



# Creativity and the Dark Triad: A meta-analysis

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## ABSTRACT

This paper presents a meta-analysis of the relationships between creativity (creative potential, activities, and achievement) and the Dark Triad of personality: narcissism, Machiavellianism, and psychopathy. Multilevel meta-analytic models demonstrated a small but significant positive association between creativity and narcissism ( $r = 0.15$  [0.10, 0.29]) and Machiavellianism ( $r = 0.06$  [0.02, 0.09]), but not with psychopathy ( $r = 0.03$  [-0.02, 0.07]). Creativity measures (self-report-vs.-performance), aspects (self-perception, creative activity, creative abilities, creative achievements), and domains (general, art, science, and everyday creativity) moderated the links with the Dark Triad. We discuss the possible mechanism of associations between Dark Triad traits and creativity and highlight future research directions.

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## 1. Introduction creativity and the Dark Triad: A Meta-Analysis

Steve Jobs is simultaneously considered a prototype of a great innovator (Fouché, du Plessis, & van Niekerk, 2017) and a symbol of an overweening, ruthless, and selfish boss who was ready to manipulate and sacrifice others for the sake of execution of his ideas (e.g., Hunter & Cushenbery, 2015). Similar to many others (see Kapoor, Tagat, & Cropley, 2016), his example leads to the question of how socially undesirable characteristics relate to creative functioning. Are positive relationships between aversive traits and creativity typical for successful creators in particular domains only or are the dark personality traits more generally linked with creative abilities and everyday creative behaviors? In this paper, we conduct a meta-analysis of available studies to provide a more robust answer to the question of the relationship between creativity and the “dark” personality traits.

Creativity, according to the “standard definition,” is founded on two pillars: originality and effectiveness (Runco & Jaeger, 2012). Although these criteria are sometimes challenged as too static and overly outcome-oriented (Corazza, 2016; Glăveanu & Beghetto, 2020), and new criteria such as surprise (e.g., Boden, 2004; Simonton, 2012, 2018) or aesthetics and authenticity (Kharkhurin, 2014) were proposed, the majority of creativity definitions indeed focuses on originality and relevance in a certain context (Plucker, Beghetto, & Dow, 2004).

Another important distinction is one that focuses on different forms and aspects of creativity. It goes back to the classic differen-

tiation between the so-called four Ps (person, process, product, and press) in creativity research (Rhodes, 1961, but see also Glăveanu, 2013). When creativity is analyzed from the perspective of a person, researchers usually focus on cognitive abilities, which are considered crucial for creative thinking: divergent thinking (Runco & Acar, 2012), imagery (Jankowska & Karwowski, 2015), insight (Kounios & Beeman, 2009), but also more general abilities like executive functions (Benedek, 2018) or intelligence (Gerwig et al., 2021; Karwowski et al., 2016). Most often, creativity is operationalized as results obtained in divergent thinking tasks (considered the best indicator of creative potential; see e.g., Reiter-Palmon, Forthmann, & Barbot, 2019). Divergent thinking was found to be linked with intelligence (Gerwig et al., 2021) and personality (Puryear, Kettler, & Rinn, 2017), mainly its openness and extraversion dimensions.

A related, yet distinct line of research explores self-perceived creativity, primarily creative self-efficacy (Beghetto, 2006); both domain-general (Karwowski, Lebuda, & Wiśniewska, 2018) and domain-specific (Snyder, Sowden, Silvia, & Kaufman, 2020). Self-perceived creativity has been found to be related to the personality trait of plasticity (Karwowski & Lebuda, 2016; Silvia, Nusbaum, Berg, Martin, & O'Connor, 2009) being stronger linked with openness ( $r = 0.47$ ) than extraversion ( $r = 0.26$ , see Karwowski & Lebuda, 2016 for a meta-analysis), and weakly related to the remaining personality traits. Its links with performance measures are less clear (Hass, Katz-Buonincontro, & Reiter-Palmon, 2019), although, as recently discussed, such measurement might be quite valid (J. C. Kaufman, 2019).

Last but not least, creativity researchers are interested in observable activity and achievements in certain creative domains

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(e.g., Carson, Peterson, & Higgins, 2005; Jauk, Benedek, & Neubauer, 2014). This approach focuses on outcomes and seeks for its cognitive (e.g., intelligence, Jauk, Benedek, Dunst, & Neubauer, 2013) or personality (e.g., S. B. Kaufman, Quilty, et al., 2016) predictors. Here, again, creative activity and achievement were found to be driven primarily by openness (Jauk et al., 2014; S. B. Kaufman, Quilty, et al., 2016) and intelligence (Karwowski, Kaufman, Lebuda, Szumski, & Firkowska-Mankiewicz, 2017; S. B. Kaufman, Quilty, et al., 2016), although these links are clearly moderated by domain. More specifically, intelligence was found to be related with achievement in cognitively-demanding creative domains (e.g., science, see Karwowski et al., 2017). Openness to experience aspect intellect predicted achievements in science, while openness aspect predicted achievements in arts (S. B. Kaufman, Quilty, et al., 2016). Among the remaining personality traits, the links with creative achievement were less clear.

It is important to note that traditionally creativity has been theorized as solely positive and beneficial both psychologically (Cropley, 1990) and socially (Florida, 2004). Indeed, there is solid evidence that creative thinking improves learning (Gajda, Karwowski, & Beghetto, 2017) and can reduce stereotypes and prejudices (Groyecka, Gajda, Jankowska, Sorokowski, & Karwowski, 2020; Groyecka-Bernard, Karwowski, & Sorokowski, 2021). Creative activity also helps to flourish mentally (Forgeard, 2018) and finding meaning in life (J. C. Kaufman, 2018). The last two decades, however, resulted in a growing number of studies examining malevolent creativity as well (Clark & James, 1999; Cropley, Kaufman, & Cropley, 2008); namely, behaviors and products that are created with the intention to destroy or damage others (see Cropley, 2010; Kapoor 2015), like terrorist attacks or crimes (Cropley & Cropley, 2011; Gill, Horgan, Hunter, & Cushenbery, 2013).

Although the socially undesirable effects of creativity were ignored in literature, reports showing socially unacceptable traits of creators have quite a long tradition in creativity research. Professional and eminent creative achievements were found to be linked to such personality characteristics as self-absorption, aggression, hostility, arrogance, emotional instability, psychoticism, tendency to lie, control, and exploitation of others (e.g., Eysenck, 1993; Feist, 1993, 1998; Feist & Gorman, 1998; Getzels & Csikszentmihalyi, 1976; Götz & Götz, 1979; Hall & MacKinnon, 1969). More recent studies demonstrate that both outstanding creative successes and more mundane creative activities and abilities are associated with a tendency to behave unethically. More specifically, creative achievements were predicted by arrogance and dishonesty (Silvia, Kaufman, Reiter-Palmon, & Wigert, 2011; but see also Ścigała et al., in press for a contrary finding) and positively related to delinquency behaviors (Lebuda, Karwowski, Galang, Szumski, & Firkowska-Mankiewicz, 2019). People with higher dispositional creativity were also found to be more deceptive during conflict negotiations (De Dreu & Nijstad, 2008) and lied more effectively (Walczyk, Runco, Tripp, & Smith, 2008). Finally, they were more likely to cheat and justify their unethical behaviors (Gino & Ariely, 2012), and demonstrate less integrity overall (Beaussart, Andrews, & Kaufman, 2013).

Disagreeableness and dishonesty correlate positively with self-serving, exploitive social behaviors reflected in the Dark Triad (DT) personality model (see Jonason & Webster, 2010). The DT consists of three socially aversive components: narcissism, Machiavellianism, and psychopathy (Paulhus & Williams, 2002). Narcissism is linked with a set of egocentric traits, such as self-absorption, sense of grandiosity, uniqueness, entitlement, superiority, and need for admiration (Paulhus & Williams, 2002; Wallace & Baumeister, 2002), and it is less antagonistic and aggressive than the remaining two traits (Rogoza, Kowalski, & Schermer, 2019). Machiavellianism denotes the tendency to manipulate and exploit others (Paulhus &

Williams, 2002). Psychopathy, indicated as the most antagonistic of the Dark Triad traits (Rauthmann, 2012), is associated with high impulsiveness, thrill-seeking, poor behavioral control, and lack of remorse (Paulhus & Williams, 2002).

