



The dark tetrad and trait emotional intelligence: Latent profile analysis and relationships with PID-5 maladaptive personality trait domains

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ARTICLE INFO

Keywords:

Dark Tetrad
Emotional intelligence
Latent profile analysis
PID-5
Maladaptive trait domains

ABSTRACT

Dark traits and emotional intelligence play a key role in contemporary personality theory. Still, the relationship between these models deserves clarification, especially regarding the latent profiles characterized by a mixture of traits from both models. The present research used a person-centred approach to explore the latent profiles derivable from dark traits measured through the Short Dark Tetrad (SD4; Jones & Paulhus, 2014) and trait emotional intelligence measured through Wong and Law's (2002) Emotional Intelligence Scale (WLEIS), in two non-clinical samples, from Romania ($N = 311$) and the UK ($N = 222$), respectively. We tested the invariance of the solution across the two samples, then how the emerging profiles relate to PID-5 maladaptive trait domains by using linear modeling. We found that a 3-profile solution represented the data best, with two profiles showing SD4 values close to the mean and comparatively high and low values across the WLEIS facets, respectively, whereas the third profile was characterized by high SD4 values and values of emotional intelligence close to the mean. Significant differences between the profiles were found in maladaptive personality trait domains. Implications for theory and research are discussed.

1. Introduction

Research in the last two decades has identified a set of sub-clinical, aversive, and maladaptive traits linked to interpersonal callousness and aggressive behavior, namely Machiavellianism, narcissism, psychopathy, and later added, sadism – jointly referred to as the ‘Dark Triad/Tetrad Traits’ (DT; Paulhus & Williams, 2002). Though unique in various aspects, the DT are highly inter-correlated and share a propensity for callous affect and manipulative interpersonal life-style, underpinned in their core by antagonism (Vize et al., 2020), callous-unemotional traits, low agreeableness (Waller & Wagner, 2019), honesty-humility (Hodson et al., 2018), and low empathy (Heym et al., 2019), showing significant empathic deficits (e.g., Heym et al., 2019; Jonason & Krause, 2013; Jones & Figueredo, 2013).

A mostly separate line of enquiry in personality research has focused on ‘Emotional Intelligence’ (EI). Since the seminal work by Salovey and Mayer (1990), research in EI has generated a debate on the definition of EI as a constellation of personality dispositions, measured through

psychometric and self-reported questionnaires, as opposed to an ability, measured through maximum performance tests (Petrides, 2011; Petrides & Furnham, 2006). In particular, trait EI was defined as a constellation of emotion-related self-perceptions and dispositions (Petrides & Furnham, 2006, p. 283) located at the “lower levels of personality hierarchies (because the trait EI factor is oblique, rather than orthogonal to the Giant Three and the Big Five)” (Petrides et al., 2007, p. 283). Drawing upon the revised four-dimensional model by Salovey and Mayer (1990), representing EI in terms of a hierarchically superordinate construct, Wong and Law (2002, p. 20) defined trait EI in terms of the following dimensions: (i) self-emotion appraisal; (ii) other-emotion appraisal; (iii) use of emotion; and (iv) regulation of emotion. These are considered to fit the trait EI conceptualisation due to their definition and operationalization through self-reported measures, representing a set of individuals' dispositions and self- and other-perceptions, rather than abilities (Brannick et al., 2009; LaPalme et al., 2016). In contrast, ability EI was defined as “the ability to perceive and express emotion, assimilate emotion in thought, understand and reason with emotion, and regulate

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<https://doi.org/10.1016/j.paid.2023.112092>

Received 13 September 2022; Received in revised form 5 December 2022; Accepted 10 January 2023

Available online 2 February 2023

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emotion in the self and others” (Mayer et al., 2000, p. 396).

