochsner, 2012). Among distinct conceptualizations, it is possible to unveil a key point of convergence. There is a fairly growing consensus in the field that empathy encompasses at least two major domains - cognitive and affective empathy - and recent meta-analytical evidence from brain imaging studies unveiled distinct neuronal networks underlying these two dimensions (Kogler, Müller, Werminghausen, Eickhoff, & Derntl, 2020).

For the scope of this review, cognitive empathy will be broadly defined as the ability to infer the mental states of others or cognitively take their perspective. These inferences may be related to cognitive content (e.g., understanding thoughts, intentions, or beliefs) as well as emotional content (e.g., inferring what another person is feeling; Corradi-Dell'Acqua et al., 2020; Tesar, Deckert, Schmoeger, & Willinger, 2020). Conversely, affective empathy will be defined as the ability to be sensitive to and vicariously experience the emotional states felt by other people, as reflected by both empathic concern (e.g., other-oriented feelings of sympathy) and personal distress (e.g., self-oriented feelings of discomfort; Grynberg & Konrath, 2020; Israelashvili, Sauter, & Fischer, 2020).

Empathic dysfunctions have been associated with several disruptive behaviors (Blair, 2005; Jolliffe & Farrington, 2004; Miller & Eisenberg, 1988; Reniers et al., 2011; van Dongen, 2020; van Langen, Wissink, van Vugt, Van der Stouwe, & Stams, 2014). Previous meta-analyses reported small to moderate empathic deficits in violent, juvenile, and sexual offenders (Jolliffe & Farrington, 2004; Morrow, 2020; van Langen et al., 2014) as well as an association between antisocial outcomes and empathy in individuals with externalizing tendencies and a history of physical abuse in childhood (Miller & Eisenberg, 1988). Interestingly, effect sizes are stronger for cognitive empathy than affective empathy, suggesting that impairment in the cognitive domain emerges as a specific risk factor for offending (Jolliffe & Farrington, 2004; Miller & Eisenberg, 1988; but see also Vachon, Lynam, & Johnson, 2014; van Langen et al., 2014). Nevertheless, these meta-analyses did not evaluate the potential confounding role of psychopathy, which is of critical importance for two main reasons: (1) psychopathy is likely overrepresented in criminal samples; and (2) affective empathy impairment in antisocial samples is thought to be dependent on the co-occurrence of psychopathy (Bons et al., 2013; Fairchild et al., 2019; Frick & Kemp, 2020; Marsden, Glazebrook, Tully, & Völlm, 2019; Sedgwick et al., 2017).

Thus, although empathy (broadly defined) can be viewed as a risk factor increasing the likelihood of antisocial outcomes, the most recent developments in the field call for a more fine-grained conceptual formulation on how cognitive and affective empathy may be differentially linked to psychopathy and antisocial behavior. This approach opens a promising venue to: (1) explore whether antisocial and psychopathy can be clearly dissociated in their empathic profiles and then (2) examine how the heterogeneous dimensions that compose the psychopathic personality relate to deficits in cognitive and affective empathy.

Importantly, the analysis on the second topic can provide critical insights on the everlasting emotion paradox of psychopathy (Lorenz & Newman, 2002) - How may psychopathic individuals who lack the ability to fully grasp affective experiences, be so competent in the manipulation of others? This paradox, firstly inspired by Cleckley's (1941, 1988) concept of the Mask of Sanity, is inherently connected to the delicate balance between cognition and affect in psychopathy - psychopathic individuals are apparently capable of superficially mimicking "normal human emotions", regardless of profound internal interpersonal-affective deficits displayed behind their mask. Their socioemotional deficits can be thus (and surprisingly) connected to exceptional social abilities (Glenn, Efferson, Kastner, Johnson, & Remmel, 2022).

Recently, there has been additional evidence supporting this paradox. The meta-analytical work of Hoppenbrouwers, Bulten, and Brazil (2016) described that the experience of others' distress is impaired in psychopathy when it comes to affective responsivity at the automatic-visceral level (i.e., reduced heart rate, skin conductance, and startle responses), even though no significant deficits exist in the evaluation of such emotions at a more cognitive-elaborated level. Another recent systematic review reported that children with high callous-unemotional traits display reduced emotional responsiveness as assessed by physiological measures, especially when using other-oriented stimuli, but results were far more inconsistent when considering other measurement methods such as self-reported subjective experience or observed behavior (Northam & Dadds, 2020). Studies indicate indeed that individuals scoring high in psychopathy can accurately identify emotions; however, this is accompanied by a pervasive slowing of response times; that is, less efficiency in the automatic processing of affective stimuli as a consequence of cognitive top-down processing (Brennan & Baskin-Sommers, 2020b; Hartmann & Schwenck, 2020; Vitale, Kosson, Resch, & Newman, 2018). Whereas social cognition is assumed to be an automatic and implicit mechanism in the human brain (Frith & Frith, 2007), deliberative and higher-level processing of social and emotional signals does exist in human species (Evans, 2008; Lieberman, 2007; Spunt & Lieberman, 2013). The dual-route model for processing social information leaves an open door for a putative compensatory pathway in psychopathy: while automatic affective states are proposed to be directly dependent on visceral inputs that are lacking in psychopathy, cognitive computations may compensate for understanding these affective states (Hoppenbrouwers et al., 2016).

Building on these findings, the dissociation between cognitive and affective empathy provides a clear rationale to further examine the emotion paradox - and especially if the multidimensional nature of the psychopathic personality structure is taken into account. For instance, in some psychopathic traits, cognitive processing at the empathic level may compensate for deficits in affective empathy, while other psychopathy expressions may be characterized by broader empathy deficits.

Based on this assumption, Gao and Raine (2010) formulated a model to systematize factors preventing highly psychopathic individuals from engaging in criminal behavior and empathy played a central in this discussion. The most recent version of Gao and Raine's model (Gao et al., 2020) emphasizes that impulsive-antisocial traits are an attribute of impaired empathy at both cognitive and affective levels, although previous meta-analysis observed larger effects in cognitive empathy (Jolliffe & Farrington, 2004; Morrow, 2020; van Langen et al., 2014). In the same vein, a meta-analysis reports that callous-unemotional traits are those expected to be strongly associated with both cognitive and affective empathy deficits in younger samples (Waller et al., 2020). By contrast, interpersonal (and presumably boldness) traits are assumed to be associated with preserved - or even increased - cognitive empathy.

For instance, previous studies report better cognitive functioning (e.g., executive functioning) in boldness-fearlessness traits (e.g., Baskin-Sommers et al., 2015; Sellbom & Verona, 2007; Pasion et al., 2018a). A superior cognitive performance – namely as reflected in cognitive empathic computations - might explain adaptive manifestations in

psychopathy, particularly by considering that affective empathic deficits are placed as a transversal risk factor for disruptive outcomes (Gao et al., 2020). As such, individuals scoring higher in interpersonal-boldness traits can be more able of using cognitive empathy as an alternative strategy for processing social-affective information. These individuals may learn social norms regarding affective states by using effortful reasoning, such that cognitive processes can compensate for impaired affective-empathic responses. For example, research demonstrates that although total psychopathy scores relate to reduced discrimination between real and fake emotional expressions, boldness scores predict high accuracy in rating genuine smiles (Glenn et al., 2022). Moreover, fearless traits relate to emotional and social intelligence to predict improved accuracy in discriminating facial emotional cues (Sacco, Merold, Lui, Lustgraaf, & Barry, 2016). Ultimately, the probabilistic combination of increased cognitive empathy with deficits in affective empathy may allow individuals scoring higher in boldness to understand the feelings of others without the accompanying affective sharing experience. This cognitive-affective dissociation may favor the process of taking advantage of others, particularly in situations involving self-benefit.

However, until this date, there is still not a systematic approach testing the assumptions of Gao and Raine's model regarding empathy while simultaneously integrating the main conceptual frameworks of psychopathy.

1.5. The current study

The current meta-analysis aims to provide the first comprehensive picture of the complex interaction between psychopathy, antisocial behavior, and empathy by integrating the main theoretical frameworks of psychopathy and considering the differential relations of psychopathy dimensions and antisocial behavior with distinct empathy domains.

The first step of the strategy consists of examining the differential role of cognitive and affective empathy in psychopathy and antisocial behavior, using both group-based and correlational analysis. Subsequently, a dimensional analysis decomposing the 2-factors, 4-facets, and 3-dimensional models of psychopathy will be conducted to explore the differential associations of each psychopathic dimension with cognitive and affective empathy.

According to previously described evidence, it is expected that affective empathy will be more clearly impaired in psychopathy in comparison to cognitive empathy (H1), especially for those traits related to shallow affect, cruelty, and lack of remorse (facet 2, and meanness; Gao & Raine, 2010; Gao et al., 2020; Waller et al., 2020). In turn, cognitive empathy is expected to be impaired to a greater extent in antisocial groups (Jolliffe & Farrington, 2004; Miller & Eisenberg, 1988; van Langen et al., 2014) and, therefore, (H2) in antisocial-impulsive expressions of psychopathy (Factor 2, facet 3 and 4, and disinhibition traits). For the adaptive dimensions of psychopathy, it is postulated that interpersonal (facet 1) and boldness traits will be associated with increased cognitive empathy (H3), despite deficits in affective empathy (Gao et al., 2020; Gao & Raine, 2010).

2. Method

2.1. Search strategy

Records were identified by systematically searching several electronic databases, namely PubMed (Medline), Web of Science Core Collection, and EBSCO (Psychology and Behavioral Sciences Collection, APA PsycArticles, and Open Dissertations). The following search terms were used to design a search query for each database: psychopathy, sociopathy, antisocial behavior/personality disorder, callous-unemotional, conduct disorders/problems, disruptive behavior, oppositional defiant/behavior, problem behavior, violent, criminals, offenders, prisoners, inmates, delinquency, empathy, perspective-taking, theory of mind, mentalizing, mindreading and mental states. Variants and MeSH for these terms were included whenever possible. The full search query for each database can be found in Appendix A. The original search was conducted on 27 April 2019, but it was subsequently updated on 15 October 2020 and 11 November 2021. Additional records were also retrieved by scanning the reference lists of major reviews addressing psychopathy and antisocial behavior as well as empathy and social cognition. Finally, authors from the included records were invited to send any additional studies that met the eligibility criteria.

2.2. Eligibility criteria

Only records written in the English language were considered for analysis. Records were included if they met the following criteria: (1) empirical studies with quantitative data, (2) antisocial and/or psychopathy assessment or group comparison, and (3) empathy assessment.

Regarding the first criterion, cross-sectional, longitudinal, and experimental studies reporting baseline assessments of psychopathy and empathy were included. Reviews, theoretical research papers, commentaries, case reports, editorial, and qualitative studies were excluded.

For the second criterion, this review included studies reporting between-group differences and correlational designs. Between-group analyses for antisocial samples covered studies comparing any given antisocial group (offenders, antisocial personality disorder, conduct disorders, latent antisocial profiles in community samples, etc.) with non-antisocial control groups. Between-group analyses for psychopathy samples comprised studies comparing any given group displaying higher psychopathic traits (e.g., clinical cut-off scores, quartile criteria) with control groups exhibiting low psychopathy levels. Overall, it is important to notice that samples with participants displaying comorbid internalizing (e.g., depression, anxiety) or externalizing (e.g., substance abuse, attention deficit and hyperactivity disorder) disorders were not excluded. Modern conceptualizations show that personalistic and psychopathological phenomena are continuously distributed in the general population and, therefore, are expected to naturally co-occur in the included samples (Kotov et al., 2017). Even the high-order dimensions of the internalizing and externalizing spectra are expected to rely on a broad latent factor that explains common variance ($r = 0.41$ to 0.72) between the two dimensions (Cosgrove et al., 2011; Kendler & Myers, 2014; Krueger, 1999; Krueger et al., 2007; Krueger, Caspi, Moffitt, & Silva, 1998); thus, psychopathic and antisocial samples mainly characterized by high externalizing traits are also expected to be prone to internalizing manifestations. Samples with comorbid cluster B personality disorders (e.g., narcissism) were included since empirically-based personality models show that antagonistic externalizing is a common feature among them (Kotov et al., 2017). Still, we excluded samples in group-based analysis where all participants were exclusively diagnosed with one of the above disorders, For example, a group where all participants had comorbid ADHD and conduct disorders would result in a confounding factor for isolating the variable of interest, i.e., antisocial behavior. Finally, studies including participants with other comorbid psychiatric disorders (e.g., schizophrenia and autism), neurological disorders, or intellectual disabilities were excluded because they are expected to interfere significantly with empathic abilities and/or overall cognitive functioning. For correlational analyses, studies reporting psychopathy and/or antisocial behavior scores and their zero-order correlation coefficients with empathy measures were included. This enabled to assess the continuous covariation between the two main variables of interest.