While DT traits share core features: callousness, emotional coldness, and empathy deficits, they are theorized as conceptually distinct (see Paulhus, 2014). However, recent *meta*-analyses (Muris, Merckelbach, Otgaar, & Meijer, 2017; Vize, Lynam, Collison, & Miller, 2018) show substantial intercorrelations between the DT traits, especially between psychopathy and Machiavellianism ( $r = 0.52$ , Vize et al., 2018). More importantly, however, the DT constructs were very similar in terms of their nomological networks; correlations between DT traits and other psychological characteristics were very similar, although the level of this similarity was moderated by the DT measure being the strongest in the case of the Dirty Dozen (Jonason & Webster, 2010). One potential reason for this overlap is that Machiavellianism items often include impulsivity and disinhibition, which are more appropriate to cover some aspects of psychopathy (see Glenn & Sellbom, 2015; Miller, Hyatt, Maples-Keller, Carter, & Lynam, 2017; 2019). Another issue with the DT measurement by short scales is that traits are measured as unidimensional, even if they are clearly multidimensional theoretically (see Miller, Vize, Crowe, & Lynam, 2019). Consider for example psychopathy that covers three separate dimensions: boldness, meanness, and disinhibition (Patrick, Fowles, & Krueger, 2009) or narcissism that consists of grandiose and vulnerable forms (Miller et al., 2016).

## 2. Creativity and the Dark Triad

Since 2002, when the DT appeared in literature (Paulhus & Williams, 2002), numerous studies started to address its links with creativity. This was likely driven by the very fact that DT traits denote high self-confidence, nonconformity, and emotional coldness – factors considered constitutive for creative personality (e.g., Feist, 1998). Some scholars even assume that socially aversive traits share a common neuropsychological background with creativity (Galang et al., 2016). Others argue that both sets of characteristics result from the selection pressure and play a significant evolutionary role, especially in mating (Furnham, Richards, et al., 2013; Griskevicius, Cialdini, & Kenrick, 2006; S. B. Kaufman, Kozbelt et al., 2016). If correct, these presuppositions would lead to expecting positive associations between creative abilities and the DT. However, if the relationship between socially unacceptable personality traits and creativity is motivational rather than cognitive, it would exist only in the case of self-reported creativity rather than divergent thinking tasks, as people with a high level of the DT traits would provide self-descriptions that are in line with social expectations. Following this reasoning, narcissists are expected to be engaging (or declaring so) in more prestigious creativity domains; ones with the highest public recognition, while people high in Machiavellianism and psychopathy will choose more practical and solitary creativity domains (see Jonason, Wee, Li, & Jackson, 2014, 2015).

Below, we briefly summarize the main findings from investigations that explored associations between creativity and the DT traits. Then, we present a *meta*-analysis conducted to estimate the effect size of links between each of the DT traits and creativity.

### 2.1. Creativity and narcissism

The most intensively explored association is the one between narcissism and creativity (e.g., Raskin, 1980; Solomon, 1985). Presumably, the link between the two is reciprocal. On one side, creative achievements build a positive image of ability and boost

narcissism (Jauk & Sordia, 2018; Lemaitre, 2017; Wallace & Baumeister, 2002). On the other, narcissistic people are more willing to express socially desirable characteristics (including creativity), to gain attention and appreciation (Furnham, Richards, et al., 2013). They are also more eager to use self-enhancement opportunities that allow them to be glorified (Wallace & Baumeister, 2002).

In studies on the relationship between narcissism and creative abilities, the obtained results are mostly mixed. While in many investigations no significant correlation between narcissism and creative abilities were found (Dahmen-Wassenberg et al., 2016; Goncalo et al., 2010; Solomon, 1985; Sordia et al., 2020), others bring a small yet significant positive association (Martinsen et al., 2019; Raskin, 1980). One possible explanation of these inconsistencies is a situational context that may modify the relationship between narcissism and creativity. For example, it was observed that narcissism is significantly related to idea generation when people have the opportunity for self-enhancement in a testing situation (Wallace & Baumeister, 2002).

Another factor that might moderate the links between narcissism and creativity is how creativity is operationalized and measured. Even if the objective measures of creativity do not always show significant links with narcissism (Dahmen-Wassenberg et al., 2016; Goncalo et al., 2010), narcissist individuals often score high in self-report measures of creativity (Dahmen-Wassenberg et al., 2016; Furnham, Hughes, Furnham, & Batey, 2013; Goncalo et al., 2010; Jonason, Richardson, & Potter, 2015, 2017). Moreover, narcissistic people's ideas may be overestimated: perceived as more creative thanks to their enthusiasm and charisma (Goncalo et al., 2010). Indeed, in an organizational context, employees with a high level of narcissism were rated as innovative by their supervisors (Wisse, Barelds, & Rietzschel, 2015). To sum up, narcissists often believe in superiority of their creativity and can get others to agree with them, even if the objective level of their creative abilities is moderate.

Beliefs about high creative abilities are conducive to taking up creative activity. Creative confidence is theorized as a factor necessary for translating creative potential to creative behaviors (Karwowski, Lebuda, & Beghetto, 2019; Karwowski & Beghetto, 2019), so narcissism could indirectly lead to creative activity (Wallace & Baumeister, 2002). Indeed, narcissists were found to be interested in artistic and enterprising careers (Jonason et al., 2014) and narcissism was correlated with creative activity (Sordia et al., 2020) as well as self-perceived creativity (Jonason et al., 2015; McKay et al., 2017). More narcissistic individuals have also declared higher creative achievements (Jonason et al., 2015; Martinsen et al., 2019).

An important caveat here is that creative activities and achievements are usually measured with self-assessment questionnaires. Therefore, it cannot be ruled out that highly narcissistic people simply state that they undertake creative activities and obtain creative achievements more often than they actually do. Indeed, as observed elsewhere (Sordia et al., 2020), while the link between narcissism and creative achievements was significant and positive when creative achievement was assessed using self-report instruments, it disappeared when it was judged by independent informants. Therefore, it seems likely that the relationship between narcissism and creativity occurs only (or, at least, is significantly stronger) in studies that measure creativity using self-report scales. The role of this moderator is addressed in our study presented below.

## 2.2. Creativity and Machiavellianism

Much less research has been devoted to the relationship between creativity and the other two traits from the Dark Triad. Machiavellianism, or inclination to manipulate others (Paulhus &

Williams, 2002), could, just like narcissism, have a reciprocal link with creativity. As was empirically demonstrated, creativity could facilitate untruthfulness (Gino & Ariely, 2012), but it can also be promoted through rule-breaking and dishonesty (Gino & Wiltermuth, 2014). Creative thinking helps to effectively fabricate explanations of one's own behaviors and combine facts and lies to justify manipulations, but—on the other hand—such activities could also strengthen creative abilities (see Gino & Ariely, 2012; Gino & Wiltermuth, 2014).

Yet, empirical evidence tends to show that people high in Machiavellianism demonstrate lower fluency and originality in divergent thinking tasks (Dahmen-Wassenberg et al., 2016; Jonason et al., 2017) than individuals lower in Machiavellianism, but they generate more responses that mention harming behaviors (Jonason et al., 2017; Kapoor, 2015). In some studies, Machiavellianism was unrelated to creative activities or global creative achievement scores (Sordia et al., 2020). Still, others discovered its positive links with scientific and performance creativity (Jonason et al., 2015), everyday, science, and artistic creativity (McKay et al., 2017), and a positive correlation with creative achievements in humor (Jonason et al., 2015) and sport (Sordia et al., 2020). Furthermore, supervisors rated people characterized by high Machiavellianism as less innovative (Wisse et al., 2015). Based on this overview, it seems that people high in Machiavellianism are not particularly creative in solving open-ended tasks, but they tend to declare creative activities in many domains and some creative achievements.