Some evidence supports the construct, predictive, and incremental validity of trait EI (Klumper, 2008; Petrides et al., 2007; van der Zee & Wabeke, 2004). Specifically, trait EI has been located at the lower levels of broadband personality taxonomies, showing incremental validity over the five-factor model of personality, life satisfaction, rumination, adaptive and maladaptive coping styles, and it has also been found to predict several adaptive life outcomes, for example personal health (Martins et al., 2010) as well as educational attainments and organizational performance (see Petrides et al., 2007; Petrides & Furnham, 2001). In contrast, as argued by Petrides (2011), the ability EI model showed inconsistencies in the definition of EI sampling domains, measurement criteria, and scoring procedures, “blurring the difference between intelligence, behavioral effectiveness, and mere declarative knowledge” (p. 656).

Research showed that high DT and low EI explain important psychological maladaptive outcomes, including suboptimal mental health and well-being (for DT: Joshanloo, 2021; for EI: Martins et al., 2010; Schutte et al., 2007) educational attainments and conduct (for DT: Curtis et al., 2022; for EI: Halimi et al., 2020), organizational performance and behavior (for DT: Nguyen et al., 2021; for EI: Miao et al., 2018; O’Boyle et al., 2011), aggressiveness (for DT: Heym et al., 2019; for EI: García-Sancho et al., 2014), and poor interpersonal relationships (for DT: Jonason et al., 2012; Rauthmann, 2012; for EI: Schutte et al., 2001).

More recently, research has explored the hypothesis of a ‘dark’ side of EI (Miao et al., 2018), based on the assumption that some individuals might be predisposed to a strategic use of their own and others’ emotion, functional to manipulating or ingratiating others to derive personal gains (Austin, 2004; Furnham & Rosen, 2016; Miao et al., 2019; Michels & Schulze, 2021; Nagler et al., 2014; Petrides, 2011). Two subsequent meta-analyses have focussed on the association between DT and EI (Miao et al., 2019; Michels & Schulze, 2021), showing general negative associations between the two. In particular, Miao et al. (2019) found negative correlations between trait EI and Machiavellianism ($\hat{\rho} = -0.27$), and between the former and psychopathy ($\hat{\rho} = -0.16$), whereas the association with narcissism was close to zero ($\hat{\rho} = 0.05$). Based on these results, they concluded that “EI scales may be a practical way to screen out candidates high in Machiavellianism and psychopathy” (p. 189). Michels and Schulze (2021) largely confirmed those results for Machiavellianism ($\bar{r} = -0.29$) and psychopathy ($\bar{r} = -0.25$), whereas regarding narcissism, they found a positive and low association between the latter and trait EI ($\bar{r} = 0.18$), which they interpreted in terms of biased views of oneself that are common among individuals high in narcissism, potentially affecting self-reported trait EI. Meanwhile, a recent paper has introduced the novel yet controversial construct of the Dark Empath, which describes individuals who are both high on dark traits and in empathic capacities. Although conceptually distinct and potentially less severe than the traditional triadic model of DT, the Dark Empath is still associated with maladaptive outcomes, compared to those low in DT (Heym et al., 2021).

A specific characterization of the latent profiles derived from DT and EI is currently unavailable, though. This is warranted to further clarify the relationships between these constructs (e.g., Heym et al., 2021). Therefore, the aim of the current study was to examine the interplay of DT traits and trait EI by using a person-centred approach and investigate how these might differ in maladaptive personality trait domains, namely antagonism, detachment, disinhibition, negative affect, and psychoticism (Krueger et al., 2012).

1.1. The Dark Tetrad

The term ‘Dark Triad’ (Paulhus & Williams, 2002) refers to “a constellation of three socially offensive personality variables” (p. 208). Although specific sub-types of each of these traits have been identified (e.g., Levenson et al., 1995; Rohmann et al., 2012), they are commonly

characterized as: (i) Machiavellianism, i.e., a disposition to moral expediency and manipulation to strategically derive personal gains (Christie & Geis, 2013); (ii) narcissism, which involves an inflated sense of self, exaggerated feelings of self-worth, grandiosity, entitlement and control (Morf & Rhodewalt, 2001); and (iii) psychopathy, i.e., an individual’s tendency to harm others in absence of empathy and remorse, usually associated with anti-social, eccentric, and unpredictable behavior, as well as violent conduct (Jones & Paulhus, 2010; Paulhus, 2014).