For the third criterion, studies had to include at least one self-report or performance-based measure assessing empathy. For cognitive empathy, measures related to the ability to infer the mental states of others or cognitively take their perspective were considered. This encompassed cognitive empathy scores on questionnaires, but also a wide range of measures related to mentalizing, perspective-taking, emotional understanding, and theory of mind. For affective empathy, measures representing the ability to be sensitive to and vicariously

experience the feelings of others were considered into analysis (e.g., scores of affective empathy, affective sharing, personal distress, and empathic concern). Total empathy scores were further extracted to test whether they were sufficiently informative for exploring the role of empathy in antisocial behavior and psychopathy.

2.3. Study selection and data coding

The non-duplicate records were initially screened by title and abstract to remove studies that were clearly out of topic. The remaining records were then full text screened by two blinded researchers to determine their eligibility for the review. Conflicts between researchers were solved by consensus in a meeting with the research team. Those records that were manually retrieved or sent by authors were further assessed for eligibility in these meetings.

Data extraction was completed by several members of the research team and was always verified by a second independent researcher. A spreadsheet was developed to extract the required information from the included studies, namely: (1) Study information - title, authors, and publication year; (2) Conditions for analysis - groups under comparison (e.g., offenders vs. controls, high psychopathy vs. low psychopathy, etc.) or correlated measures (e.g., total psychopathy and affective empathy); (3) Sample characteristics - sample size (*n* for each sample/group), sample type (community, criminal and/or clinical), age (mean or other metrics if mean was not available); and percentage of females; (4) Antisocial and psychopathy criteria/measure - for group-based analyses, antisocial and/or psychopathy criteria to define groups (e.g., offenders with criminal records, DSM-V APSD diagnosis, PCL-R cut-off score for high and low psychopathy), while for correlational analyses the main psychopathy dimensions under analysis were coded (see Fig. 1 and the Analytic Strategy heading); and (5) Empathy measure - each measure was classified according to its domain (total, cognitive, or affective empathy) and measure type (self-report and performance-based).

For effect size calculation in between-group analyses, means and standards deviation for each group were coded whenever possible. Alternatively, Cohen's d, *t*-, *F*-, and *p*-values were considered if these statistics granted an accurate estimation of the effect size of interest (e.g., an effect size was not estimated if the only information available was $p > .05$ or $p < .05$). For correlational analyses, only zero-order correlations were retrieved (i.e., non-parametric and partial correlations were not extracted). Effect size direction was labeled for each available condition. Negative effects represent reduced empathy in antisocial/psychopathy groups (group-based analyses) and lower empathy in higher levels of psychopathic or antisocial behavior (correlational analyses).

Missing information for effect size calculation and other queries regarding included studies (e.g., unclear information, duplicate samples, etc.) were requested by email to the authors. Studies were excluded if no information was available for effect size calculation and the authors did not reply to the request. Any inconsistencies after verification were clarified with the original authors or addressed in a meeting by the research team.

2.4. Analytical strategy

As previously described, this work encompassed a wideset of analyses that required distinct analytical strategies.

Group-based analysis required the dissociation of antisocial and psychopathy groups whenever possible, given that this confounding factor exists in previous meta-analyses. For this purpose, antisocial groups were classified according to psychopathy traits (e.g., offenders with high vs. low psychopathy). Only groups with low psychopathy were included in the antisocial group comparison whenever this information was available (e.g., low psychopathy offenders vs. community controls). Conversely, antisocial groups with low psychopathy scores were included as the control group in the psychopathy group comparison, allowing us to compare high vs. low psychopathy groups. For studies including high, moderate, and low psychopathy groups, we combined high and moderate psychopathy groups to compare them with the low psychopathy group.

Then, antisocial and psychopathy group-based analyses were complemented with additional correlational analyses intersecting total psychopathy and antisocial scores with empathy. This is particularly relevant for psychopathy as this construct is nowadays more widely conceptualized as being continuously distributed in the general population (Guay, Ruscio, Knight, & Hare, 2007; Skeem et al., 2011). Total psychopathy included not only multidimensional psychopathy measures that provide a total score (e.g., PCL, Triarchic Psychopathy Measure) as well as other questionnaires that assess psychopathy as a unidimensional construct (e.g., Dirty Dozen, Short Dark Triad). Broad antisocial measures included delinquency and criminal activities questionnaires (e.g., Self-Reported Delinquency, Antisocial Behavior Questionnaire), conduct and oppositional-behavior problems scales (e.g., Child Behavior Checklist - Rule-Breaking subscale, Strength and Difficulties Questionnaire - Conduct Problems subscale), and Conduct Disorders or Antisocial Personality Disorder symptoms (indexed by DSM-based measures).

Finally, a major goal of this meta-analysis was to examine different psychopathy models (2-factors, 4-facets, and 3-dimensions). Thus, effect sizes extracted for correlational analyses were labeled according to the psychopathy framework in which each scale can be framed. This categorization is described in Table 1 and relies on the rationale presented in the introduction section. As callous-unemotional questionnaires models (e.g., Inventory of Callous-Unemotional Traits (ICU); Kimonis et al., 2008) are represented in both 3-dimensional and 4-facets models, additional control analyses were conducted excluding these measures to examine whether the same pattern of results was retained using only model-specific effect sizes. Due to the previously mentioned theoretical reasons regarding the YPI, further control analyses were conducted, namely: (1) YPI Grandiose-Manipulate effect sizes alone; (2) boldness analyses without YPI effects; (3) interpersonal facet 1 analyses with YPI effects.

2.5. Meta-analytic methods

Data analysis was conducted using Comprehensive Meta-Analysis software (version 3.0; Biostat, U.S.A). Random effect models were used for each meta-analysis as variability in effect sizes for the included records is not only due to sampling error and can be explained by other

Table 1
Operationalization of the different conceptual frameworks of psychopathy.

Psychopathy Models		
2-Factors	4-Facets	3-Dimensions
Psychopathy Checklist Self-Report Psychopathy Scale Levenson Self-Report Psychopathy Antisocial Process Screening Device Child Psychopathy Scale	Psychopathy Checklist Self-Report Psychopathy Scale	Triarchic Psychopathy Measure Psychopathic Personality Inventory Youth Psychopathic Traits Inventory

Notes: Egocentricity (Levenson Self-Report) and Narcissism (Antisocial Process Screening) were combined for Factor 1 analysis with the Callous-Unemotional subscale of the respective measure. Measures developed to assess callous-unemotional traits regardless of psychopathy model (e.g., Inventory of Callous-Unemotional) were included in all three models (Factor 1, Facet 2, and Meanness) because they map all these dimensions. The Durand Adaptive Psychopathic Traits Questionnaire was developed as an extension of Fearless Dominance and Boldness and for this reason it was included in the 3-dimensional model. The Child Problematic Traits Inventory was developed to measure a childhood version of the 3-factor model similarly to the Youth Psychopathic Traits Inventory. Some subscales of the Personality Inventory for DSM-5 were recently framed according to the triarchic model and were also included in the 3-dimensions analysis.

moderating factors (e.g., age, sex, type of measure). As such, these models allow for the generalization of results beyond the scope of the observed studies (Borenstein, Hedges, Higgins, & Rothstein, 2009; Hedges & Vevea, 1998).

Each analysis encompassed multiple effect sizes stemming from the same sample and, therefore, a mean effect size was calculated to account for the lack of independence between effects. These mean effect sizes were computed so that each available measure had the same weight in the combined effect. The following scenarios were accounted for when combining effect sizes: (1) in longitudinal studies, only correlations between measures collected at the same timepoint were included for analysis; if no simultaneous timepoints were available, a mean correlation between all assessment moments was calculated; (2) in studies encompassing different raters (e.g., parents, teacher, self-report), correlations between measures completed by the same rater were prioritized; if both psychopathy/antisocial and empathy measures were not available for the same rater, a mean correlation between all available measures for every rater was computed; (3) when a study reported different versions of the same measure, only correlations regarding the latest and/or longest version available were considered; (4) effect sizes were separately included for each independent subgroup whenever this information was available (e.g., men and women, offenders, and controls).

For group-based analyses (antisocial and psychopathy groups) effect sizes were estimated using Hedges' g (Hedges, 1981). Hedges' g includes a correction factor that allows reducing effect size overestimation in small sample sizes. In several studies, it was required to combine groups before proceeding with effect size calculation (e.g., sex and non-sex offenders vs. controls, psychopathic offenders vs. non-psychopathic offenders and community controls). Groups were combined using the formulas provided by the Cochrane Handbook for Systematic Reviews (Higgins et al., 2019). For correlations analyses, effect sizes were calculated as zero-order correlations and transformed to Fisher's *z* scale. Correlation coefficients are not usually used in meta-analytical calculations as its variance widely depends on the correlation itself (Borenstein et al., 2009). The transformed values were then converted back to *r* for easier interpretation. It is important to notice that the same record could originate group-based and correlational effect sizes as they were independent analyses (e.g., a study could be included for group comparison of high vs. low psychopathy groups using extreme quartiles as well as continuous correlations between psychopathy and empathy scores).

Moderation analyses were conducted to explore additional factors accounting for overall effect sizes. For the categorical moderator "type of empathy measure", self-report and performance-based measures were separately analyzed. For continuous moderators (age and % of females), meta-regression techniques were implemented to examine the association between these variables and the mean effect size (*b* and 95% confidence intervals). Of note, when interpreting meta-regression coefficients for negative effect sizes, a positive coefficient implies that the effect size is larger (more negative) for lower values of the predictor (age or percentage of females). For example, when an effect size is negative, a positive meta-regression coefficient for age equates to larger effect sizes for younger samples and smaller effect sizes for older samples.

Heterogeneity of effect sizes and publication bias were also evaluated on overall effect sizes for each analysis. More specially, between-study variability was tested using the Q (Cochran, 1954) and I^2 tests (Higgins et al., 2019). Publication bias was assessed using the Eggers's test of intercept bias (Egger, Davey Smith, Schneider, & Minder, 1997). For those effect sizes displaying publication bias ($p < .05$), the trim-and-fill method was used to correct them (Duval & Tweedie, 2000).

For each analysis, the weighted mean effect size, 95% confidence intervals, and *p*-values were reported. Effect sizes for correlational analyses were labeled as small ($r \geq |.10|$), medium ($r \geq |.20|$), and large ($r \geq |.30|$) according to recent meta-analytical normative guidelines for interpreting results in the individual differences research field (Funder & Ozer, 2019; Gignac & Szodorai, 2016). These cut-off values were converted to between-group effect sizes using the formulas provided by Rosenthal (1994) to allow for comparability across analyses. Thus, for group-based analyses, effect sizes were labeled as small ($g \geq |0.20|$), medium ($g \geq |0.41|$), and large ($g \geq |0.63|$).

Finally, the statistical significance threshold for inference testing was set using the two-stage false discovery rate procedure described by Benjamini, Krieger, and Yekutieli (2006). This method allows for improved power over the classical false-discovery rate method and performs well in analyses encompassing correlated *p*-values. The threshold was calculated for a false discovery rate of .010 and considering only *p*-values used for inferential testing (weighted mean effect size, categorical moderators, and meta-regression). These procedures were implemented using a spreadsheet from Pike (2011) and returned a statistical significance threshold of $p \leq .006$. FDR-threshold adjusted confidence intervals for each effect size are supplied in Appendix B.