## 2.3. Creativity and psychopathy

Psychopathy is the third trait in the DT model. People high in psychopathy are usually interested in more realistic and practical activities (Jonason et al., 2014); they are unlikely to engage in mental, imaginative, or divergent processes typical for creativity. Consequently, it is to be expected that their creative activity is low, and their creative achievements—if any—will mostly be in “hands-on,” pragmatic creativity domains.

Indeed, in some studies, psychopathy and its facets were found to be negatively correlated with creative abilities (Dahmen-Wassenberg et al., 2016; Jonason et al., 2017; Sordia et al., 2020), yet positively with a tendency to generate ideas oriented toward harming others (Jonason et al., 2017; Kapoor, 2015; but see also Kapoor & Khan, 2016). In a professional context, people high in psychopathy perceived themselves as creative in entrepreneurship (Akhtar, Ahmetoglu, & Chamorro-Premuzic, 2013) and were rated by their peers as creative and innovative (Babiak, Neumann, & Hare, 2010). Still, their supervisors did not rate them higher in innovative behavior than the less psychopathic employees (Wisse et al., 2015).

However, it was also found that psychopathy correlates with creative activities in general and creativity in sport and visual art in particular (Sordia et al., 2020). People with psychopathic tendencies reported a higher record of overall creative achievements (Galang et al., 2016), higher scientific and performance creativity (Jonason et al., 2015; McKay et al., 2017), and more creative achievements in humor (Jonason et al., 2015). Similarly, as in the two remaining DT traits, psychopathy's links with creative achievement (in arts, crafts, and sports) were observed only when self-report measures were applied and disappeared in the case of informant ratings (Sordia et al., 2020).

## 3. The present study

The DT model was published two decades ago (Paulhus & Williams, 2002) and almost immediately, researchers noticed a

similarity between the three characteristics and personality traits that for years were considered typical for highly creative people (e.g., Batey & Furnham, 2006; Feist, 1998). How are the DT traits related to creativity? To answer this question, we decided to conduct a *meta-analysis* to assess the strength of the link between creativity and “dark” traits of personality: narcissism, Machiavellianism, and psychopathy. We included several theoretically justified moderators: a form of creativity (abilities, activities, achievements), a method of creativity assessment (self-description versus objective testing, evaluation by raters), domains of creative activities, as well as achievements. We tested whether the effect obtained depends on the DT measure as well. Additionally, we examined the extent to which studies on creativity-DT links are prone to publication bias.

## 4. Method<sup>1</sup>

### 4.1. Literature search and inclusion criteria

To collect the studies relevant to the presented *meta-analysis*, we used a multimodal search strategy. We searched in electronic literature databases (EBSCO, ERIC, Google Scholar, OpenDissertations, PsychInfo, ResearchGate, Scopus, Web of Science), reviewed works published in leading creativity journals (i.e., *Creativity Research Journal*; *Journal of Creative Behavior*; *Psychology of Aesthetics, Creativity, and the Arts*; *Thinking Skills and Creativity*), and performed a cross-reference check, screening publication lists of thematically relevant publications. To include gray literature (e.g., conference proceedings, preprints, project reports; Schmucker et al., 2017) in the review, we additionally searched preprint repositories (Cogprints, OSF Preprints, PsyArXiv, SocArXiv). In our search, we used the following keywords: “antisocial creativity,” “dark creativity,” “malevolent creativity,” “negative creativity,” and used Boolean search operators on the following terms “creativity,” OR “creative accomplishment,” OR “creative achievement,” OR “innovation,” AND “narcissism,” “creativity,” OR “creative accomplishment,” OR “creative achievement,” OR “innovation,” AND “Machiavellianism,” “creativity,” OR “creative accomplishment,” OR “creative achievement,” OR “innovation,” AND “psychopathy.” During the search, we did not apply any restrictions concerning the time of publication. In the next step, to avoid bias due to selective publication and to enrich the power of our review (Korevaar et al., 2020), we contacted via e-mail the authors who previously published on the subject, asking about unpublished data.

We included accessible manuscripts, reports, and datasets that presented quantitative data and were published or summarized in English. Because our systematic review focuses on the relationship between creativity and Dark Triad traits, we included correlational studies that reported this effect. We included only studies with sufficient methodological and statistical information to calculate the effect size: the correlation, sample size based on which the effect was determined, the measurement of at least one Dark Triad trait, and creativity measurement information. Database queries were completed by December 2020.

### 4.2. Coding scheme / coding procedures

The second and third authors extracted and coded the following information: sample size, effect size, reliability of creativity, and Dark Triad traits measurements. Furthermore, potential moderators were coded.

### 4.3. Study selection

The study selection process is presented in a flow diagram (Fig. 1). Through queries in electronic databases using keywords, we found 3,658 documents and we received seven datasets directly from other researchers. After removing duplicated and non-scientific records, we read the titles, keywords, and abstracts of the remaining documents ( $m = 612$ ) and selected studies that met the criteria described above ( $m = 34$ ). These sources were checked again against the inclusion criteria in the next step by reviewing the entire method and results parts of the reports. As a result, eight studies were excluded. The applied selection process led us to identify 25 studies (143 correlations) that explored the links between creativity and narcissism, 20 studies (107 correlations) that examined the links between Machiavellianism and creativity and 22 studies (112 correlations) that focused on the relationship between creativity and psychopathy.

### 4.4. Statistical procedures

We conducted three independent *meta-analyses* on correlations between creativity and Dark Triad traits: narcissism, psychopathy, and Machiavellianism. As the studies we included tended to report several coefficients (i.e., usually there were several creativity measures in one study), to control for clustered data, a three-level *meta-analysis* was computed (Konstantopoulos, 2011) in both the metafor package for R (R Core Team 2016; Viechtbauer, 2010), with a robustness check provided in the metaSEM (Cheung, 2014, 2015) package. Multilevel *meta-analysis* estimates sampling variance and the between-study variance accounting for variability between studies, and the within-study variance accounting for the variability within the different studies (between effects). The true variance was estimated using the restricted maximum likelihood estimator (REML) to avoid bias or underestimation of the variance as a consequence of less reliable estimators (Viechtbauer, 2010). Before *meta-analysis*, all coefficients were corrected for unreliability by dividing the observed correlations by the square root of creativity and Dark Triad measures reliability (Schmidt & Hunter, 2015). According to Cohen's (1988) guidelines, correlations of  $r = 0.10$ ,  $r = 0.30$  and  $r = 0.50$  were recommended as benchmarks for small, medium, and large effect sizes. However, based on the recommendations developed particularly for individual differences research (Gignac & Szodorai, 2016), we decided to interpret  $r = 0.10$  as small,  $r = 0.20$  as typical, and  $r = 0.30$  as strong, given the benchmarks in individual differences literature. Our lower boundary for the correlation to be considered meaningful (put aside significance), meaning the smallest effect size of interest, is  $r = 0.10$  (see Ścigała et al., in press for a similar decision).

All datasets and scripts used for the current *meta-analysis* are available in OSF: [https://osf.io/pdsyw/?view\\_only=173dca7055ba45cfa2b65f5b17c873e5](https://osf.io/pdsyw/?view_only=173dca7055ba45cfa2b65f5b17c873e5)

### 4.5. Moderators

We tested moderation of four study characteristics: the study's year, percentage of female participants, average age of participants, and status of the study (published-vs.-unpublished). We also tested moderation of three creativity measures' characteristics: self-report-vs.-performance (creativity tests), measured aspects of creativity (self-perception, creative activities, creative abilities, creative achievements), and domain of creativity (general, art, science, and everyday creativity). Finally, we tested whether the DT measure moderated the correlations obtained.

<sup>1</sup> This study was not preregistered.