Several operationalizations and measurements of the Dark Triad exist, including the so-called Dirty Dozen (Jonason & Webster, 2010) and the Short Dark Triad (SD3; Jones & Paulhus, 2014), although the more comprehensive Dark Tetrad model accounting for the fourth trait of sadism has recently shown theoretical strengths and empirical support (Johnson et al., 2019). In particular, Paulhus et al. (2021) suggested two fundamental arguments for the inclusion of the fourth trait. Firstly, the lack of empathy commonly displayed by sadistic individuals, considered as a characteristic of other DT (Paulhus & Williams, 2002). Secondly, the element of “intrinsic pleasure in hurting others” (Paulhus et al., 2021, p. 208) observed in previous studies (Johnson et al., 2019; Nell, 2006; Pajevic et al., 2018), which was not specifically addressed in the traditional triadic model. Although overlaps of sadism with psychopathy had been noted, with some authors concluding that both constructs should be redefined into a single trait representing a constellation of callous sub-facets (Jones & Figueredo, 2013; O’Connell & Marcus, 2019), the new tetradic model addresses the aspect of intrinsic pleasure derived from a secondary fruition of other-directed violence (e.g., watching violent movies), which is distinguished as an independent factor from psychopathy (Paulhus et al., 2021). Consequently, the development of a new measure of dark traits, namely the Short Dark Tetrad (SD4; Paulhus et al., 2021) included items assessing specific features of ‘vicarious’ sadism (Johnson et al. (2019).

Though the DT are typically studied in the context of empathic deficits, the results from the recent study by Heym et al. (2021; see also Bloxson et al., 2021) and the introduction of the construct of the Dark Empath defined a profile characterized by a combination of average-to-high empathy and high DT. This was obtained by using a person-centred approach to the analysis of profiles derivable from a mixture of Dark Triad traits, cognitive and affective empathy, and their relationships with Big-Five factors. The authors presented four latent profiles: (i) the Dark Empath, alongside (ii) the traditional DT (with low levels of empathy); (iii) the Empath (low dark traits, high empathy); and (iv) a Typical normative group (low dark traits, average empathy). Both the DT and the Dark Empath showed high SD3 scores, but the Dark Empath also showed high scores in broadband personality traits such as extraversion and agreeableness, and comparatively lower scores in aggression vs. the traditional DT, overall indicating enhanced levels of adjustment and tendency to well-being, albeit still involving DT’s original elevated “antagonistic core” (p. 110172), when compared to the Empath and Typical. The authors argued that such combination of DT with empathic capacities might explain some of the findings observed in the literature on empathy deficits and maladaptive outcomes in those scoring highly in dark traits. Thus, whilst research typically examined the direct relationship or mediating role of empathy deficits in maladaptive outcomes linked to dark traits, Heym et al.’s (2021) findings suggest that empathy might have a moderating impact, instead. Some authors have argued that empathy represents a sub-facet of EI (Baudry et al., 2018; Fernández-Abascal & Martín-Díaz, 2019; Olderbak & Wilhelm, 2017; Petrides et al., 2007), and for this reason, studying the relationship between DT and EI is fundamental to advance our understanding of these two models.

1.2. The relationship between dark traits and Emotional Intelligence

Research has examined the relationship between DT and EI. Petrides et al. (2011) showed positive correlations of trait EI with narcissism and

negative phenotypical correlations with Machiavellianism and psychopathy in a sample of 214 adult twin pairs. However, Miao et al. (2019) found in their meta-analysis that EI was not correlated with narcissism, using either trait EI or ability EI. Furthermore, differences in types of EI – i.e., trait vs. ability – did not affect the relationship between DT and EI (although the strength of the relationship was dependent on the specific measures of DT and EI used). Nevertheless, the negative associations with psychopathy and Machiavellianism challenged the view according to which some individuals may use their EI to strategically manipulate others and/or situations to achieve personal gains. Yet, as previously introduced, the results of the meta-analysis by Michels and Schulze (2021) showed a positive correlation between narcissism and trait EI, although overall, DT were only marginally associated with emotion-related traits and abilities, once again challenging the hypothesis of a ‘dark side’ of EI.