3. Results

3.1. Search results

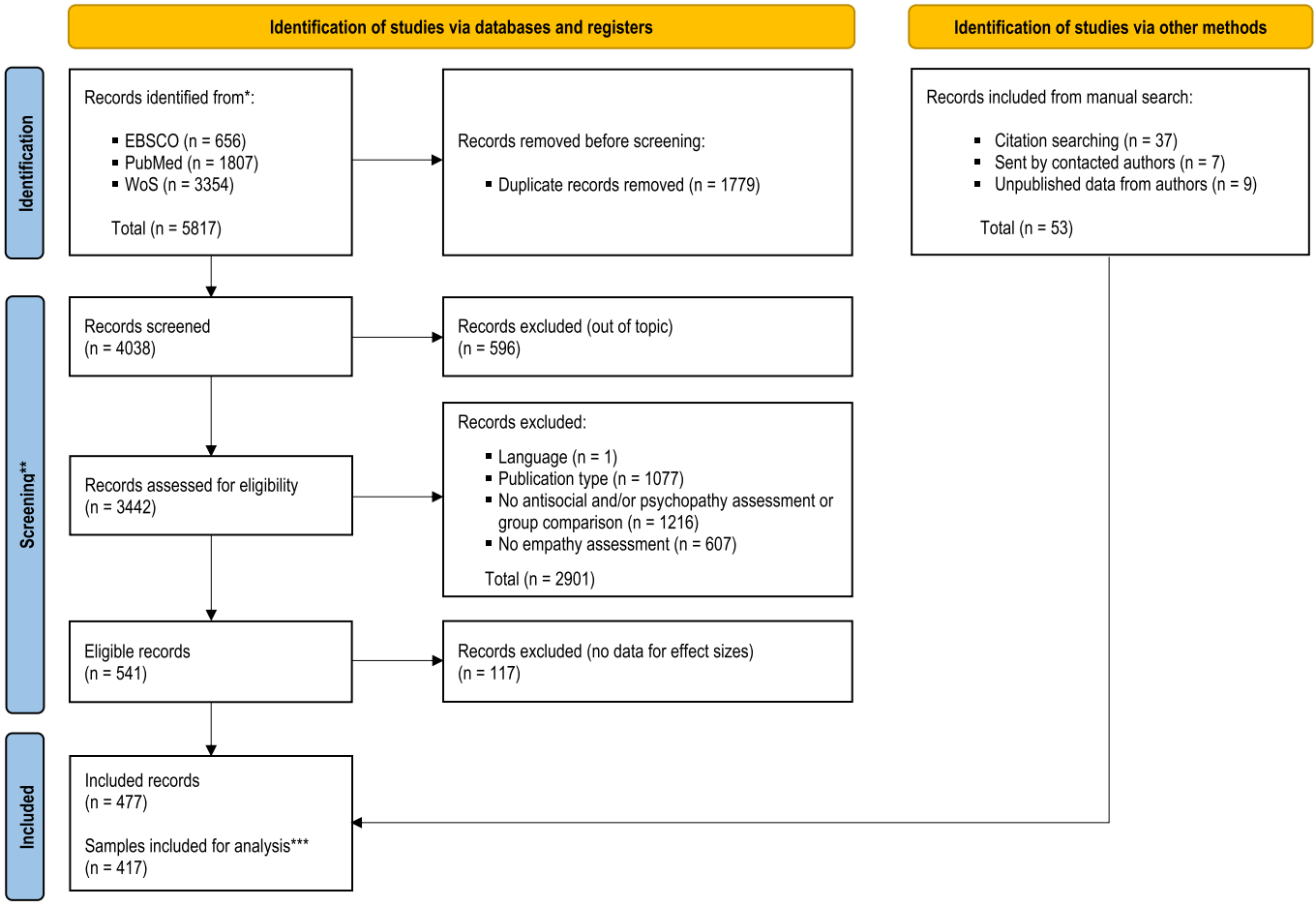
A detailed flow diagram of study selection was developed using the PRISMA guidelines (Fig. 2). A total of 5817 records were retrieved after the electronic search. After removing duplicates ($n = 1779$) and out of topic records ($n = 596$), the remaining records were full text screened for eligibility ($n = 3442$). From these records, 541 met the eligibility criteria, although only 424 records were further included for analysis as there was not enough information to compute effect sizes and the authors did not reply to the information request. An additional 53 records were also added by manual search, including additional records sent by contacted authors ($n = 7$) and unpublished data from our research group ($n = 9$). Thus, a total of 477 records were included (citations available in Appendix C). However, after contacting authors, several records were shown to include replicated data. Thus, the effective number of samples included for analysis were 417, encompassing a total of 142,692 subjects.

3.2. Antisocial behavior

A total of 127 samples were analyzed to test for empathy differences between antisocial and non-antisocial groups. The antisocial groups included a total of 8660 participants, while the control groups included 10,123 participants (25.80% females, $M_{age} = 21.45$, pooled for both groups). In the antisocial samples, only 13.39% studies recruited participants from the community, while 68.50% and 25.98% included subjects from criminal and clinical settings, respectively.[2] Self-report measures were more frequently used to assess empathy (84.25%) and the most widely used measure was the Interpersonal Reactivity Index (45.67%), followed by Hogan's Empathy Scale (10.24%), the Basic Empathy Scale (7.87%), the Index of Empathy for Children and Adolescent/Bryant's (7.09%), and the Empathy Quotient (6.30%). Performance-based measures were used in 34.65% of the samples.

For correlational analyses, a total of 124 samples were included ($n = 62,216$, 46.24% females, $M_{age} = 19.02$). Most of the samples encompassed subjects recruited from the community (83.06%), while 20.16% and 12.10% had participants recruited from criminal and clinical samples, respectively. To assess antisocial behavior, the most widely used measure was the Achenbach System of Empirically Based Assessment (Child Behavior Checklist – 12.10% and Youth Self Report – 10.48%)

[2] Cumulative percentage surpasses 100% as some studies included participants from more than one setting (e.g., community and clinical). The same happens with studies including participants that fulfilled more than one criterion (e.g., juvenile offenders with conduct disorders).



* EBSCO (Psychology and Behavioral Sciences Collection, APA PsycArticles, and Open Dissertations), PubMed (Medline), WoS (Web of Science Core Collection)
** Initial screening to remove out of topic records was performed using title and abstract only. Record assessment for eligibility was conducted using full text screening.
*** Several included records were reporting data originated from the same samples/datasets.

Fig. 2. Study selection flow diagram adapted from the PRISMA guidelines (Page et al., 2021).

together with the Strengths and Difficulties Questionnaire (13.71%). However, the array of measures included for these analyses were more heterogeneous (other antisocial measures = 67.74%). Self-report assessment of empathy (86.29%) was mostly accomplished using the Interpersonal Reactivity Index (32.26%), the Basic Empathy Scale (10.48), the Index of Empathy for Children and Adolescent/Bryant's (8.87%), and the Griffith Empathy Measure (8.06%). Performance-based measures were applied in 24.19% of the samples.

Results from group-based and correlational analyses for antisocial behavior are reported in Tables 2 and 3, respectively.

3.2.1. Group-based analyses

Overall, reduced empathy was observed in antisocial groups (Table 2), $g = -0.37$, 95% CI [−0.47, −0.27], $p < .001$, although there was evidence for publication bias ($p = .005$). The adjusted effect size after correction was smaller, $g = -0.23$, 95% CI [−0.34, −0.13]. However, these deficits were larger for cognitive empathy, $g = -0.43$, 95% CI [−0.51, −0.34], $p < .001$, than for affective empathy, $g = -0.13$, 95% CI [−0.21, −0.05], $p = .001$. Publication bias was detected for affective empathy ($p = .010$), but the adjusted effect size after the trim-and-fill method displayed a similar magnitude, $g = -0.11$, 95% CI [−0.19, −0.03]. The results for affective empathy were moderated by age and measurement type such that effects were more robust in younger samples and only significant when using self-report empathy measures. Performance-based measures yielded medium effects in the cognitive empathy domain, while the results were only small for self-report measures.

3.2.2. Correlational analyses

Correlational results addressing the association between total empathy scores and antisocial behavior were less robust than group effects, $r = -0.16$, 95% CI [−0.18, −0.14], $p < .001$, namely regarding the dissociation between cognitive, $r = -0.11$, 95% CI [−0.14, −0.07], $p < .001$, and affective empathy, $r = -0.12$, 95% CI [−0.14, −10], $p < .001$, as both yielded small effects (Table 3). Moderation analyses further revealed that self-report measures (all empathy domains) and samples with lower percentage of females (total empathy) were associated with larger effects. There was no significant publication bias on neither of the analyses (all $p \geq .072$).

3.3. Psychopathy

For group-based analyses, 43 samples were meta-analyzed, encompassing 2065 participants with high levels of psychopathy and 2438 subjects with low/no psychopathic traits (18.27% females, M_{age} = 23.38). Most samples recruited participants from criminal settings (58.14%), while only 34.88% and 23.26% included subjects from clinical groups and the community, respectively. Psychopathy groups were mainly evaluated thought PCL-R (39.53%), although other measures such as the ICU (20.93%), ASPD (11.63%), SRP (4.65%), LSRP (4.65%),

Table 2
Group-based analyses for antisocial behavior.

	Effect size statistics						Heterogeneity Statistics			Publication bias		Categorical Moderators			Meta-regression		
	k	*n* Antisocial	*n* Controls	*g*	95% CI	*p*	*Q*	*p*	I^2	*B*	*p*	*g*	95% CI	*p*	*b*	95% CI	*p*
Antisocial/ Total Empathy	44	2772	4625	−.37	[−.47, −.27]	< .001	136.1	< .001	68.4	−2.06	.005						
Self-report	42											−.34	[−.44, −.25]	< .001			
Performance	2											−1.04	[−1.58, −.50]	< .001			
Age (*M*)	44														−.002	[−.013, .008]	.696
Females (%)	43														.002	[−.001, .004]	.178
Antisocial/ Affective Empathy	96	6293	7162	−.13	[−.21, −.05]	.001	384.5	< .001	75.3	1.28	.010						
Self-report	89											−.12	[−.20, −.04]	.003			
Performance	17											−.11	[−.35, .14]	.404			
Age (*M*)	95														.012	[.005, .019]	< .001
Females (%)	96														−.003	[−.005, −.0003]	.030
Antisocial/ Cognitive Empathy	110	7292	7776	−.43	[−.51, −.34]	< .001	579.4	< .001	81.2	−.53	.312						
Self-report	89											−.34	[−.43, −.26]	< .001			
Performance	38											−.58	[−.75, −.41]	< .001			
Age (*M*)	108														.002	[−.006, .010]	.708
Females (%)	109														.003	[−.0002, .005]	.069

and YPI were also used (4.65%). Self-report measures of empathy were used most often (72.09%), although 55.81% of the studies also used performance-based measures. Regarding self-report measures, the Interpersonal Reactivity Index stood out as the preferential measure (44.19%), followed by the Basic Empathy Scale (11.63%), Hogan's Empathy Scale (4.65%), Griffith Empathy Measure (4.65%), and the Index of Empathy for Children and Adolescent/Bryant's (4.65%).

For correlational analyses, 221 samples were included, representing a sample size of 76,420 (49.77% females, $M_{age} = 22.84$). Most samples included participants recruited from the community (80.54%), while 20.81% and 9.05% recruited subjects from criminal and clinical settings, respectively. The most frequently used measures to evaluate psychopathy were: ICU (21.27%), LSRPS (19.91%), SRP (15.84%), PPI (10.86%), ASPD (9.05%), YPI (7.69%), TriPM (7.24%), and PCL (6.79%). Self-report measures were more frequently used to assess empathy (84.62%), while performance-based were only used in 31.22% of the samples. The most common self-report measures of empathy were: Interpersonal Reactivity Index (36.20%), Basic Empathy Scale (16.29%), Questionnaire of Cognitive and Affective Empathy (6.33%), Griffith Empathy Measure (5.43%), and Empathy Quotient (4.52%).

Results from group-based and correlational analyses for total psychopathy scores can be found in Tables 4 and 5, respectively. Correlational analyses for each conceptual framework are presented in Table 6 (2-factors), Table 7 (4-facets model), and Table 8 (3-dimensional models).

3.3.1. Group-based analyses

In contrast with antisocial groups, empathy deficits in high psychopathy groups were larger in the affective domain, $g = -0.40$, 95% CI [−0.55, −0.25], $p < .001$, compared to cognitive empathy, $g = -0.22$, 95% CI [−0.32, −0.12], $p < .001$ (Table 4). A medium effect was further observed for total empathy scores, $g = -0.54$, 95% CI [−0.85, −0.24], $p < .001$. There was no evidence for publication bias on all these analyses (all $p \geq .476$). Contrarily to what was reported in antisocial groups, moderation analysis in the cognitive empathy domain revealed significant effects only for self-report measures (not performance-based).

3.3.2. Correlational analyses: total scores

According to previous analyses, a medium and negative correlation was observed between psychopathy scores and affective empathy, $r = -0.29$, 95% CI [−0.32, −0.25], $p < .001$, as well as total empathy, $r = -0.29$, 95% CI [−0.33, −0.25], $p < .001$, while the effects were small for cognitive empathy, $r = -0.19$, 95% CI [−0.22, −0.16], $p < .001$ (Table 5). Effect sizes across all empathy domains were larger for self-report measures (medium to large) in comparison to performance-based tasks (residual to small). There was no publication bias for any of the analyses (all $p \geq .459$).

3.3.3. Correlational analyses: 2-factors model

Factor 1 (interpersonal-affective traits) was negatively associated with affective empathy, $r = -0.33$, 95% CI [−0.36, −0.30], $p < .001$, and total empathy, $r = -0.38$, 95% CI [−0.42, −0.34], $p < .001$ (large effect sizes for both analysis; Table 6). The findings for affective empathy were moderated by age such that effects were increased in older samples. In cognitive empathy, the negative association was medium, $r = -0.26$, 95% CI [−0.29, −0.23], $p < .001$, with effects being more robust for samples with larger percentage of females. There was some evidence for publication bias ($p = .022$) in the latter analysis, although the bias adjustment actually suggested a large effect size $r = -0.31$, 95% CI [−0.33, −0.28]. Importantly, self-report measures were once again associated with higher effect sizes (medium to large) in comparison to performance-based task (small effect) in both cognitive and affective empathy. For Factor 1, effects did not change substantially when callous-unemotional traits measures were removed from the analysis ($r_{affective} = -0.33$, $k = 87$; $r_{cognitive} = -0.22$, $k = 75$; $r_{total} = -0.36$, $k = 49$).