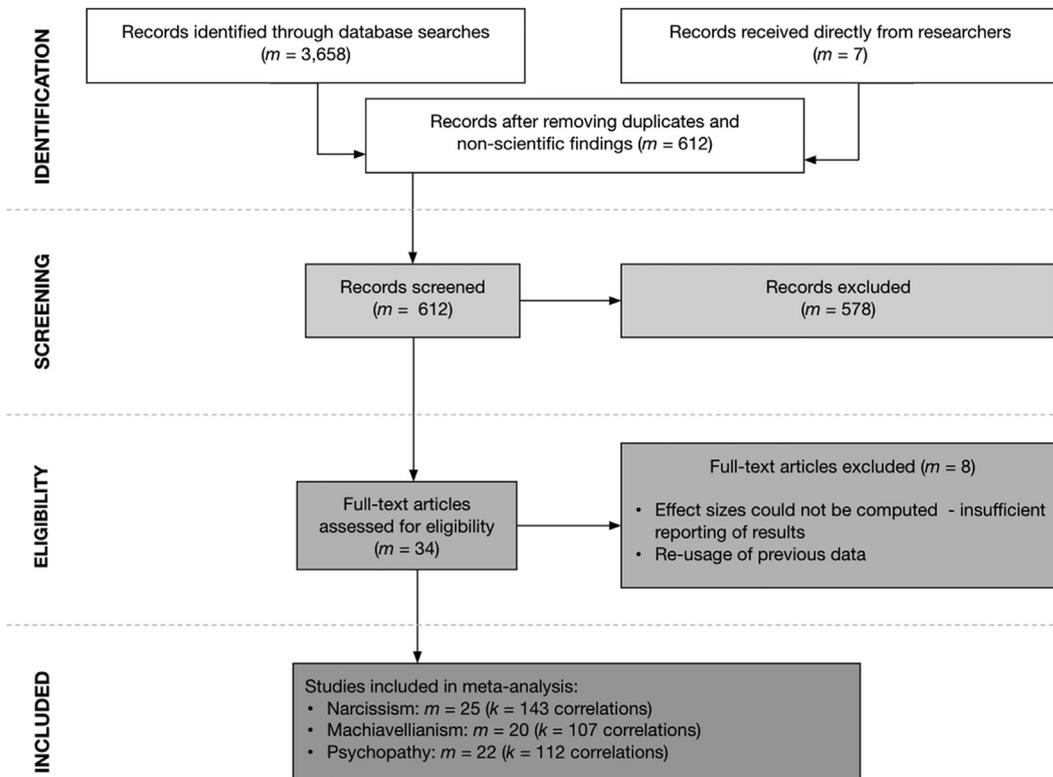


Fig. 1. Flow diagram describing literature search and selection of eligible creativity and Dark Triad traits effect studies (adapted from the PRISMA Statement; Moher, D., Liberati, A., Tetzlaff, J., Altman, D. G., & the PRISMA Group, 2009).

## 5. Results

For narcissism, we obtained 143 correlations from 25 studies (total  $N = 12,692$ ). For Machiavellianism, there were 107 correlations from 20 studies (total  $N = 10,556$ ), while for psychopathy, there were 112 correlations clustered in 22 studies (total  $N = 11,053$ ). Mean sample age ranged from 15 to 46 years ( $M = 26.10$ ,  $SD = 7.85$ ). Seven studies were from Poland, four from the USA, two each from Australia, Austria, India, and one from the UK, Norway, the Netherlands, Philippines, Germany, Georgia, and China.

### 5.1. Overall effect

The estimated overall correlation between narcissism and creativity (Fig. 2) was  $r = 0.15$ , 95% CI: 0.10, 0.19 ( $m = 25$ ,  $k = 143$ ), which is almost exactly the same when estimated using the metaSEM package  $r = 0.14$ , 95% CI: 0.10, 0.18. Only Level-2, namely within-studies (between-effects) variance was statistically significant (Level-2 = 0.02,  $se = 0.004$ ,  $p < .001$ ), while between-study variance was not significant (Level-3 = 0.005,  $se = 0.003$ ,  $p = .07$ ). Overall heterogeneity was significant:  $Q(df = 142) = 2,107.92$ ,  $p < .001$ , with  $I^2$  for Level-2 being estimated at 77% and  $I^2$  for Level-3 at 17%. Therefore, while the overall effect was statistically significant and small-to-typical in size, its heterogeneity was related to different measures and aspects of creativity within studies rather than between studies.

For the links between creativity and Machiavellianism, we found a statistically significant yet small correlation of  $r = 0.06$ , 95% CI: 0.02, 0.09 ( $m = 20$ ,  $k = 107$ ), replicated in metaSEM ( $r = 0.06$ , 95% CI: 0.02, 0.10). Both within-studies (Level-2 = 0.005,  $se = 0.001$ ,  $p < .001$ ) and between-studies variances (Level-3 = 0.005,  $se = 0.002$ ,  $p = .02$ ) were significant. Overall

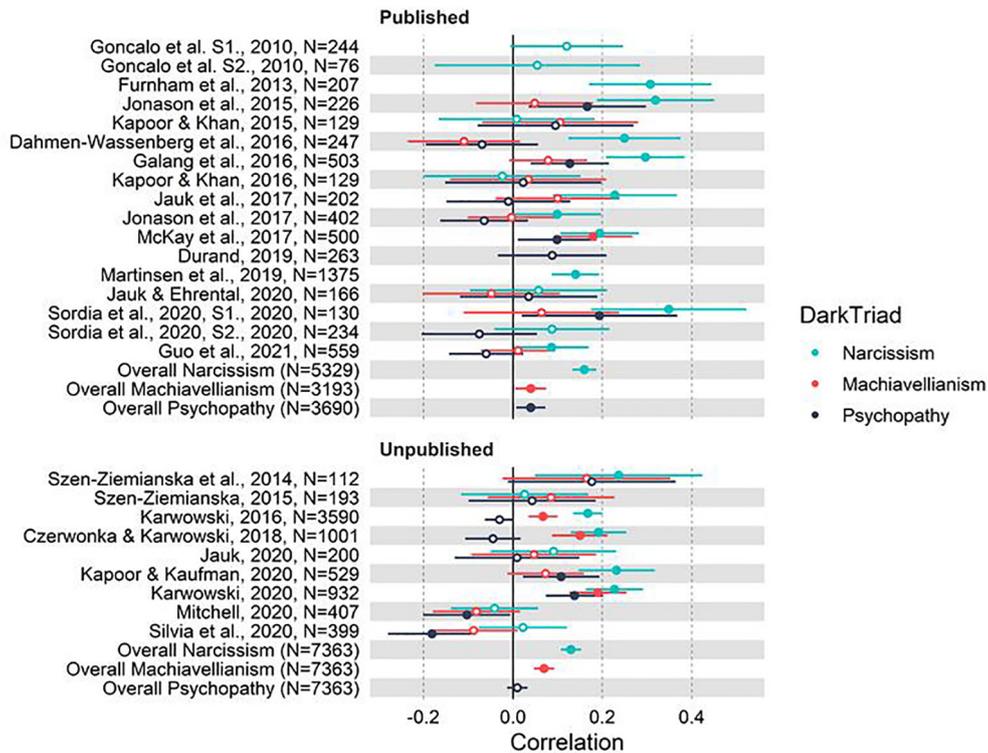
heterogeneity was significant as well  $Q(df = 106) = 600.43$ ,  $p < .001$ , with almost the same level of overall variability being associated with differences between effects within studies ( $I^2 = 41\%$ ) and between studies ( $I^2 = 46\%$ ).