However, Austin et al. (2007) explored the relationship between Machiavellianism, trait and ability EI ($N = 199$), aiming to clarify whether Machiavellianism plays a role “as a manipulative aspect of EI” (p. 181). In addition, in a second study ($N = 341$), the authors developed a scale measuring emotional manipulation and explored the correlations between the latter construct, Machiavellianism, EI, and broadband personality traits. The results showed that Machiavellianism was negatively correlated with trait and ability EI, as well as with agreeableness and conscientiousness. Emotional manipulation correlated positively with Machiavellianism, though the former was not associated with EI. This suggests a pattern of emotionally-manipulative behavior in individuals scoring highly in Machiavellianism, independent from EI, apart from some significant correlations with dimensions of appraisal and use of emotions. Another study by O’Connor and Athota (2013) tested alternative models in which agreeableness was used as a mediator/moderator between trait EI and Machiavellianism, in 884 workers. They found that agreeableness acted both as a mediator and as a moderator of such relationship, suggesting that high trait EI is associated with low Machiavellianism. They interpreted the results in terms of an individual’s general positive emotionality attributable to agreeableness, rather than to a specific disposition to emotional competence. On the other hand, low agreeableness was associated with a high sense of perceived emotional competence in some participants scoring highly in Machiavellianism, in line with the hypothesis by Austin et al. (2007).

Besides the previously introduced, extant correlational studies on DT and trait EI, there is a gap in the current understanding of the latent profiles derivable from DT and trait EI, whereas latent profiling could provide a unique source of evidence to clarify the possible co-occurrence of such traits. This would help clarify (i) how many and which profiles would emerge, relying on a probabilistic modeling of group memberships, assuming data to reflect a mixture of distributions of multiple traits; (ii) the relative prevalence of these profiles; (iii) whether profiles allow for the prediction of other associated variables (Spurk et al., 2020). In addition, LPA would enable a comparison with findings from previous research, specifically: (iv) the findings from recent meta-analyses (Miao et al., 2019; Michels & Schulze, 2021) on the association between narcissism and EI; (v) the correlations between Machiavellianism and trait EI, especially with regards to the ability to appraise others’ emotions vs. appraising and regulating own emotions, possibly explained by a tendency manifested by those high in Machiavellianism to manipulate and use emotions for personal gains (Austin et al., 2007; O’Connor & Athota, 2013); (vi) recent findings on the Dark Empath, i.e., whether a profile characterized by high trait EI and DT aligns with the hypothesis of a partially antagonistic core associated with empathy, ultimately acting as a protective factor against personality dysfunction (Heym et al., 2021).

1.3. Dark Traits and PID-5 maladaptive personality trait domains

A large corpus of previous studies focussed on DT in relation to normative personality taxonomies, and in particular, the five-factor

model and the HEXACO model (for a meta-analysis, see Howard & Van Zandt, 2020). To date, few studies have considered the relationship between DT and the recently introduced DSM-5 (American Psychiatric Association, 2013) maladaptive personality trait domains. These have been conceptualised in terms of continuous dimensions of maladaptive and dysfunctional personality, namely the PID-5 (Krueger et al., 2012): (i) antagonism, representing a tendency to callousness and resentment (counterpart of agreeableness); (ii) detachment, involving refrain and withdrawal from interpersonal relationships and interactions (low extraversion); (iii) disinhibition, representing a tendency to act without consideration of the consequences of one’s own behavior (counterpart of conscientiousness); (iv) negative affect, involving a tendency to experience negative emotion (based on neuroticism); and (v) psychoticism, representing a tendency to eccentricity and odd behavior, which showed overlaps with openness to experience (De Fruyt et al., 2013).

The PID-5 are commonly used to supplement traditional clinical and diagnostic assessments of personality dysfunction, although they do not directly map onto personality disorders, rather, they are considered as polar dimensions “determining how personality can cause a social dysfunction” (Lyons, 2019, p. 50). In this regard, Grigoras and Wille (2017) found in a sample of Romanian law enforcement employees ($N = 266$), that psychopathy and Machiavellianism were positively correlated with most of the five PID-5 trait domains ($p < 0.001$), specifically antagonism ($r = 0.38$ and 0.44 , respectively), negative affect ($r = 0.29$ and 0.27), psychoticism ($r = 0.38$ and 0.26), disinhibition ($r = 0.39$ for psychopathy), and detachment ($r = 0.24$ for psychopathy). Narcissism was also linked to antagonism ($r = 0.34$), yet its associations with detachment, negative affect, and disinhibition were non-significant.