Table 3
Correlational analyses for antisocial behavior.

		Effect size statistics				Heterogeneity Statistics			Publication bias		Categorical Moderators			Meta-regression		
	k	*n*	*r*	95% CI	*p*	*Q*	*p*	I^2	*b*	*p*	*r*	95% CI	*p*	*b*	95% CI	*p*
Antisocial/ Total Empathy	73	36,106	-.16	[−.18, −.14]	< .001	231.5	< .001	68.9	.13	.707						
Self-report	71										−.16	[−.18, −.14]	< .001			
Performance	4										-.03	[−.15, .08]	.589			
Age (*M*)	71													.0004	[−.002, .003]	.749
Females (%)	73													.002	[.001, .002]	.001
Antisocial/ Affective Empathy	112	28,806	-.12	[−.14, −.10]	< .001	295.9	< .001	62.5	.06	.858						
Self-report	104										-.12	[−.15, −.10]	< .001			
Performance	13										−.07	[−.16, .02]	.132			
Age (*M*)	112													.0004	[−.002, .003]	.786
Females (%)	112													.001	[.0001, .002]	.035
Antisocial/ Cognitive Empathy	97	24,395	-.11	[−.14, −.07]	< .001	551.0	< .001	82.6	.76	.072						
Self-report	71										-.13	[−.17, −.09]	< .001			
Performance	36										-.06	[−.11, −.01]	.029			
Age (*M*)	97													.001	[−.002, .005]	.385
Females (%)	97													−.0001	[−.001, .001]	.946

The effect sizes regarding Factor 2 (impulsive-antisocial traits) were small for both total, $r = -0.17$, 95% CI [−0.23, −0.12], $p < .001$, and cognitive empathy, $r = -0.15$, 95% CI [−0.18, −0.11], $p < .001$. For affective empathy, the negative correlation was residual, $r = -0.09$, 95% CI [−0.14, −0.05], $p < .001$. For these analyses, there were not any major differences in the effect size magnitude of self-report vs. performance-based measures, although the association between performance-based affective empathy and Factor 2 was not statistically significant. There was no publication bias (all $p \geq .153$).

As it stands, the interpersonal-affective traits of psychopathy seem to emerge as the core dimension to explain deficits in affective empathy, while impulsive-antisocial traits are less informative for dissociating cognitive and affective empathy and yield a more proximal pattern for what was reported in antisocial behavior analysis (i.e., significant deficits in cognitive empathy). Nevertheless, after adjusting for publication bias, interpersonal-affective traits appear to relate to robust findings in cognitive deficits as well.

3.3.4. Correlational analyses: 4-facets model

By separately considering the facets included in Factor 1 (facet 1: interpersonal and facet 2: affective), it was possible to unveil that impaired affective empathy was mainly related to the affective features of psychopathy (facet 2). Effect sizes were large in facet 2 for affective, $r = -0.34$, 95% CI [−0.38, −0.29], $p < .001$, and total empathy, $r = -0.40$, 95% CI [−0.45, −0.35], $p < .001$, while effects were medium for cognitive empathy, $r = -0.27$, 95% CI [−0.31, −0.23], $p < .001$ (Table 7). There was evidence for publication bias in the total empathy estimate ($p = .021$) but the effect size was even larger after bias correction, $r = -0.49$, 95% CI [−0.54, −0.44]. After removing callous-unemotional traits measures, effect sizes for cognitive empathy reduced even more ($r_{cognitive} = -0.19$, $k = 26$, $p < .001$) and the effects of total empathy became even higher ($r_{total} = -0.42$, $k = 17$, $p < .001$). Removing callous-unemotional traits measures produced only negligible changes in the large effect size previously reported in affective empathy ($r_{affective} = -0.33$, $k = 31$, $p < .001$).

This dissociation between affective and cognitive empathy was also observed in interpersonal traits (facet 1) but at more modest levels (Table 7). The effects were medium in facet 1 for affective, $r = -0.25$, 95% CI [−0.31, −0.19], $p < .001$, and total empathy, $r = -0.25$, 95% CI [−0.30, −0.20], $p < .001$, and small for the cognitive domain, $r = -0.16$, 95% CI [−0.21, −0.10], $p < .001$. The cognitive empathy model displayed publication bias ($p = .004$) and the negative correlation of this domain with facet 1 was larger after correction, $r = -0.24$, 95% CI [−0.29, −0.19]. As previously described, there are some reasons to frame the YPI Grandiose-Manipulate traits within the non-adaptive facet 1. Thus, control analyses were implemented to check unique associations of YPI Grandiose-Manipulate with empathy domains and also to examine whether including it within the interpersonal facet 1 interfered with the pattern of results. YPI Grandiose-Manipulate traits alone were only significantly associated with affective empathy, although the negative effect size was only residual, $k = 15$, $r = -0.08$, 95% CI [−0.13, −0.03], $p = .002$. The association of this YPI domain with cognitive and total empathy was not significant and even smaller ($r = 0.00$ and -0.04, respectively). Interestingly, merging the YPI with facet-1 operationalization significantly reduced effect sizes across all empathy domains. After including YPI Grandiose-Manipulative effect, the association between cognitive empathy and facet 1 was only residual, $r = -0.09$, 95% CI [−0.14, −0.04], $p = .001$. Similarly, facet 1 effects sizes for affective and total empathy downgraded to small negative effects ($r = -0.19$ and $r = -0.17$, respectively). Thus, YPI Grandiose-Manipulate seems to be suppressing the expected association of psychopathy maladaptive traits with empathic deficits, possibly suggesting that it is a closer operationalization of the 3-dimensional models.

The impulsive lifestyle and antisocial traits (facets 3 and 4,

Table 4
Group-based analyses for psychopathy.

	k	Effect size statistics					Heterogeneity Statistics			Publication bias		Categorical Moderators			Meta-regression		
		n		g	95% CI	p	Q	p	I^2	b	p	g	95% CI	p	b	95% CI	p
		Psychopathy	Controls														
Psychopathy / Total Empathy	13	922	938	−.54	[−.85, −.24]	.001	85.9	< .001	86.0	.13	.938						
Self-report	13											−.54	[−.85, −.24]	.001			
Performance	0											–	–	–			
Age (*M*)	13														.013	[−.013, .040]	.324
Females (%)	13														−.007	[−.017, .004]	.218
Psychopathy/ Affective Empathy	31	1610	1662	−.40	[−.55, −.25]	< .001	102.7	< .001	7.8	.52	.543						
Self-report	28											−.39	[−.58, −.21]	< .001			
Performance	9											−.35	[−.52, −.19]	< .001			
Age (*M*)	31														.011	[−.003, .025]	.112
Females (%)	31														−.002	[−.007, .003]	.438
Psychopathy/ Cognitive Empathy	36	1831	1916	−.22	[−.32, −.12]	< .001	62.5	.003	44.0	−.38	.476						
Self-report	25											−.28	[−.40, −.16]	< .001			
Performance	20											−.16	[−.29, −.03]	.019			
Age (*M*)	36														.008	[−.002, .018]	.104
Females (%)	36														−.002	[−.006, .001]	.217

respectively) yielded a pattern of findings that was consistent with the broad factor they encompass (i.e., Factor 2), with effect sizes being small in all analyses. For facet 3, effect sizes were small for total and affective empathy (both $r = -0.12$), as well as for cognitive empathy, $r = -0.10$, 95% CI [−0.15, −0.05], $p < .001$. The effect size regarding facet 3 and affective empathy was likely influenced by publication bias ($p = .029$) and the trim-and-fill correction suggested a residual association between both constructs, $r = -0.03$, 95% CI [−0.09, 0.02]. For facet 4, effect sizes also were quite similar and small for total, affective, and cognitive empathy ($r = -0.14$ to -0.11).

Regarding moderation analyses, effect sizes for facets 1 and 2 were consistently larger for self-report measures (small to large effects) in comparison to performance-based tasks (mostly residual effects) in both empathy domains. Effect sizes for performance-based cognitive and affective empathy were not statistically significant for facet 1. The magnitude of effects for facets 3 and 4 were less discrepant between measures, although most effect sizes computed for performance-based tasks were not statistically significant (only the effect regarding facet 3 and cognitive empathy was significant). Moreover, effect sizes were larger in younger samples for the analysis addressing the association of total empathy with facets 3 and 4, as well as for the relationship between cognitive empathy and facet 3.

In summary, the 4-facets model seems to be more informative than the 2-factors model. Affective traits (facet 2) appear to be the critical factor explaining reduced affective empathy in the broad Factor 1. Even though facet 2 is also negatively associated with cognitive empathy, effects are consistently larger in total and affective empathy. Although a similar pattern was found for interpersonal traits (facet 1), effect sizes remained at the medium range and more modest compared to affective traits (facet 2) even after adjusting for publication bias. Finally, both impulsive lifestyle (facet 3) and antisocial traits (facet 4) displayed small or residual negative associations with both cognitive and affective empathy, similarly to findings for Factor 2 and general antisocial behavior measures. There were no significant changes in these facets after correcting for publication bias (facet 2 with total empathy and facet 3 with affective empathy).

3.3.5. Correlational analyses: 3-dimensions model

In this model (Table 8), meanness was the dimension more strongly associated with reduced affective empathy scores, $r = -0.35$, 95% CI [−0.40, −0.31], $p < .001$, even though there was some evidence for publication bias in this analysis ($p = .018$). The adjusted estimate for this effect originated an even stronger negative correlation $r = -0.46$, 95% CI [−0.51, −0.42]. This large effect was also observed in total empathy, $r = -0.41$, 95% CI [−0.46, −0.35], $p < .001$, with both findings being moderated by age (larger effects in older samples). In turn, the effect size for cognitive empathy was only medium, $r = -0.26$, 95% CI [−0.30, −0.22], $p < .001$, suggesting that effects related to meanness were more robust in the affective domain of empathy. In this psychopathy phenotype, self-report measures exhibited stronger effects compared to performance-based tasks on affective empathy (large vs. moderate effects, respectively), but especially in the cognitive domain (larger vs. residual effects, respectively). Of note, the main effects remained almost unaltered when excluding callous-unemotional traits measures from meanness ($r_{affective} = -0.38$, $k = 49$; $r_{cognitive} = -0.22$, $k = 49$; $r_{total} = -0.42$, $k = 33$).

Effect sizes for disinhibition were negligible to small (Table 8) across all empathy domains ($r = -0.14$ to -0.08), providing similar results to Factor 2, facets 3 and 4, and general antisocial behavior measures. Yet these effects were moderated by age in affective empathy such that older samples depicted larger effects. In the association between disinhibition and affective empathy, it was found evidence for publication bias ($p = .028$). The trim-and-fill adjusted estimate suggested that disinhibition and affective empathy are moderately and negatively associated $r = -0.21$, 95% CI [−0.27, −0.16]. The effect sizes for disinhibition were all small and significant for self-report measures, but none of the empathy

Table 5
Correlational analyses for psychopathy total scores.

		Effect size statistics				Heterogeneity Statistics			Publication bias		Categorical Moderators			Meta-regression		
	k	*n*	*r*	95% CI	*p*	*Q*	*p*	I^2	*b*	*p*	*r*	95% CI	*p*	*b*	95% CI	*p*
Psychopathy/ Total Empathy	87	28,365	-.29	[−.33, −.25]	< .001	916.6	< .001	9.6	.33	.614						
Self-report	85										-.30	[−.34, −.26]	< .001			
Performance	2										-.03	[−.18, .12]	.687			
Age (*M*)	87													−.003	[−.007, .002]	.268
Females (%)	87													−.0003	[−.002, .001]	.612
Psychopathy/ Affective Empathy	113	32,229	-.29	[−.32, −.25]	< .001	100.9	< .001	88.8	.39	.459						
Self-report	106										-.31	[−.34, −.27]	< .001			
Performance	24										-.15	[−.21, −.09]	< .001			
Age (*M*)	111													−.004	[−.009, .0001]	.056
Females (%)	113													−.001	[−.002, .0003]	.166
Psychopathy/ Cognitive Empathy	106	29,797	-.19	[−.22, −.16]	< .001	533.7	< .001	8.3	.10	.808						
Self-report	92										-.20	[−.23, −.17]	< .001			
Performance	28										-.12	[−.16, −.07]	< .001			
Age (*M*)	103													.0003	[−.004, .004]	.871
Females (%)	106													−.001	[−.001, .0004]	.303

domains displayed a statistically significant association when using performance-based tasks.