Finally, for the links between creativity and psychopathy, the obtained correlation was estimated at  $r = 0.03$ , 95% CI: -0.02, 0.07 ( $m = 22$ ,  $k = 112$ ). When estimated using the metaSEM package, the correlation was the same:  $r = 0.03$ , 95% CI: -0.02, 0.06. Again, only within-studies (between-effects) variance was statistically significant (Level-2 = 0.01,  $se = 0.002$ ,  $p < .001$ ), Level-3 = 0.005,  $se = 0.003$ ,  $p = .053$ ). Overall heterogeneity was significant:  $Q(df = 111) = 979.31$ ,  $p < .001$ , with  $I^2$  for Level-2 being estimated at 59% and  $I^2$  for Level-3 at 31% of the overall variance.<sup>2</sup>

### 5.2. Sensitivity analyses

As our meta-analysis covered some large and unpublished studies (e.g., Karwowski, 2016,  $n = 3,590$ ), we tested for sensitivity of the estimated overall effect size for outlying and large studies by conducting the leave-one-out-analysis. More specifically, we performed a series of new meta-analyses, each time excluding one effect. The results are presented in Supplementary Online Material (SOM) Tables 1-3 (SOM T1-T3). For narcissism, the effects ranged from  $r = 0.146$  to  $r = 0.163$ , showing that the overall effect we reported was reasonably robust. The same conclusion was also valid for the links between creativity and Machiavellianism. The leave-one-out analysis resulted in estimates ranging from  $r = 0.046$  to  $r = 0.065$ : in all cases, the links were statistically signif-

<sup>2</sup> Uncorrected correlations were as follows: for the relationship between creativity and narcissism:  $r = 0.11$ , 95% CI: 0.08, 0.15,  $p < .001$ ,  $Q(df = 142) = 1,152.28$ ,  $p < .001$ . In the case of the links between creativity and Machiavellianism:  $r = 0.04$ , 95% CI: 0.01, 0.08,  $p = .01$ ,  $Q(df = 106) = 381.35$ ,  $p < .001$ , and for the links between creativity and psychopathy:  $r = 0.02$ , 95% CI: -0.02, 0.05,  $p = .27$ ,  $Q(df = 111) = 621.48$ ,  $p < .001$ .



**Fig. 2.** Forest plot with aggregated effect size for all studies included in the meta-analysis. Please note that as all analyses reported in this paper used multilevel models, there might be small differences between the effects reported in Fig. 2 and the effects estimated in multilevel meta-analysis. Empty circles denote effects that were not significant. (See above-mentioned references for further information.)

icant yet small. For psychopathy, the correlations ranged from  $r = 0.016$  to  $r = 0.033$ , and excluding individual studies did not significantly affect the overall effect. Therefore, we conclude that influential studies did not change our estimates.

### 5.3. Moderator analyses

We included three continuous (study year, percentage of females, average age of participants) and five categorical moderators (status of the study: unpublished-vs.-published; measure of creativity: self-report-vs.-performance; aspect of creativity measured: self-perception, creative activity, creative abilities, creative achievement; DT measure: the Short Dark Triad, the Dirty Dozen and Narcissistic Personality Inventory/Other, and the domain of creativity [general, arts, science, and everyday creativity]).

#### 5.3.1. Study Characteristics: Year and sample composition

We started with a multilevel model using metaSEM that regressed the effect size on the year the study's was conducted, percentage of female participants, and average age of participants in the study (all variables were grand mean centered to facilitate interpretation). None of these effects yielded statistically significant differences in the case of narcissism: year ( $b = 0.00$ ,  $SE = 0.01$ ,  $p = .95$ ), average age of participants ( $b = -0.003$ ,  $SE = 0.003$ ,  $p = .29$ ), and percent of female participants ( $b = 0.08$ ,  $SE = 0.15$ ,  $p = .62$ ).

The same pattern was observed in the case of links between creativity and Machiavellianism (year:  $b = -0.01$ ,  $SE = 0.01$ ,  $p = .20$ , age:  $b = 0.00$ ,  $SE = 0.00$ ,  $p = .80$ , percent of females:  $b = -0.29$ ,  $SE = 0.21$ ,  $p = .16$ ).

For the links between creativity and psychopathy these moderators did not result in significant differences either (year:  $b = -0.01$ ,  $SE = 0.01$ ,  $p = .18$ , age:  $b = 0.00$ ,  $SE = 0.00$ ,  $p = .50$ , percent of females:  $b = -0.01$ ,  $SE = 0.22$ ,  $p = .97$ ).

#### 5.3.2. Measure of creativity

Our first categorical moderator tested whether the links between creativity and the DT depended on the measure of creativity. All creativity measures were coded into self-report or performance. The latter category covered divergent thinking tests.

In narcissism, the moderator resulted in statistically significant differences in effect size obtained:  $Q(df = 1) = 123.51$ ,  $p < .001$ . As illustrated in Table 1, the links between narcissism and creativity were stronger (and "typical" for individual difference research in terms of effect size) when creativity was measured using self-report measures ( $r = 0.19$ ) than when it was measured using performance tests ( $r = 0.09$ ).

A similar pattern was observed in Machiavellianism: the type of creativity measurement moderated the effect size obtained:  $Q(df = 1) = 52.46$ ,  $p < .001$ . When creativity was measured using self-report scales, the relationship was small yet significant ( $r = 0.08$ ,  $p < .001$ ), while it did not differ from null when performance tests were used to measure creativity ( $r = -0.01$ ,  $p = .65$ ).

Also for the correlations between creativity and psychopathy, the moderator effect was significant:  $Q(df = 1) = 42.23$ ,  $p < .001$ . When creativity was measured using self-report scales, the correlation was small yet significant ( $r = 0.05$ ,  $p = .01$ ), while it did not differ from zero when performance measures were used ( $r = -0.03$ ,  $p = .15$ ).

#### 5.3.3. Aspect of creativity

Our next moderator concerned the aspect of creativity measured. More specifically, all measures used in the studies were coded into one of four categories: measures of creative self-perception (e.g., creative self-efficacy, self-rated creativity, etc.), creative abilities (e.g., divergent thinking), creative activity (e.g., activities checklists), and creative achievements (i.e., observable and socially recognized accomplishments).

**Table 1**  
Moderator Analysis Results.

	Narcissism			Machiavellianism						Psychopathy								
	<i>r</i>	95% <i>CI</i>	<i>p</i>	<i>m</i>	<i>k</i>	<i>N</i>	<i>r</i>	95% <i>CI</i>	<i>p</i>	<i>M</i>	<i>K</i>	<i>N</i>	<i>r</i>	95% <i>CI</i>	<i>p</i>	<i>m</i>	<i>k</i>	<i>N</i>
<b>Overall</b>	0.15	0.10, 0.19	< 0.001	25	143	12,692	0.06	0.02, 0.09	0.006	20	107	10,556	0.03	-0.02, 0.07	0.21	22	112	11,053
<b>Status</b>																		
Unpublished	0.13	0.06, 0.20	< 0.001	9	50	7,363	0.07	0.01, 0.13	0.02	9	50	7,363	0.01	-0.05, 0.08	0.68	9	50	7,363
Published	0.16	0.10, 0.21	< 0.001	16	93	5,329	0.04	-0.01, 0.10	0.14	11	57	3,193	0.04	-0.02, 0.09	0.21	13	62	3,690
<b>Measure of creativity</b>																		
Self-report	0.19	0.16, 0.22	< 0.001	22	85	11,965	0.08	0.05, 0.12	< 0.001	19	64	10,149	0.05	0.02, 0.09	0.01	21	67	10,646
Performance	0.06	0.02, 0.09	0.002	14	59	6,688	-0.01	-0.05, 0.03	0.65	11	43	6,134	-0.03	-0.07, 0.01	0.15	12	45	6,368
<b>Aspect of Creativity</b>																		
Self-Perception	0.18	0.14, 0.21	< 0.001	16	57	10,171	0.06	0.02, 0.09	0.003	14	48	8,589	0.03	-0.02, 0.07	0.23	15	49	8,852
Activity	0.21	0.18, 0.25	< 0.001	12	18	8,789	0.15	0.11, 0.20	< 0.001	9	9	6,973	0.12	0.08, 0.17	< 0.001	10	10	7,207
Abilities	0.06	0.03, 0.10	< 0.001	15	59	8,063	-0.01	-0.05, 0.03	0.50	11	43	6,134	-0.03	-0.08, 0.01	0.12	12	45	6,368
Achievement	0.20	0.15, 0.24	< 0.001	8	9	2,986	0.12	0.06, 0.17	< 0.001	7	7	2,752	0.08	0.02, 0.13	0.01	8	8	2,986
<b>Measure of the DT</b>																		
SDT	0.20	0.11, 0.29	< 0.001	6	18	2,197	0.03	-0.05, 0.10	0.48	6	18	2,197	0.06	-0.02, 0.15	0.15	6	18	2,197
DD	0.13	0.06, 0.21	< 0.001	10	53	7,652	0.08	0.03, 0.14	0.003	10	53	7,652	0.02	-0.05, 0.08	0.56	10	53	7,652
NPI/Other	0.13	0.06, 0.20	< 0.001	9	72	2,843	0.03	-0.06, 0.12	0.54	4	36	707	0.01	-0.08, 0.09	0.90	6	41	1,204
<b>Domain</b>																		
General	0.13	0.09, 0.16	< 0.001	20	98	11,105	0.04	0.01, 0.08	0.011	15	71	8,969	0.01	-0.03, 0.04	0.68	17	75	9,466
Arts	0.13	0.10, 0.17	< 0.001	14	88	9,258	0.06	0.03, 0.10	< 0.001	12	75	7,649	0.05	0.01, 0.08	0.01	13	80	7,883
Science	0.15	0.11, 0.19	< 0.001	14	29	9,258	0.11	0.07, 0.14	< 0.001	12	26	7,649	0.10	0.07, 0.14	< 0.001	13	27	7,883
Everyday	0.11	0.08, 0.15	< 0.001	14	36	8,090	0.04	0.00, 0.08	0.034	12	30	7,649	-0.02	-0.05, 0.02	0.43	13	32	7,883