A recent review of the literature by Lyons (2019) has further highlighted that the associations between DT and PID-5 trait domains tend to differ in clinical vs. non-clinical populations. For example, with regards to narcissism, the manifestations of pathological and non-pathological forms of narcissism might underlie the presence of different traits (Pincus et al., 2016). Additionally, a recent review (Al-Dajani et al., 2016) showed that studies conducted in patients diagnosed with narcissistic personality disorder identified positive correlations of psychopathy and narcissism with antagonism and disinhibition. These results highlight the importance of differentiating personality profiles across populations, which might help predict and explain distinct patterns of personality dysfunction, aggressive and anti-social behavior.

1.4. Research aims and hypotheses

Despite the findings from the presented studies, the relationships between the tetradic model of DT and maladaptive personality measured through the PID-5 is still relatively unexplored. Moreover, it is not clear whether the presence of EI would help prevent maladaptive outcomes. In addition, as per recent research findings, invariance in the manifestation and expression of DT should be taken into account when investigating their association with EI (e.g., Jonason et al., 2020; Ma et al., 2021). Consistently, in the present research we used a person-centred approach to (i) explore the latent profiles derivable from the DT tetrad model (Jones & Paulhus, 2014) and Wong and Law’s EI model (Law et al., 2004; Wong & Law, 2002); (ii) replicate the solution across two samples (Romania, UK); and (iii) investigate how these relate to PID-5 maladaptive personality domains.

Although we had no a priori assumptions on the number of profiles to derive from the analysis, considering the negative and low associations found in recent meta-analyses between DT traits and trait EI (Miao et al., 2019; Michels & Schulze, 2021), and research on the relationship between Machiavellianism and EI (Austin et al., 2007; O’Connor & Athota, 2013), we were interested to test whether patterns of comparatively higher scores in DT and lower scores in EI would emerge at the same time, with the exception of Machiavellianism, for which we considered that fluctuations at the level of appraising and regulating own vs. others’ emotions would emerge. In this regard, because Wong and Law’s EI

theoretical and measurement model underlies a hierarchical structure (Iliceto & Fino, 2017; Wong & Law, 2002), including four inter-correlated factors tapping onto a higher-order EI dimension, we decided to use the four factors in the analyses and investigate the latent profiles emerging from a mixture of distributions of first-order factors from both personality models (i.e., DT and trait EI).

Additionally, we hypothesised that any latent profiles characterized by high scores in DT would be characterized by elevated maladaptive trait domain levels, specifically the PID-5 trait domains of antagonism and disinhibition, yet lower levels in detachment and negative affectivity, possibly reflecting social potency and stress immunity (e.g., Latzman et al., 2020). In fact, according to Venables et al. (2014), psychopathy is characterized by low anxiousness (reduced negative affect), high attention seeking (antagonism) and low withdrawal (detachment), reflecting social potency/dominance and protection from stress.

Lastly, although the person-centered latent characterization of DT and EI was the main focus of the present study, because we used samples from different national and linguistic contexts, we tested the invariance of the retained LPA solution between the two groups to determine the extent to which the same profiles are exhibited by both (Olivera-Aguilar & Rikoon, 2017, p. 1).

2. Methods

2.1. Participants and procedure

Participants were 562 undergraduate psychology students recruited via convenience sampling from two universities in Romania and the United Kingdom, respectively. In total, 536 provided informed consent and completed the study's procedure (Romania = 313; UK = 223). The Romanian sample was recruited at Alexandru Ioan Cuza University, at the end of classroom lectures, with students being invited to take part in an online cross-sectional study. No incentives to participation were provided. The UK sample was recruited at Nottingham Trent University via an institutional research participation scheme's website, with participation being voluntary and students being offered two research credits for their time. The procedure was reviewed by and met favorable ethics opinion of the ethics committees of the relevant institutions (for the UK: Schools of Business, Law and Social Sciences Research Ethics Committee; application no. 2021/230).