Finally, there was a negative association between boldness and total empathy, $r = -0.14$, 95% CI [−0.21, −0.06], $p = .001$. The specific analysis for each empathy domain showed that affective empathy is the main factor accounting for this effect, $r = -0.17$, 95% CI [−0.22, −0.12], $p < .001$, although the negative correlation was still small. Here it is important to notice that this effect was moderated by measurement type, as the effect size was small and significant for self-report measures, but not statistically significant when using performance-based tasks. Conversely, no significant effects at the false discovery rate threshold were detected for cognitive empathy, suggesting that boldness is not associated with deficits in this domain, $r = 0.03$, 95% CI [−0.02, 0.08], $p = .200$. No publication bias was observed (all $p \geq .700$).

Additional control analyses were conducted to assess whether YPI Grandiose-Manipulate traits moderated the boldness-related associations with empathy. That is, it was explored whether the associations between boldness and empathy remained the same after excluding YPI Grandiose-Manipulate from these analyses. Non-YPI boldness measures were still negatively associated with affective and total empathy, only with a slight increase in magnitude ($r = -0.21$ and $r = -0.20$, respectively). Even after removing effects pertaining to the YPI, boldness was still not significantly associated with cognitive empathy, $r = 0.04$, 95% CI [−0.02, 0.11], $p = .181$. YPI Grandiose-Manipulative traits are similarly associated with empathy domains as other 3-dimensional measures, further justifying the option of considering it within the psychopathy personality operationalization.

Thus, in the 3-dimensional model, meanness results closely resemble those reported for the affective domain of the 4-facets model (facet 2), with effects being even larger after correcting for publication bias. Disinhibition further presented a similar pattern to impulsive and antisocial traits (Factor 2, facets 3 and 4 and correlations with general antisocial behavior measures), although the effect size for affective empathy was medium after correcting for publication bias. Boldness and interpersonal traits (facet 1) shared a negative association with affective empathy, with a non-significant (positive) effect being reported for cognitive empathy. As a result, boldness seems to be associated with preserved cognitive empathy.

4. Discussion

Empathy deficits are widely regarded as a hallmark of psychopathy. However, it is still lacking a comprehensive endeavor examining the complex interplay between empathy domains (cognitive and affective) and psychopathy dimensions, particularly addressing the conceptual controversies between the main frameworks in the field. The available theoretical models provide different assumptions about the role of antisocial behavior in psychopathy and tend to progress on their separate lanes without any major integration attempts for evaluating how underlying processes – such as empathy – are differently related to heterogeneous expressions of psychopathy. To address this gap, this meta-analysis set out to systematically review the association between psychopathy traits, antisocial behavior, and empathy domains. The next sections will review the main results and discuss their implications for the theoretical conceptualization of psychopathy and antisocial behavior.

4.1. Main findings

In this section, we aim to provide an overview of the main meta-analytical findings. We will focus on group-based analysis and how they can inform on fundamental differences in empathic profiles in psychopathy and antisocial behavior and then on correlational analysis and what they can tell us about the heterogeneity of the personality

Table 6
Correlational analyses for the 2-factor model.

		Effect size statistics				Heterogeneity Statistics			Publication bias		Categorical Moderators			Meta-regression		
	k	*n*	*r*	95% CI	*p*	*Q*	*p*	I^2	*b*	*p*	*r*	95% CI	*p*	*b*	95% CI	*p*
Factor 1/ Total Empathy	86	22,276	−.38	[−.42, −.34]	< .001	973.9	< .001	91.3	.09	.894						
Self-report	86										−.38	[−.42, −.34]	< .001			
Performance	0										–	–	–			
Age (*M*)	84													−.003	[−.007, .002]	.282
Females (%)	84													−.001	[−.002, .0001]	.061
Factor 1/ Affective Empathy	137	3.564	-.33	[−.36, −.30]	< .001	1101.0	< .001	87.6	.68	.170						
Self-report	125										-.36	[−.39, −.32]	< .001			
Performance	31										-.19	[−.25, −.13]	< .001			
Age (*M*)	134													−.006	[−.010, −.002]	.002
Females (%)	135													−.001	[−.002, .0001]	.092
Factor 1/ Cognitive Empathy	128	28.463	-.26	[−.29, −.23]	< .001	685.5	< .001	81.5	.91	.022						
Self-report	107										-.29	[−.32, −.26]	< .001			
Performance	38										-.12	[−.17, −.06]	< .001			
Age (*M*)	124													−.001	[−.004, .002]	.774
Females (%)	126													−.001	[−.002, −.0004]	.004
Factor 2/ Total Empathy	49	15,167	-.17	[−.23, −.12]	< .001	457.1	< .001	89.5	−.07	.937						
Self-report	44										-.17	[−.23, −.12]	< .001			
Performance	0										–	–	–			
Age (*M*)	49													−.002	[−.008, .004]	.462
Females (%)	49													−.001	[−.002, .001]	.436
Factor 2/ Affective Empathy	76	19,529	-.09	[−.14, −.05]	< .001	534.8	< .001	86.0	.86	.153						
Self-report	69										-.10	[−.15, −.06]	< .001			
Performance	16										-.06	[−.10, −.01]	.012			
Age (*M*)	75													−.001	[−.007, .005]	.756
Females (%)	76													−.001	[−.002, .001]	.388
Factor 2/ Cognitive Empathy	73	18,571	-.15	[−.18, −.11]	< .001	339.3	< .001	78.8	−.06	.906						
Self-report	61										-.16	[−.20, −.12]	< .001			
Performance	18										-.10	[−.15, −.04]	< .001			
Age (*M*)	71													−.004	[−.008, .001]	.091
Females (%)	73													−.001	[−.002, .0004]	.249

structure, especially regarding the dissociation of adaptive and maladaptive features and their links with empathy.

4.1.1. Psychopathy vs. antisocial behavior: the differential role of cognitive and affective empathy

A longstanding research question in the field leans on whether antisocial behavior is a coherent part of the psychopathic personality structure. Some theoretical models argue that antisocial behavior is inherently blended in the construct of psychopathy (Hare & Neumann, 2008; Neumann et al., 2007), while others postulate that this association is not linear (Cooke & Michie, 2001; Pasion et al., 2018a; Patrick, 2006; Patrick et al., 2009). As a result, critical processes that may underpin

Table 7
Correlational analyses for the 4-facets model.

		Effect size statistics				Heterogeneity Statistics			Publication bias		Categorical Moderators			Meta-regression		
	k	*n*	*r*	95% CI	*p*	*Q*	*p*	I^2	*b*	*p*	*r*	95% CI	*p*	*b*	95% CI	*p*
Interpersonal (f1)/ Total Empathy	20	6036	-.25	[−.30, −.20]	< .001	53.1	< .001	64.2	.21	.744						
Self-report	18										-.25	[−.30, −.20]	< .001			
Performance	0										–	–	–			
Age (*M*)	20													.006	[−.004, .016]	.259
Females (%)	20													−.0001	[−.002, .002]	.965
Interpersonal (f1)/ Affective Empathy	29	9476	-.25	[−.31, −.19]	< .001	222.4	< .001	87.4	−1.08	.225						
Self-report	25										-.30	[−.36, −.23]	< .001			
Performance	10										-.07	[−.14, −.01]	.028			
Age (*M*)	27													.004	[−.007, .016]	.480
Females (%)	29													−.001	[−.004, .001]	.287
Interpersonal (f1)/ Cognitive Empathy	25	8823	-.16	[−.21, −.10]	< .001	94.7	< .001	74.6	1.75	.004						
Self-report	21										-.17	[−.22, −.12]	< .001			
Performance	10										-.07	[−.12, −.01]	.013			
Age (*M*)	24													.005	[−.004, .014]	.276
Females (%)	25													−.002	[−.003, −.0004]	.014
Affective (f2)/ Total Empathy	58	12,893	-.40	[−.45, −.35]	< .001	562.0	< .001	89.9	2.07	.021						
Self-report	53										-.40	[−.45, −.35]	< .001			
Performance	0										–	–	–			
Age (*M*)	55													−.005	[−.012, .002]	.157
Females (%)	55													−.001	[−.003, .001]	.293
Affective (f2)/ Affective Empathy	87	19,949	-.34	[−.38, −.29]	< .001	731.7	< .001	88.2	.31	.627						
Self-report	78										-.37	[−.41, −.33]	< .001			
Performance	22										-.17	[−.22, −.13]	< .001			
Age (*M*)	82													−.002	[−.008, .003]	.370
Females (%)	84													−.0002	[−.002, .001]	.742
Affective (f2)/ Cognitive Empathy	84	18,940	-.27	[−.31, −.23]	< .001	629.0	< .001	86.8	.11	.860						
Self-report	72										-.31	[−.36, −.27]	< .001			
Performance	28										-.08	[−.12, −.04]	< .001			
Age (*M*)	80													−.0001	[−.005, .005]	.967
Females (%)	81													−.001	[−.003, −.0001]	.050
Impulsive Lifestyle (f3)/ Total Empathy	19	5972	-.12	[−.17, −.07]	< .001	47.2	< .001	61.9	−.46	.481						
Self-report	19										-.12	[−.17, −.07]	< .001			
Performance	0										–	–	–			
Age (*M*)	19													.014	[.005, .024]	.003
Females (%)	19													.0003	[−.001, .002]	.758
Impulsive Lifestyle (f3)/ Affective Empathy	29	9472	-.12	[−.17, −.07]	< .001	11.7	< .001	74.7	−1.33	.029						
Self-report	25										-.14	[−.19, −.09]	< .001			
Performance	10										-.05	[−.12, .01]	.100			
Age (*M*)	27													−.001	[−.008, .007]	.830
Females (%)	29													.001	[−.001, .002]	.570
Impulsive Lifestyle (f3)/ Cognitive Empathy	25	8.799	-.10	[−.15, −.05]	< .001	101.8	< .001	76.4	1.06	.113						
Self-report	21										-.10	[−.16, −.04]	< .001			
Performance	10										-.10	[−.15, −.04]	< .001			
Age (*M*)	24													.011	[.007, .016]	< .001
Females (%)	25													−.001	[−.003, .001]	.302
Antisocial (f4)/ Total Empathy	16	3197	-.14	[−.21, −.07]	< .001	49.7	< .001	69.8	.18	.869						
Self-report	16										-.14	[−.21, −.07]	< .001			
Performance	0										–	–	–			
Age (*M*)	16													.018	[.005, .030]	.006
Females (%)	16													−.001	[−.003, .002]	.644
Antisocial (f4)/ Affective Empathy	26	6461	-.12	[−.17, −.08]	< .001	59.0	< .001	57.6	.12	.830						
Self-report	22										-.14	[−.19, −.09]	< .001			
Performance	10										-.05	[−.11, .02]	.155			
Age (*M*)	24													.004	[−.002, .010]	.163
Females (%)	26													−.001	[−.003, .001]	.487
Antisocial (f4)/ Cognitive Empathy	22	6039	-.11	[−.17, −.05]	.001	94.5	< .001	77.8	−.76	.360						
Self-report	18										-.12	[−.19, −.05]	.001			
Performance	10										-.08	[−.15, −.01]	.020			
Age (*M*)	21													.011	[.001, .022]	.037
Females (%)	22													−.001	[−.003, .001]	.255

psychopathy and antisocial behavior – e.g., empathy – are critical to examine points of convergence/divergence between both constructs.

Results on group-based analyses indicated that antisocial groups display deficits in cognitive empathy. Smaller effects are reported in the affective domain. Overall, these findings are consistent with previous meta-analyses describing that cognitive empathy is the core component that is impaired in criminal and antisocial samples (Jolliffe & Farrington, 2004; Miller & Eisenberg, 1988; Morrow, 2020; van Langen et al., 2014). However, these meta-analyses did not account for the confounding role of psychopathy, which is thought to be a criminogenic trait with high prevalence in forensic settings. The implemented analytical strategy removed samples with high psychopathy traits from the antisocial groups whenever this information was available, allowing to better control for this confounding factor.

Psychopathy group-based analysis revealed an opposite pattern of results in comparison to antisocial groups. High psychopathy groups displayed affective empathy deficits (nearly reaching the medium cut-off) that were almost twice the size of cognitive empathy impairments (near the lower threshold of small effects). These findings are compatible with previous studies suggesting that affective empathy is impaired in antisocial samples only when callous-unemotional (Fairchild et al., 2019; Frick & Kemp, 2020) and psychopathic traits co-vary (Bons et al., 2013; Fairchild et al., 2019; Frick & Kemp, 2020; Marsden et al., 2019; Sedgwick et al., 2017) Importantly, these results strengthen the assumption that psychopathic and antisocial groups exhibit fundamentally differences in empathic profiles, which suggests that these two constructs are not linearly associated and should not be clustered together.