In the relationship between creativity and narcissism, the aspect of creativity significantly moderated the effects obtained, as demonstrated by the omnibus test:  $Q(df = 3) = 137.04, p < .001$ . The links between creativity and narcissism were stronger—and “typical” in terms of the effect size—when creativity was operationalized as self-perception ( $r = 0.18$ ), creative activity ( $r = 0.21$ ), or creative achievement ( $r = 0.20$ ). They were weaker (albeit still significant) when creative abilities were analyzed ( $r = 0.06$ ).

In the case of the links between Machiavellianism and creativity, the moderator effect was also significant:  $Q(df = 3) = 103.49, p < .001$ . Positive correlations were observed in the case of links between Machiavellianism and creative activity ( $r = 0.15$ ) and creative achievement ( $r = 0.12$ ). They were weaker in creative self-perception ( $r = 0.06$ ) and null in the case of creative abilities ( $r = -0.01$ ).

A similar pattern was also noted in the relationships between creativity and psychopathy. The moderator effect was significant as well,  $Q(df = 3) = 92.69, p < .001$ , with statistically significant links observed when creative activity ( $r = 0.12$ ) or achievement ( $r = 0.08$ ) were measured. The relationships were null in the case of creative self-perception ( $r = 0.03$ ) and creative abilities ( $r = -0.03$ ).

**5.3.4. Dark Triad measurement**

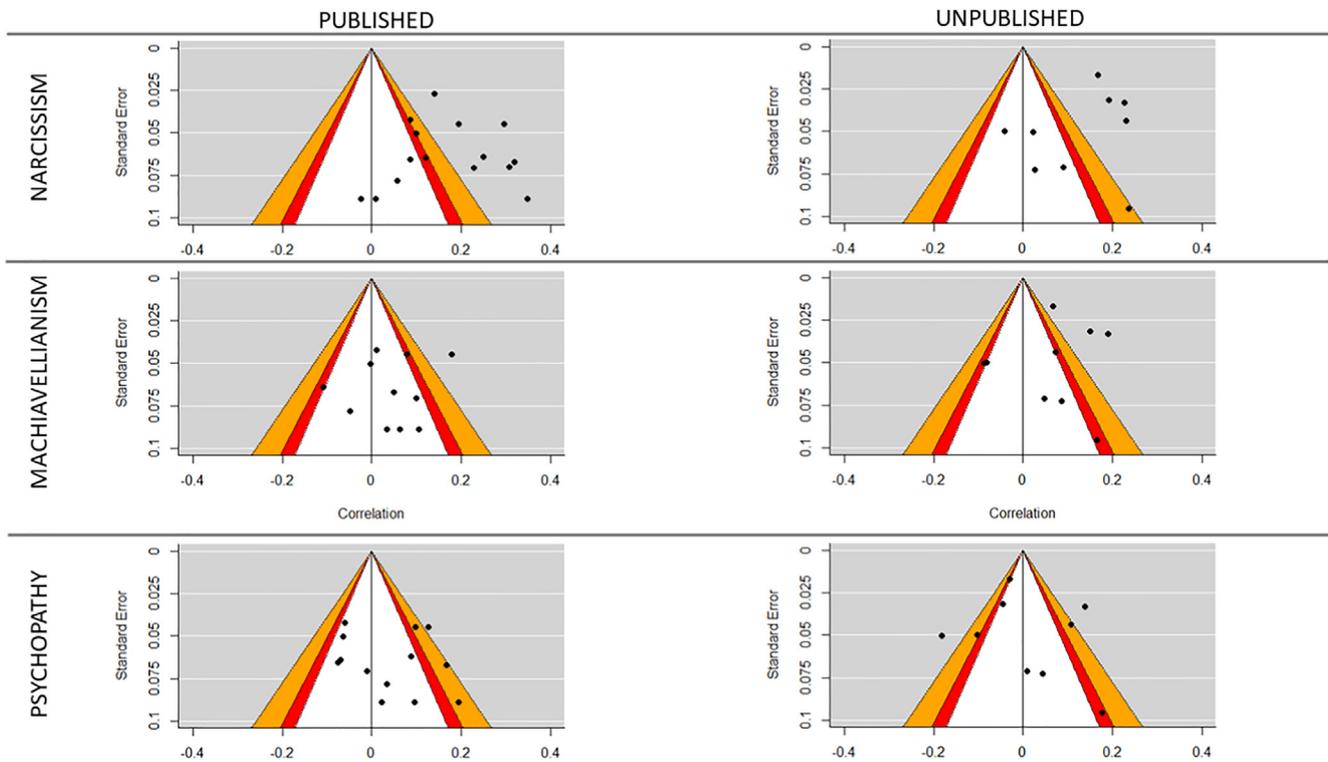
The DT measure was the next potential moderator included. All measures were categorized according to the instrument used,

which resulted in three categories. The first was the Short Dark Triad scale (SD3; Jones & Paulhus, 2014), used in six studies. The second, the Dirty Dozen (DD, Jonason & Webster, 2010), applied in ten studies. Finally, the third group consisted of the Narcissism Personality Inventory (NPI, Raskin, 1980) used to measure narcissism, or the broader category of “Other” measures (e.g., Mach-IV, Rauthmann, 2013 or Levenson Self-Report Psychopathy Scale, Miller, Gaughan, & Pryor, 2008) applied to measure Machiavellianism and psychopathy.

In narcissism, the DT measure did not significantly affect the correlations obtained,  $Q(df = 2) = 1.69, p = .43$ . The links between narcissism and creativity tended to be stronger when SDT3 was used ( $r = 0.20$ ) than when the DD or the NPI were applied (in both cases,  $r = 0.13$ ). However, when we applied contrast, comparing the correlation obtained in the case of SDT3 and both remaining measures of the DT, the difference was not statistically significant ( $Q [df = 1] = 1.69, p = .19$ ).

The DT measure did not differentiate the correlations obtained between creativity and Machiavellianism,  $Q(df = 2) = 1.87, p = .39$ . The only significant links were observed when the DD was used ( $r = 0.08$ ), being null in the case of SDT3 ( $r = 0.03$ ) and other measures ( $r = 0.03$ ).