Even so, the distinct empathy profiles of antisocial behavior and psychopathy were not as clearly observed in correlational analyses. Although total psychopathy scores were more strongly correlated with affective empathy rather than cognitive empathy (as expected), general antisocial behavior displayed similar small effect sizes for both empathy domains. Hence, the small correlation between general antisocial behavior and cognitive empathy fell short of the greater deficits found in group-based analysis for this empathy domain. Interestingly, psychopathy dimensions closely related to antisocial expressions (Factor 2, facet 3, facet 4, and disinhibition) also yielded residual or small associations with both cognitive and affective empathy, similar to the correlational analysis for general antisocial behavior. The unique exception was for disinhibition after correcting for publication bias, since it yielded associations in the medium range with affective empathy.

These findings do not invalidate the latter conclusions from group-based analysis, but rather suggest that cognitive empathy deficits are only observed in the extreme end of the antisocial spectrum. A possible mechanism to explain these results may rely on differences in cognitive functioning, namely the dysfunction of executive brain networks in antisocial behavior. A previous meta-analysis systematically documented the interplay between executive functioning and cognitive empathy, such that the lack of inhibitory control was specifically associated with deficits in cognitive empathy (Yan, Hong, Liu, & Su, 2020). Findings from developmental and cognitive neuroscience further demonstrate that theory of mind and executive functioning share neurobiological commonalities (Wade et al., 2018). Thus, executive functioning may play a critical role in the ability to understand the mental states of oneself and others, allowing human beings to inhibit self-perspective and shift towards the perspective of others more effectively. As executive functioning is widely impaired across antisocial groups (Ogilvie et al., 2011), one can argue that deficits in these domain-general mechanisms may interfere with cognitive empathy. Whilst this may be the case for the antisocial group-based analysis, impairments on basic cognitive dimensions might not play a role in correlational analysis, particularly considering that over 80% of the included studies encompassed community samples, which likely explains the gap between group and correlational analyses.

Regardless of these results for antisocial behavior, correlational

Table 8
Correlational analyses for the 3-dimensions model.

		Effect size statistics				Heterogeneity Statistics			Publication bias		Categorical Moderators			Meta-regression		
	k	*n*	*r*	95% CI	*p*	*Q*	*p*	I^2	*b*	*p*	*r*	95% CI	*p*	*b*	95% CI	*p*
Boldness/ Total Empathy	33	10,649	-.14	[−.21, −.06]	.001	458.4	< .001	93.0	.29	.823						
Self-report	32										-.14	[−.22, −.06]	.001			
Performance	1										-.01	[−.10, .09]	.887			
Age (*M*)	33													−.004	[−.013, .005]	.412
Females (%)	33													−.001	[−.003, .001]	.351
Boldness/ Affective Empathy	51	14,541	-.17	[−.22, −.12]	< .001	357.8	< .001	86.0	.31	.700						
Self-report	50										-.19	[−.24, −.15]	< .001			
Performance	8										.01	[−.15, .17]	.877			
Age (*M*)	50													−.006	[−.012, −.0002]	.044
Females (%)	51													−.001	[−.002, .001]	.311
Boldness/ Cognitive Empathy	51	14,467	.03	[−.02, .08]	.200	354.6	< .001	85.9	.116	.875						
Self-report	45										.03	[−.02, .08]	.251			
Performance	11										.01	[−.06, .08]	.735			

(*continued on next page*)

Table 8 (*continued*)

		Effect size statistics				Heterogeneity Statistics			Publication bias		Categorical Moderators			Meta-regression		
	k	*n*	*r*	95% CI	*p*	*Q*	*p*	I^2	*b*	*p*	*r*	95% CI	*p*	*b*	95% CI	*p*
Age (*M*)	50													.004	[−.001, .010]	.105
Females (%)	51													−.0003	[−.002, .001]	.754
Meanness/ Total Empathy	73	19,277	-.41	[−.46, −.35]	< .001	1288.8	< .001	94.4	1.26	.194						
Self-report	72										-.41	[−.46, −.36]	< .001			
Performance	1										-.15	[−.24, −.05]	.003			
Age (*M*)	71													−.009	[−.015, −.003]	.003
Females (%)	71													−.001	[−.003, .001]	.300
Meanness / Affective Empathy	100	23,225	-.35	[−.40, −.31]	< .001	1433.1	< .001	93.1	1.84	.018						
Self-report	95										-.38	[−.42, −.33]	< .001			
Performance	19										-.20	[−.26, −.13]	< .001			
Age (*M*)	97													−.009	[−.014, −.004]	.001
Females (%)	98													−.001	[−.003, .001]	.296
Meanness/ Cognitive Empathy	102	22,884	-.26	[−.30, −.22]	< .001	875.0	< .001	88.5	.20	.730						
Self-report	89										-.31	[−.35, −.27]	< .001			
Performance	28										-.07	[−.11, −.02]	.003			
Age (*M*)	99													−.002	[−.007, .002]	.329
Females (%)	100													−.001	[−.002, .0002]	.111
Disinhibition/ Total Empathy	35	10,822	-.14	[−.21, −.06]	<.001	457.8	< .001	92.6	1.95	.096						
Self-report	34										-.14	[−.22, −.06]	<.001			
Performance	1										-.08	[−.18, .01]	.089			
Age (*M*)	35													−.008	[−.015, −.0004]	.038
Females (%)	35													.001	[−.001, .003]	.484
Disinhibition/ Affective Empathy	52	15,059	-.08	[−.14, −.03]	.005	594.2	< .001	91.4	2.16	.028						
Self-report	51										-.09	[−.15, −.03]	.005			
Performance	8										.01	[−.09, .12]	.787			
Age (*M*)	51													−.009	[−.015, −.003]	.006
Females (%)	52													−.0001	[−.002, .002]	.9996
Disinhibition/ Cognitive Empathy	53	14,601	-.10	[−.15, −.05]	<.001	349.0	< .001	85.1	.37	.597						
Self-report	46										-.11	[−.16, −.06]	<.001			
Performance	12										-.01	[−.08, .05]	.720			
Age (*M*)	52													−.006	[−.012, −.001]	.022
Females (%)	53													.0002	[−.001, .002]	.759

analysis still suggested that psychopathy is more strongly and negatively associated with affective rather than cognitive empathy, which emphasizes out the importance of identifying which psychopathy dimension better explains these deficits.

4.1.2. The core underlying factor of empathy deficits in psychopathy: affective, callous, and meanness traits

The current results strongly suggest that the affective dimension of psychopathy (facet 2, meanness, and callous-unemotional traits) is associated with a broad empathy impairment, although effect sizes were larger for affective empathy. Regardless of the conceptual framework, this dimension displayed large correlations with affective empathy and medium effect sizes for cognitive empathy, allowing for two important considerations. Firstly, results exhibit the pattern reported in the psychopathy group-based analysis, suggesting that callous-unemotional and meanness-affective traits can be of a nuclear role in psychopathy-related empathic deficits. Secondly, the pattern of results in these dimensions were clearly distinct from traits more closely related to antisocial behavior (i.e., disinhibition and impulsive-antisocial traits). This strengthens the assumption that psychopathy is not a unitary construct insofar as empathic profiles differ across psychopathic dimensions.

Despite these findings, it is imperative to evaluate whether empathic deficits in affective, callous, and meanness traits of psychopathy are not due to item-overlap between inventories assessing empathy and psychopathy. For instance, callous-unemotional questionnaires are often used as interchangeable measures of empathy since they include items that resemble those commonly included in empathy scales (e.g., ICU -"*I do not care whom I hurt to get what I want", "I do not feel remorseful when I do something wrong";* TriPM - *"How other people feel is important to me", "I am sensitive to the feelings of others", "It's easy for me to relate to other people's emotions")*. This could cause a certain circularity in assessing the interrelations between both constructs (Waller et al., 2020). However, several aspects of the current analytical approach enabled to somewhat discard the idea that the covariance between psychopathy and empathy is only due to item overlap. Firstly, the correlation coefficients reported were far from being multicollinear and Waller et al. (2020) previously noted that measures of empathy and callous-affective psychopathy traits map onto different attributes (e.g., items related to exploitation, excitement seeking, defiance to authority, etc.). Secondly, there were also medium correlation effects with cognitive empathy, a domain much lesser represented in psychopathy inventories. Thirdly, performance-based affective empathy further yielded significant negative associations with these psychopathic traits. Effects were smaller but this is likely due to shared method variance (i.e., self-report measures will correlate higher between them than with other measurement modalities) and the reduced number of included studies (cf. also Further Results section).

In sum, callous-unemotional, meanness, and affective traits of psychopathy seem to be essentially linked to deficits in affective empathy and, to a lesser extent, with cognitive empathy impairments. However, these deficits in the affective dimension cannot solve the emotion paradox, which stresses the importance of exploring how interpersonal traits interact with cognitive and affective empathy.

4.1.3. Adaptive vs. non-adaptive interpersonal traits: the differential role of cognitive empathy

Effect size directions regarding the association between empathy and interpersonal features of psychopathy (facet 1 and boldness) were conflicting across the theoretical models under analysis. In the 4-facets model, the interpersonal dimension (facet 1) correlated with reduced empathy in both domains although at a more modest range compared to the affective dimension (facet 2). Conversely, preserved cognitive empathy was found in boldness traits, despite evidence for small deficits in affective empathy.

PCL-based measures used to operationalize the 4-facets models are extensively used in forensic settings and intend to capture the maladaptive characteristics of psychopathy (e.g., glibness/superficial charm, pathological lying, conning/manipulative; Hare & Neumann, 2008). Inversely, boldness was conceived to map the positive adjustment features of psychopathy as distributed in the general community (e.g., TriPM, *"I can get over things that would traumatize others", "I am well-equipped to deal with stress", "I function well in new situations, even when unprepared", "I'm a born leader"* (Patrick, 2010). Similarly, to minimize social desirability bias, the items of the Youth Psychopathic Traits Inventory (3-dimensional operationalization) were written in terms that may be considered positive or admirable by individuals scoring high in psychopathy (Drislane et al., 2015). Our control analysis confirmed that YPI suppressed the effects of facet 1 and results were more proximal of those reported in boldness. As such, one could argue that distinct conceptualizations and operationalizations exist in the field. PCL-based interpersonal domains (facet 1) will be inherently more closely related to antisocial expressions of behavior, while this association is much less linear for the positive adjustment indicators weighted into a greater extent in boldness-related traits from TriPM, PPI, or YPI.

The distinct architecture of psychopathy inventories is a direct consequence of the fundamental differences between the 3-dimensions and 4-facets models, which may ultimately lead to opposite associations with cognitive empathy. Although the association of empathy with the affective (facet 2 and meanness) and antisocial-behavioral components of psychopathy (facets 3 and 4, disinhibition) indicates some degree of overlap in the conceptual frameworks of psychopathy, the same cannot be said regarding the operationalization of the interpersonal dimension. As a result, the divergence between PCL-based and triarchic models is not only inherently related to the controversy on whether the antisocial dimension can be excluded from psychopathy inventories but also to what extent interpersonal traits should be operationalized in an adaptive manner.

Hence, adaptive interpersonal traits (boldness but not facet 1) may be critical to understanding the emotion paradox of psychopathy. These traits could explain why some psychopathic individuals may be able to use cognitive computations to infer the mental states of others (i.e., intact cognitive empathy), while simultaneously masking their inability to share the emotional states of others (i.e., impaired affective empathy). This can allow them to mimic normal human interactions and take advantage of these features to deceive and manipulate others for self-benefit.

4.2. Further results, clinical practice, limitations, and future directions

In this section, we aim to comprehensively explore additional moderators of effect sizes, reflect on limitations and future directions, and analyze how our results translate for psychological assessment and intervention practices.

4.2.1. Sociodemographic moderators

Moderation analyses were conducted to explore how age and sex played a role in the relationship between psychopathy and empathy.

Empathy and psychopathic traits are thought to be differentially expressed in males and females (Cale & Lilienfeld, 2002; Christov-Moore et al., 2014; Verona & Vitale, 2018). For instance, a meta-analysis indicated that overall empathy is less affected in female offenders in comparison to male offenders (van Langen et al., 2014). However, globally, the current meta-analysis does not show the moderation effects of sex. In general antisocial scores, only total empathy effects were moderated by studies including a higher proportion of males. Regarding psychopathy, only studies measuring Factor 1/cognitive empathy reported increased effect sizes for studies including a higher percentage of females. The lack of sex moderation effects is consistent with a previous meta-analysis (Waller et al., 2020).