The correlations between creativity and psychopathy were not moderated by the DT measure either,  $Q(df = 2) = 1.00, p = .61$ . When psychopathy was measured using the SDT3, the correlation tended to be slightly stronger ( $r = 0.06$ ), than when DD ( $r = 0.02$ ) or other



**Fig. 3.** Funnel plot to test publication bias. Dots are studies. A white border denotes non-significant correlations; red, correlations with  $0.05 < p \leq 0.10$ ; orange  $0.01 < p \leq 0.05$ ; and grey background  $0.001 < p \leq 0.01$ . (For interpretation of the references to colour in this figure legend, the reader is referred to the web version of this article.)

measures were used ( $r = 0.01$ ). Planned contrast comparing the correlation obtained when SDT3 was used to two remaining values was not significant ( $Q[df = 1] = 0.99, p = .32$ ).

#### 5.4. Domains of creativity

Our last moderator concerned the domain of creativity. We focused on four domains: general (overall scores in self-report measures or domain-general creativity tests results), creativity levels in the arts, science, and everyday creativity. This moderator was found to be responsible for significant variability of the effect size for the links between creativity and narcissism ( $Q[df = 3] = 11.81, p = .008$ ), Machiavellianism ( $Q[df = 3] = 41.89, p < .001$ ), and psychopathy ( $Q[df = 3] = 123.73, p < .001$ ).

For narcissism, the links tended to be more robust when creativity in scientific domains was considered ( $r = 0.15$ ) compared to everyday creativity ( $r = 0.11$ ), with domain-general measures and creativity in the arts resulting in the same point estimate (both  $r_s = 0.13$ ).

In Machiavellianism, all correlations were significant, yet they were stronger when creativity in science was considered ( $r = 0.11$ ) as compared to creativity in the everyday domain ( $r = 0.04$ ), domain-general creativity ( $r = 0.04$ ), and creativity in the arts ( $r = 0.06$ ).

Finally, for psychopathy, there was a statistically significant positive correlation with creativity in science ( $r = 0.10$ ) and weaker, yet also significant in the arts ( $r = 0.05$ ). In contrast, the links between domain-general measures ( $r = 0.01$ ) and everyday creativity ( $r = -0.02$ ) were not significant.

#### 5.5. Publication bias

We addressed the risk that our estimates are prone to the publication bias in two ways. First, we compared the estimates

obtained in published and unpublished studies. The effects did not differ in the case of creativity-narcissism links:  $Q(df = 1) = 0.36, p = .55$ , with  $r = 0.14 [0.06, 0.20]$  in unpublished and  $r = 0.16 [0.10, 0.21]$  in published studies. Also, correlations between creativity and Machiavellianism in published ( $r = 0.04 [-0.01, 0.10]$ ) and unpublished ( $r = 0.07 [0.01, 0.13]$ ) studies did not differ:  $Q(df = 1) = 0.48, p = .49$ , similarly to the links between creativity and psychopathy (unpublished:  $r = 0.04 [-0.02, 0.09]$ , published:  $r = 0.01 [-0.05, 0.08]$ ,  $Q(df = 2) = 0.27, p = .60$ ).

In the second step, we focused only on published studies. We analyzed funnel plots to examine whether there were any signs that smaller, underpowered (and hence more prone to type-1 error) studies were associated with stronger links. As illustrated in Fig. 3, it was not the case (for comparability purposes, we also present funnel plots for unpublished studies). When accompanied with Egger's regression test, we did not observe signs of publication bias in any case; narcissism:  $z = -0.61, p = .54$ , Machiavellianism:  $z = -0.41, p = .69$ , or psychopathy:  $z = 0.71, p = .48$ . Therefore, we conclude that it is unlikely that our estimates were influenced by publication bias.

## 6. Discussion

For decades, socially undesirable traits were theorized as quite typical for highly creative people (e.g., Eysenck, 1993; Feist, 1998; Kapoor et al., 2016). Since 2002, when the DT model of personality was introduced (Paulhus & Williams, 2002), the number of studies on the relation between creativity and three components of the DT construct (i.e., narcissism, Machiavellianism, and psychopathy), has been continuously growing (e.g., Furnham, Richards, & Paulhus, 2013). To more robustly assess the strength of the link between creativity and Dark Traits of personality and to make an attempt at resolving some inconsistencies in published results, we conducted this meta-analytical study. Its results uncover some

of the complex links and demonstrate promising avenues for future research.

At the most general level, the links between creativity and narcissism, and creativity and Machiavellianism this *meta*-analysis provided are statistically significant, with effect size possible to be categorized as “typical” when the narcissism-creativity links are considered and small when we consider Machiavellianism-creativity relationship. Therefore, practical significance of the association between creativity and Machiavellianism seems doubtful. A relationship between creativity and psychopathy is not significantly different from zero. As our sensitivity analyses have shown, the effects were robust and there was no sign of publication bias: published and unpublished studies yielded similar estimates and funnel plots were symmetric overall. Thus, the first conclusion that this *meta*-analysis provides is that while narcissism indeed tends to be positively associated with creativity, in the case of Machiavellianism and psychopathy—even if the links are significant (as in Machiavellianism’s case)—these constructs should be viewed as almost completely independent. Still, however, our moderators provide a more nuanced picture. Below, we discuss the results concerning each of the DT traits.

### 6.1. Creativity and narcissism

The strongest link we found (albeit still not impressive:  $r = 0.15$ ) was the one between creativity and narcissism—most widely studied DT trait (see, e.g., Jauk & Sordia, 2018; Lemaitre, 2017; Raskin, 1980; Solomon, 1985; Wallace & Baumeister, 2002). This relationship was further moderated by the creativity-related characteristics we included: self-report-vs.-performance measure of creativity, aspects of creativity measured (i.e., whether self-perception, creative activity, creative abilities, or creative achievement were taken into consideration), and creativity domain (be it domain-general scores or creativity in the domains of arts, science, or everyday functioning).

When it comes to the creativity measures (i.e., self-report-vs.-performance), the relationship was significant, positive, yet small when self-report measures of creativity were applied, and even weaker (but still significant) when creativity tests (i.e., performance measures) were used. Moreover, this association remained positive and significant regardless of the measured aspects of creativity (self-perception, creative activity, creative abilities, and creative achievement), yet it was clearly and significantly weaker when creative abilities were correlated with narcissism.

This significant moderation resembles the findings observed in previous studies that ranged from null (Dahmen-Wassenberg et al., 2016; Goncalo et al., 2010; Solomon, 1985; Sordia et al., 2020) to small yet positive links (Martinsen et al., 2019; Raskin, 1980). As one of the studies demonstrated, the relationship between narcissism and creative achievements disappeared when the latter was judged by independent raters rather than by self-report scales (Sordia et al., 2020). This finding—together with our estimates—suggests that the positive link may reflect a sense of grandiosity (Paulhus & Williams, 2002; Wallace & Baumeister, 2002) and a tendency to overestimate abilities and achievements among narcissists (see Dahmen-Wassenberg et al., 2016; Furnham, Hughes et al., 2013; Goncalo et al., 2010; Jonason et al., 2015, 2017). Still, we emphasize that, in our *meta*-analysis, narcissism was the one and only Dark Triad trait that was also positively associated with performance measures of creative abilities, even if this link was trivial ( $r = 0.06$ ).

While interpreting the positive links between narcissism and creative activities and achievements, it should be remembered that activity and achievement were measured by self-report scales. Anyway, we see at least two mechanisms—other than a sense of superiority typical for narcissists—that may play a role here. The

first is the agentic aspect of creative self-beliefs hypothesized elsewhere (Karwowski & Beghetto, 2019). Feeling more creative may facilitate undertaking creative activities (Wallace & Baumeister, 2002), help to develop skills and knowledge, and as a result, succeed in chosen domains. Of course, creative agency driven by confidence, requires such cognitive skills as divergent thinking, imagery, or metaphorical thinking. Confidence alone is by no means a sufficient factor for achievement, yet for those narcissists who are effective creative thinkers, it might be helpful. The second mechanism assumes that creative success is a factor that builds a positive image of one’s own ability and—even if indirectly—increases the level of narcissism with time (see Jauk & Sordia, 2018; Lemaitre, 2017; Wallace & Baumeister, 2002). These two hypothetical mechanisms are not mutually exclusive; rather, they highlight different aspects of creativity-narcissism links.