Age was a significant moderator for several of the computed effect sizes, albeit regression coefficients being quite small. Waller et al. (2020) argued that larger effect sizes for empathy deficits in younger offender

samples are likely due to the increased prevalence of delinquent behaviors during adolescence. Our data in antisocial groups and psychopathic traits closely related to antisocial behavior (facets 3 and 4) aligns with this reasoning. Interestingly, several analyses in the 3-dimensional model yielded opposite results; that is, effect sizes were larger in older samples for the correlation between meanness and total/affective empathy, as well disinhibition and affective empathy. These results are once again probably best explained by differences in the operationalization of psychopathy. Given that 3-dimensional questionnaires remove the antisocial dimension and weight to a greater extent adaptive features, they can be less able to detect delinquent acts in younger samples. It is also important to emphasize that cognitive and affective empathy display different development patterns across the lifespan (Main & Kho, 2020; Sun, Luo, Zhang, Li, & Li, 2018). Hence, future longitudinal studies need to explore how psychopathy and empathy evolve across development while also shedding light on environmental factors that may moderate this link.

4.2.2. Lessons learned for empathy assessment

Despite the focus on the dissociation between cognitive and affective empathy, the analytical strategy of the current work also encompassed the computation of effect sizes for total empathy scores. Across both group-based and correlational analyses, total empathy was more strongly associated with psychopathy than antisocial behavior, making it reasonable to state that empathic deficits are much largely a core feature of psychopathy rather than antisociality. Despite this valuable insight, only the analyses for each empathy domain allowed to dissociate distinct profiles in psychopathy and antisocial behavior and the differential role of each empathy domain across psychopathy dimensions. Thus, stating that empathy is a major hallmark in psychopathy is not an incorrect saying, but it provides an unprecise picture of the complex interaction between these two variables.

Even more so, several empathy models and empirical data reveal that specific subcomponents of empathy exist within the broader cognitive and affective domains (e.g., Dvash & Shamay-Tsoory, 2014; Schurz et al., 2020; Rijnders, Terburg, Bos, Kempes, & van Honk, 2021; Stevens & Taber, 2021). Cognitive empathy can be further subdivided into cognitive and affective theory of mind; that is, the ability to mentalize about non-emotional mental states (cognitive perspective-taking) in contrast to mentalizing about others' feelings and emotions (affective perspective-taking). There is evidence suggesting that cognitive and affective theory of mind display somewhat different neuroanatomical correlates, despite both constructs being associated with activation of classic theory of mind brain networks (Kalbe et al., 2010; Schlaffke et al., 2015; Sebastian et al., 2012; Shamay-Tsoory & Aharon-Peretz, 2007). Similarly, affective empathy can be further decomposed into affective sharing, personal distress, and empathic concern. Affective sharing diverges from other affective empathy subcomponents due to its degree of isomorphism and it has been associated with distinct neurobiological correlates when compared, for example, to empathic concern (de Vignemont & Singer, 2006; Decety, Lewis, & Cowell, 2015; Klimecki, Leiberg, Ricard, & Singer, 2014). Personal distress and empathic concern further differ on the degree of self- vs. other-orientation of responses when seeing someone in distress (Stevens & Taber, 2021). These constructs were differentially associated with emotion recognition (Israelashvili et al., 2020) and pro-social behavior (Williams, O'Driscoll, & Moore, 2014), while also displaying distinct neuroanatomical correlates (Ashar, Andrews-Hanna, Dimidjian, & Wager, 2017). However, this putative dissociation between personal distress and empathic concern is not widely consensual as conflicting findings also exist. Personal distress and empathic concern were similarly associated with greater closeness towards another person experiencing pain (Grynberg & Konrath, 2020) and emotional regulation when observing someone in distress (Grynberg & López-Pérez, 2018). Moreover, there is evidence suggesting that both constructs are associated with insula-related activations during empathy tasks (Saarela et al., 2007; Singer et al., 2004). Thus, personal distress and empathic concern should be at least partially correlated, representing a common latent factor which is likely emotional reactivity to others' distress.

Despite the underlying subcomponents of cognitive and affective empathy not being widely consensual, it is reasonable to argue that psychopathy dimensions may be differentially associated with these constructs. For instance, the negative association between boldness-related traits and affective empathy could be related to reduced personal distress driven by enhanced stress immunity, and not due to an affective-sharing inability per se. Maladaptive interpersonal traits were negatively associated with cognitive empathy, although it is feasible to postulate whether these deficits can be observed in both cognitive and affective theory of mind tasks. Thus, future studies should keep up with recent behavioral and neuroscientific evidence on additional empathy subcomponents. The dimensional nature of empathy has been explored within other social brain disorders such as autism (Song, Nie, Shi, Zhao, & Yang, 2019) and schizophrenia (Bonfils, Lysaker, Minor, & Salyers, 2017). Similar endeavors in psychopathy should be accomplished.

There are also a few issues that need to be addressed regarding the way self-reports assess empathy. Studies mainly used the Interpersonal Reactivity Index to assess empathy in both group-based and correlation analyses in psychopathy (45% and 38.19%, respectively). This was one of the first questionnaires that truly proposed a multidimensional framework of empathy (Davis, 1983), but in the last decades, poorly fit two-factorial solutions have been reported for a wide array of scoring alternatives (Wang, Li, Xiao, Fu, & Jie, 2020) (Chrysikou & Thompson, 2016). For instance, the construct validity of the personal distress subscale is questionable (Murphy et al., 2020) and the fantasy subscale is not always conceived as a proxy for cognitive empathy (Murphy & Lilienfeld, 2019). As a result, recent questionnaires such as the Questionnaire of Cognitive and Affective Empathy (Reniers et al., 2011) or the Basic Empathy Scale (Jolliffe & Farrington, 2006) propose more refined alternatives to dissociate the neurobiological processes underlying the cognitive and affective domains of empathy. Another interesting approach to measure empathy, especially in this research field, can be evaluating affective responses that are dissonant with the expected emotional states for a given situation (e.g., sadism, *schadenfreude*) rather than uniquely assessing congruent affective-empathic experiences (e.g., sympathy, compassion) as proposed by the Affective and Cognitive Measure of Empathy (Vachon & Lynam, 2016).

Regarding issues around empathy measurements, it was possible to unveil that cognitive empathy deficits in antisocial groups were larger in performance-based vs. self-report measures, whilst an oppositive pattern was observed in high psychopathy groups (smaller effects on performance-based cognitive empathy than self-report measures). Furthermore, larger effects (on both empathy domains) were found for self-report measures across several psychopathy analyses. To address these findings, it is important to consider the relationship between self-reported psychopathy traits and distorted response styles. Despite some historically questioning about using self-report measures to assess psychopathy, there is meta-analytical evidence suggesting that psychopathy is not related to the willingness to self-report socially undesirable traits, with the lifestyle-antisocial dimension actually being negatively associated with these faking good tendencies (Ray et al., 2013). These authors also found a positive association between psychopathy and negative impression management across several psychopathy subscales. Hence, it is feasible to postulate that the reduced effect sizes for performance-based measures reported here may be mostly driven by method variance (psychopathy self-report vs. empathy tasks) and, in some analyses, by the reduced number of studies using performance-based tasks. Regardless, even if the influence of psychopathy on self-report questionnaires is somewhat overstated, using performance-based measures closely mimicking real-world empathic behaviors can be a more reliable and ecological alternative to assess empathy. Further studies that examine how performance-based measures moderate the association between psychopathy and empathy are still needed.

4.2.3. Lessons learned for psychopathic personality assessment

From the current findings, 4-facets and 3-dimensional models were more informative than the 2-factors one. For example, facet 2 displayed larger effect sizes in comparison to facet 1 for both empathy domains, and they are both comprised in Factor 1. As such, 3-dimensional and 4-facets models provide more fine-grained solutions to unravel the differences between psychopathic traits, at least regarding empathy.

Another important issue that should be addressed when interpreting the current results is the clear difference in sample types across each analysis. For psychopathy group-based analyses, more than 50% of the samples were recruited from criminal settings, with PCL-R being the most widely used measure. Conversely, for correlation analyses, almost 80% of the included samples were from the community and the use of 3-dimensional questionnaires becomes more expressive. Thus, findings should be interpreted considering historical differences between the two main conceptual frameworks. Specifically, the discrepant findings in the interpersonal dimension (facet 1 vs. boldness) should be interpreted with caution since the adaptive interpersonal traits are probably more represented within community samples, while maladaptive interpersonal behaviors are more prevalent in criminal and clinical settings. Even so, this does not conceal the fact that facet 1 and boldness are inherently distinct operationalizations of the interpersonal dimension of psychopathy. Facet 1 stems from the interpersonal dimension proposed by the PCL (and the SRP that can be used in community samples) in which adaptive characteristics were largely ruled out (Hare, 1980), while boldness aims to measure several of Cleckley's (1941, 1988) positive adjustment behaviors that were originally excluded from psychopathy scales. A major future direction for the field calls for conducting large-scale studies including measures encompassing both adaptive and maladaptive traits. Looking at the role of empathy in psychopathy without fully contemplating its dimensional and heterogeneous nature will likely be insufficient.

Remarkably, the differential role of cognitive and affective empathy in antisocial behavior and psychopathy can inform future studies and classification diagnosis systems. The Antisocial Personality Disorder diagnosis includes specific criteria on affective empathy (e.g., DSM-5: lack of concern for feelings, needs, or suffering of others; lack of remorse after hurting or mistreating another). Therefore, it is quite surprising that cognitive empathy stands as the core feature of the most severe expressions of antisocial behavior. This may require revising diagnostic criteria in an era where the field is moving towards empirically informed classification systems. In turn, affective empathy was more clearly associated with psychopathy, which unveils a possible route for dissociating the two constructs and avoiding the overlap between psychopathy and antisocial personalities. Nonetheless, diagnostic criteria should not rely on broad, unitary descriptions. Total scores of psychopathy only provided a limited overview of its association with empathy, which highlights that it is necessary to target specific psychopathic traits.

Finally, it is also important to acknowledge some additional limitations of the current work regarding psychopathy assessment. First, this meta-analysis did not retrieve descriptive statistics on psychopathy scores. It remains possible that effect sizes would be larger in more heterogeneous samples capturing the full spectrum of psychopathy traits. The same reasoning could be made for empathy and antisocial behavior scores. Secondly, the issue of collinearity between psychopathy dimensions should be discussed, particularly when considering available knowledge about the 3-dimensional model. Several studies have provided evidence for a clear positive association between meanness and disinhibition, while boldness is also positively correlated with meanness (e.g., Blagov et al., 2015; Drislane et al., 2014; Fanti et al., 2016; Stanley et al., 2013). These interactions across psychopathy dimensions can influence the association between empathy and psychopathy. For instance, the small but significant associations between empathy and antisocial expressions of psychopathy (Factor 2, Facets 3 and 4, disinhibition) may be driven by the shared variance between these traits and the affective dimension of psychopathy (meanness and callous-unemotional traits). Similarly, the small affective empathy deficits observed in boldness-related traits may be linked to its shared variance with meanness. Hence, although this endeavor would be quite challenging, future meta-analytical work controlling for the collinearity between dimensions of psychopathy could provide valuable contributions to the field.

4.3. Perspectives for clinical practice: Adaptive and antisocial expressions of psychopathy

As an attempt to conciliate different perspectives around the role of antisocial behavior in psychopathy, it is now widely accepted that the heterogeneity in psychopathy can be explained by two etiological pathways - externalizing vulnerability and dispositional fearlessness.

Externalizing vulnerability is described as a common transdiagnostic feature across externalizing disorders such as antisocial personality, alcohol, and drug abuse (Kotov et al., 2017; Krueger et al., 2002; Krueger et al., 2007). That way, psychopathy dimensions linked to antisocial behavior map onto externalizing vulnerability, while dispositional fearlessness is more closely connected with adaptive boldness manifestations (Fowles & Dindo, 2006; Nelson & Foell, 2018; Patrick & Bernat, 2009). The affective-meanness dimension is quite complex as it shares both externalizing and fearless dispositions. This probably helps to explain why affective traits are the core component of these broad empathic deficits.

The body of literature dissociating externalizing vulnerability from low-fear dispositions of psychopathy provides indeed valuable insights and opens new possibilities for clinical interventions(Bresin, Finy, Sprague, & Verona, 2014; Maes & Brazil, 2013; Pasion et al., 2019; Pasion, Cruz, & Barbosa, 2016; Pasion, Fernandes, Pereira, & Barbosa, 2018b). The next section will address how the etiological pathways of psychopathy can relate to its maladaptive and adaptive expressions when evaluating aggression and antisocial behavior – a clinical outcome of Gao and Raine's model that is inherently connected to empathy deficits. We argue that a differential approach to psychopathy and empathy has the potential to inform targeted interventions, namely when considering its developmental roots.

4.3.1. Reactive aggression and impulsive-disinhibition traits of psychopathy

Cognitive empathy was the nuclear deficit in antisocial groups, although correlational analysis only yielded small effects. Thus, individuals higher in externalizing might not entirely fail to empathize with others, at least affectively. Research reveals indeed that these individuals are not emotionally detached and can feel remorse, shame, and guilt (Campbell & Elison, 2005; Gudjonsson & Roberts, 1983; Miller & Eisenberg, 1988; Morrison & Gilbert, 2001; Prado, Treeby, & Crowe, 2016; Skeem, Johansson, Andershed, Kerr, & Louden, 2007).

Still, externalizing is a close attribute of antisocial behavior, so we need to search for alternative hypotheses that can explain this link beyond empathy. At this point, one should bear in mind that reactive aggression is the most expected outcome when talking about externalizing expressions of behavior (Blais, Solodukhin, & Forth, 2014; Brennan & Baskin-Sommers, 2020b; Long, Felton, Lilienfeld, & Lejuez, 2014; Paiva et al., 2020a; Patrick et al., 2009; Woodworth & Porter, 2002). Reactive aggression incorporates two main features: deficits in inhibitory control and hypervigilance towards threat. The rationale is that impulsive-disinhibited individuals are likely to interpret a negative stimulus as having hostile content (even if they are ambiguous) and to exhibit an emotion-driven response towards that stimulus (e.g., anger outbursts) which will not be suppressed because they exhibit deficits in inhibitory control and emotional regulation (Patrick et al., 2009; Vitale, Newman, Serin, & Bolt, 2005; Wilkowski & Robinson, 2012). From a developmental perspective, research links disinhibition, hostile tendencies, reactive aggression and abusive experiences during growth in a common framework (Blair, 2018; Brennan & Baskin-Sommers, 2020a,

2020b; Dodge, 2006; Paiva et al., 2020a; Richey, Brown, Fite, & Bortolato, 2016). Growing up in abusive environments interferes with children's ability to identify hostile cues and is likely to increase physiological arousal levels, since infants need to be capable of continuously detecting social cues that convey signals of potential danger (e.g., anger displays). Hence, antisocial behavior within the impulsive-disinhibition dimension of psychopathy may not be critically driven by empathy impairment, but rather by a proneness to reactive aggression, underlined by hostility attribution biases as well as deficits in inhibitory control and emotional regulation. Importantly, these mechanisms appear to be specific to disinhibition-impulsivity traits, as they do not relate substantially with fearlessness (Donahue, McClure, & Moon, 2014; Long et al., 2014; Paiva et al., 2020b; Weidacker, Whiteford, Boy, & Johnston, 2017).

4.3.2. *Predatory aggression and affective-meanness traits of psychopathy*

Affective traits emerged as the core dimension of psychopathy linked to empathic deficits. Although affective traits of psychopathy share the externalizing etiological pathway with disinhibition-impulsive traits, these dimensions correspond to two distinct factors of the externalizing spectrum (Nelson & Foell, 2018). Affective-meanness traits are specifically related to callous-aggression and agentic disaffiliation in most interpersonal relations, while disinhibition is framed within the purest externalizing factor (Nelson & Foell, 2018; Palumbo et al., 2020).

Affective-meanness traits are, therefore, best conceived as an affiliative deficit combined with a motivational style in which excitement through cruelty is actively pursued without any regard for others (Patrick et al., 2009). This may predispose to a different form of aggression: premeditated aggression. Individuals high in affective-meanness traits will probably tend to exploit and resort to intimidation to control others in a context of emotional indifference and to exhibit a callous pattern of aggression that is more predatory, premeditated, and instrumental in nature (Paiva et al., 2020a; Palumbo et al., 2020; Patrick et al., 2009; van Dongen, Drislane, Nijman, Soe-Agnie, & van Marle, 2017).

The origins of these conducts can be traced back to early socialization processes since deviations in the child's affiliative motivations influence empathy (Frick & Kemp, 2020; Patrick et al., 2009). The failure of secure attachments is thought to be a risk factor for some of the aspects embodied in these traits and sets the stage for possible failures in the development of positive relationships (Patrick et al., 2009). Notably, attachment styles differ between disinhibition-impulsive and affective-meanness traits, revealing differences on these dimensions that may relate to distinct patterns of aggression as mediated by empathic processes. Both dimensions are associated with suboptimal parenting (Craig, Gray, & Snowden, 2013), but disinhibition-impulsive traits are associated with an anxious attachment style, while affective-meanness traits relate to an avoidant one. Thus, anxious attachment styles will explain the intense irritability and emotion regulation difficulties in disinhibition-impulsive traits, while avoidance styles in meanness-affective traits may shape relationships marked by a limited concern for others (Christian, Sellbom, & Wilkinson, 2017; Craig et al., 2013). Taking the perspective of others may be more difficult for a child with high callous-unemotional traits because he/she is not motivated to do so, and he/she does not experience the expected level of emotional arousal to others' distress (Frick & Kemp, 2020).

4.3.3. *Adaptive and non-adaptive interpersonal traits: the fine line between prosocial and antisocial behavior*

PCL-based interpersonal traits were associated with broad empathy impairments. In turn, boldness correlated with intact cognitive empathy and to (small) deficits in affective empathy. These two results are not mutually exclusive and yield direct implications to the understanding of adaptive and maladaptive behavior in psychopathy.

Intact cognitive empathy in boldness can compensate for affective deficits, capturing the emotion paradox. Bold individuals might be good at manipulating others without the accompanying affective response – and especially because of that – since they will be more cognitively aware of others' mental states and expectations and are not clouded by affective interferences. As a result, while non-adaptive interpersonal traits of psychopathy may predispose individuals for disruptive outcomes - as they are not able to effectively conceal their lack of affiliative capacity - adaptive interpersonal-boldness traits may allow individuals to retain their masks and to successfully navigate the social world.

One can even argue that this can lead to nuanced variations of antisocial-prosocial manifestations in boldness. Antisocial and prosocial behaviors do not necessarily lie on opposite poles (Costello et al., 2018; Smith et al., 2013), especially when talking about fearlessness features of psychopathy that relate to everyday altruistic behavior (Bronchain et al., 2019;Costello et al., 2018 ; Patton et al., 2018 ; Smith et al., 2013). Lykken (1995, p. 118) contended that "the hero and the psychopath may be twigs on the same genetic branch," sharing a fearlessness predisposition that could manifest in either socially praiseworthy or socially blameworthy behaviors depending on yet unknown variables (Patton et al., 2018). Empathy relates to different types of prosocial behavior as well (Batson, Ahmad, & Stocks, 2011; Eisenberg, Eggum, & Di Giunta, 2010). Empathy plays a stronger role in altruistic and anonymous prosocial behavior, whereas prosocial behaviors performed in front of others are thought to be driven by more egoistic (self-serving) motives. From this perspective, White (2014) found that interpersonal-affective psychopathy scores were positively associated with empathic behaviors in the real world, but only when others were watching. One might postulate that intact cognitive empathy in boldness make these individuals more able to read and formulate cognitive schemas of others' mental states and, consequently, may exhibit more deliberative prosocial acts that are primarily motivated by dominance and reputation. In turn, meanness and disinhibition traits are both uncorrelated or negatively associated with prosocial acts and altruism (Costello et al., 2018; Patton et al., 2018; Smith et al., 2013).

Yet, one might be aware that boldness-related traits co-occur with affective-meanness traits (Drislane et al., 2014; Pasion et al., 2018a; Patrick & Bernat, 2009; van Dongen et al., 2017). However, several differences exist between them. Boldness correlates positively with care experiences in infancy and secure attachment styles, and negatively with avoidant and anxious attachment (Christian et al., 2017; Craig et al., 2013). Hence, a low-fear disposition does not inevitably lead to a failure of conscience development as seen in affective-meanness traits. Warm and responsive environments will probably reverse or attenuate dispositional low-fear deficits by fostering the internalization of social norms and the development of cognitive empathic skills – aspects that are implicated in successful interpersonal interactions by means of promoting trust in others and emotional stability (Christian et al., 2017; Frick & Kemp, 2020; Patrick et al., 2009). Moreover, boldness can be distinguished from impulsive-disinhibition dimensions: boldness traits are associated with enhanced brain functioning (Bresin, Finy, Sprague, & Verona, 2014; Maes & Brazil, 2013; Pasion et al., 2018b; Pasion, Cruz, & Barbosa, 2016) and are unrelated to hostile attribution biases and difficulties in anger regulation (Donahue et al., 2014; Hicks & Patrick, 2006; Long et al., 2014; Paiva et al., 2020a).

Altogether, it sounds reasonable to argue that boldness is essentially adaptive and will probably reflect on adequate social functioning via preserved cognitive empathy, whilst attenuating antisocial expressions that characterize meanness and disinhibition (and facet 1).

5. Closing remarks

Gao and Raine (2010) conceived a framework for dissociating psychopathic manifestations differentially associated with antisocial expressions. In this model, empathy was framed as an important mediator. Thus, the current meta-analysis provides a compelling opportunity to revisit Gao and Raine's model in its updated version (2020) and to conciliate different theoretical frameworks of psychopathy in the field.

The first major conclusion of the current review was that antisocial

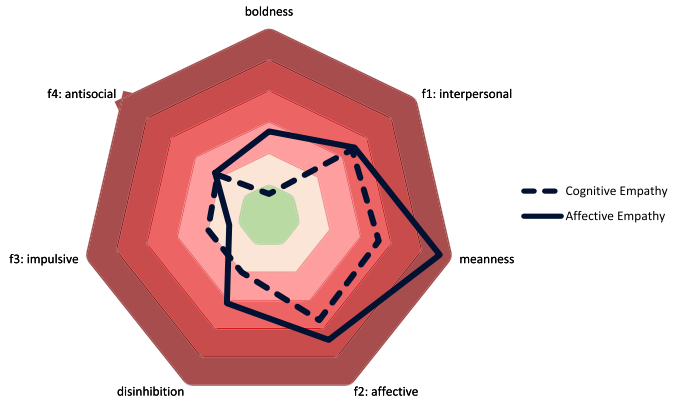


Fig. 3. The interplay of cognitive and affective empathy across psychopathic traits.
Note: Red layers represent negative correlations, with outer and darker layers equating to larger negative correlations (from the inner to the outer layer: residual, $r = -0.01$ to -0.09; small, $r = -0.10$ to -0.19; medium, $r = -0.20$ to -0.29; large: $r < -0.30$). Green layer represents residual positive correlations ($r = 0.01$ to 0.09). Effects adjusted for publication bias are reported.

and high psychopathy groups display distinct empathic profiles, suggesting that these constructs should be clearly differentiated. Cognitive empathy was more clearly impaired in antisocial groups, while psychopathy groups were more strongly associated with affective empathy deficits.

The second major set of findings shows differential associations between empathy and psychopathy dimensions when integrating the main theoretical models in the field. Affective (facet 2) and meanness traits were strongly associated with affective empathic deficits, which supports H1. However, cognitive empathy was also moderately impaired - a finding that should be added to further refine Gao and Raine's model. Moreover, contrary to what was foreseen by the evidence in the field (cf. H2), impulsive-antisocial traits of psychopathy do not seem to be majorly related to empathic impairment. It seems that these traits are not the main driver in psychopathy-empathy interplay and should be rethought in the model. Only disinhibition showed a moderate association with affective empathy after adjusting for publication bias. Finally, the conflicting associations in the interpersonal domain should be considered. In contrast to the authors' hypothesis (cf. H3), findings from facet 1 resembled the results reported for the affective traits (facet 2) - albeit the magnitude of the effect sizes was smaller. In this sense, boldness-related traits better fit the authors' proposal regarding the role of preserved cognitive empathy in the adaptive expressions of psychopathy.

Altogether, these findings are a compelling opportunity for advancing knowledge on the complex interactions between psychopathy and empathy and are systematized in Fig. 3. In fact, Gao and Raine's proposals were coincident with the growing dissemination of dimensional approaches, and, consequently, the current work constitutes a unique opportunity for updating a set of postulates that can now be empirically based.

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Contributors

Carlos Campos and Rita Pasion: Co-First Authorship (contributed equally to this manuscript), Conceptualization, Project Administration, Methodology, Investigation, Validation, Formal Analysis, Data Curation, Visualization, Writing - Original Draft, Review & Editing.

Andreia Azeredo and Eduarda Ramião: Investigation, Validation, Data Curation, Writing - Review & Editing.

Prune Mazer and Inês Macedo: Investigation, Validation, Formal Analysis, Data Curation, Writing - Review & Editing.

Fernando Barbosa: Methodology, Supervision, Resources, Writing - Review & Editing,

Author notes

Carlos Campos and Rita Pasion contributed equally to this manuscript (co-first authorship).

Declaration of Competing Interest

All authors declare that they have no conflicts of interest.

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Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.cpr.2022.102145.

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