Further, when we look at how the creative domain moderates the link between narcissism and creativity, it becomes apparent that the link is strongest for a scientific domain, weaker for general and artistic creativity, and lowest for everyday creativity. The relationship of narcissism to a wide variety of domains (e.g., Jonason et al., 2015; McKay et al., 2017; Sordia et al., 2020) and general creative success (Furnham, Hughes et al., 2013; Galang et al., 2016) has already been demonstrated. These investigations have also shown that people with a high level of narcissism prefer artistic and entrepreneurial careers over scientific, investigative ones (Jonason et al., 2014). The discrepancy we observed in our synthesis may result from the somehow complex character of the domain moderator we have included. The particular domains in our *meta*-analysis not only covered professional and non-professional creative activities and achievements, but also self-perception of one’s creativity across domains (for example, as measured by Kaufman Domain of Creativity Scale; see, e.g., McKay et al., 2017). Still, given that science is a more structured and stable domain than art, it could be associated with perceived higher status (see Karakowsky, Kotlyar, & Good, 2020) – a factor that is essential to narcissists.

### 6.2. Creativity and Machiavellianism

The relationship between creativity and Machiavellianism was positive and significant (albeit small) only when self-report instruments were used to measure creativity; it disappeared when creative performance was considered. We observed positive and significant (yet small in all the cases) correlations between Machiavellianism and creative activities, achievements, and self-perception. Based on previous research, it might even be hypothesized that the relationship between Machiavellianism and creative abilities will be negative (see, e.g., Dahmen-Wassenberg et al., 2016; Jonason et al., 2017; Wisse et al., 2015), while it was null in this *meta*-analysis.

The links between creativity and Machiavellianism were stronger in the case of art and science than for everyday creativity. That was contrary to what could be hypothesized based on previous research, which suggested the strongest effects of Machiavellianism on creativity in the most practical domains (see Jonason et al., 2014), closest to the broad category of everyday creativity. Nevertheless, it seems possible that people high in Machiavellianism are more prone to engage in scientific or artistic creativity, which is considered more prestigious and gives a chance for higher status (see Jonason et al., 2014; Paulhus & Williams, 2002).

### 6.3. Creativity and psychopathy

While the overall effect of the relationship between creativity and psychopathy was not significant, our moderation analysis did provide some interesting and more nuanced patterns.

Specifically—and mirroring the previous cases of narcissism and Machiavellianism—the relationship was positive when self-report measures of creativity were utilized, but it disappeared when performance tests were applied. Psychopathy was not associated with creative self-perception or creative abilities, but was significantly linked to creative activity and achievement. As people high in psychopathy are usually less concerned about others' opinions than people high in the other two Dark Triad traits (see Jonason & Karuse, 2013), it is possible that their creative self-perception is quite accurate.

The link between creativity and psychopathy was moderated by creativity domains. The correlation was significant in science ( $r = 0.10$ ) and the arts ( $r = 0.05$ ), yet in the latter the effect size makes the link practically meaningless. Links with everyday or general creativity were not significant (see Galang et al., 2016). It is worth to emphasize that all three dark personality traits were more strongly associated with scientific creativity, weakly but significantly with creativity in arts, and with far less systematic patterns in the case of domain-general and everyday creativity. As previous studies demonstrated, artistic creativity was related to socially unacceptable traits, such as a tendency to behave contrary to the norms, being opposed to the rules accepted by society, non-conformity, than creativity in science (see Batey & Furnham, 2006; Feist, 1998). Still, however, there were some hypothesized and empirically demonstrated benefits of dark personality traits also for the effective functioning in science (Feist, 1993).

To summarize the results of the moderation analysis, we emphasize that dark personality traits seem to be mainly associated with self-rated creativity. This is in line with the prediction that these links are rather motivational (see Sordia et al., 2020) or even caused by measurement issues (i.e., common method variance in the case of questionnaires) than being driven by a common neuropsychological basis (e.g., Galang et al., 2016) or evolutionary mechanisms (e.g., Furnham, Richards, et al., 2013). Indeed, people high in dark personality traits perceived themselves as creative (except people high in psychopathy) and reported social recognition for creative achievement, while the links between the Dark Triad and performance measures were either null (Machiavellianism, psychopathy) or small (narcissism). This could imply a motivational mechanism to provide responses in line with social expectations but also reflect potential self-serving bias in the perception of one's abilities. Further research is needed to determine whether this mechanism is due to the desire to present a socially expected image or whether it arises from inaccuracies in creative self-beliefs.

#### 6.4. Limitations and future directions

The findings of this *meta-analysis* should be read in light of its limitations. At least four are worth mentioning and addressing in future investigations. The first stems from the fact that the current *meta-analysis* was exclusively based on correlational studies, so no causal conclusions are in place. Future longitudinal studies (see e.g., Feist & Barron, 2003) and experimental research on people scoring high in Dark Triad measures are necessary to untangle the directions of the possible influences.

The second limitation relates to the scope of the current *meta-analysis*. While the number of studies exploring the links between Dark Triad and creativity is growing, the overall number of identified investigations was quite limited. The above results in a low number of studies (albeit a fair number of analyzed correlations within studies) in some moderators' categories, so it could therefore result in unstable estimates. Relatedly, we were unable to test for some potentially interesting moderators, such as the relationship between socially unacceptable traits and prosocial and antisocial, malevolent creativity (see Clark & James, 1999; Cropley et al.,

2008). It seems very likely that ideas' social valence moderates the links between creativity and the Dark Triad traits (see Jonason et al., 2017; Kapoor, 2015).

The third limitation and direction for future investigation is considering the facets of the Dark Triad traits (see Miller et al., 2019) at least in the case of narcissism and psychopathy (Jauk et al., 2017; Lilienfeld, Watts, Francis Smith, Berg, & Latzman, 2015; Patrick et al., 2009). As creativity differently relates to grandiose and vulnerable narcissism (Sordia et al., 2020) or psychopathic boldness (see Galang et al., 2016), this line of research can indeed provide more insight into the links between these constructs. Applying multidimensional measures of the Dark Triad would allow to more efficiently differentiate Machiavellianism from psychopathy (see Miller et al., 2017; 2019). Additionally, it would also make it possible to more effectively employ person-centered statistical analyses (e.g., latent profile or latent class analysis) to explore how different configurations of narcissistic, psychopathic or Machiavellistic individuals vary on creativity. Importantly, in this *meta-analysis* we did not observe that the measure of the DT moderated the relationships with creativity, yielding very similar correlates despite the measure. Still, however, future studies would benefit from relying on longer and multidimensional scales of the DT.

What could be considered a fourth limitation is a somehow arbitrary classification of creativity domains in four broader groups: art, science, everyday, and general creativity. While perhaps suboptimal, this decision allowed us to avoid overly detailed categories that would result in unstable estimates. Still, however, scholars interested in more specific questions (e.g., how are the Dark Triad traits related to creative achievement in visual arts or humor) are invited to use our openly shared data and scripts to investigate it.

## 7. Conclusion

This *meta-analysis* established statistically significant relationships between creativity and two of the three Dark Triad traits: narcissism and Machiavellianism: "typical" in terms of the effect size in the case of narcissism and small in the case of Machiavellianism. Furthermore, the dark personality traits were related to creativity mainly when the latter was measured with self-report scales, but less so when creative performance was considered. Finally, the effect size of the correlations reported leads to the conclusion that in most cases, the relationships are quite trivial. In other words, Dark Triad personality traits and creativity are mostly independent characteristics. The main exceptions concern narcissism, particularly the links between narcissism and self-reported creativity, creative self-perception, creative activity, and creative achievement – strength of all these effects could be considered typical for individual differences studies (Gignac & Szodorai, 2016). In Machiavellianism, less trivial links were observed when creative activity was considered. Psychopathy—while generally unrelated to creativity—yielded correlations that may have some practical significance in the case of creative activity and creativity in science.

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