In both cases, participants completed the questionnaire electronically, in their own time, using online data management platforms (Romania: LimeSurvey, <https://www.limesurvey.org>; UK: Qualtrics, www.qualtrics.com). All participants were informed about the aims and characteristics of the study and the inclusion criterion (i.e., being 18 years old or older), and provided electronic informed consent. Participants completed a series of self-reported measures in English or Romanian, respectively, for a total of about 20–25 min, and were debriefed at the end of the study.

2.2. Measures

The *Short Dark Tetrad (SD4; Paulhus et al., 2021)* is a 28-item measure of the four dark personality traits (Machiavellianism, narcissism, psychopathy and sadism). Items are scored on a 5-point Likert-type scale (1 = “strongly disagree”, 5 = “strongly agree”; exemplificative item: “It's not wise to let people know your secrets.”) indicating a participant's level of agreement. The SD4 is internally consistent with Cronbach's alpha values ranging from 0.78 to 0.83 across the four traits (for the original English version, see Paulhus et al., 2021; see Bajcsi et al., 2023, for the Romanian version).

The *Wong and Law's Emotional Intelligence Scale (WLEIS; Wong & Law, 2002; Law et al., 2004)* is a 16-item self-report trait EI measure assessing four facets: (i) self-emotion appraisal (expression of one's own emotion); (ii) other-emotion appraisal (recognition of emotion in others); (iii) use of emotion; (iv) emotion regulation. Items are scored on a Likert-type 7-

point scale (1 = “strongly disagree”, 7 = “strongly agree”; exemplificative item: “I have good understanding of my own emotions.”), with higher scores indicating higher trait EI. The scale is internally consistent, with Cronbach's alpha values ranging from 0.83 to 0.90, both for total scores and sub-scale scores for the English version (Wong & Law, 2002), and between 0.66 and 0.82 for the Romanian version (Runcan & Iovu, 2010). A recent study investigating the relationships between trait EI facets measured through the WLEIS and DT in 322 adults from the general population of Croatia showed that EI was associated with DT traits - negatively with Machiavellianism, psychopathy, and sadism, and positively with narcissism (Sokić, 2022).

The *Personality Inventory for DSM-5, Short Form (PID-5-SF; Krueger & Markon, 2014; Maples et al., 2015)* is a 25-item self-report assessment of the maladaptive personality domains of antagonism, detachment, disinhibition, negative affect, and psychoticism, integrated in Appendix III of the DSM-5 (American Psychiatric Association, 2013). The PID-5-SF uses a Likert-type 4-point scale (0 = “Very false or often false”, 3 = “Very true or often true”; exemplificative item: “People would describe me as reckless.”). The scale has shown satisfactory internal consistency, with Cronbach's alpha values ranging from 0.74 to 0.91 across the five domains (Maples et al., 2015), and from 0.84 to 0.95 in a Romanian context (Constantin et al., 2021).

2.3. Analytical plan

Firstly, we investigated the latent profiles emerging from DT and EI via LPA, including a test of invariance of the retained model across the two samples. Secondly, we tested for differences in PID-5 maladaptive personality domains between latent profiles. LPA was run in *Mplus* Version 7.4 (Muthén & Muthén, 1998) and with the auxilium of the *MplusAutomation* (Hallquist & Wiley, 2018) R (version 4.1.3; R Core Team, 2022) package, whereas the *afex* (Singmann et al., 2022) R package was used for linear modeling.

We screened for unengaged responses ($SD \leq 3$) and multivariate outliers by estimating Mahalanobis' distances ($\text{Alpha} = 0.001$). Then, to facilitate the interpretation of results of LPA, we mean-centered all the variables. We used omega (95 % CI) to estimate variables' internal consistency reliability and Pearson's product moment coefficients for correlations.

LPA is a probabilistic statistical technique belonging to the wider family of Gaussian mixture models. Its main aim consists of identifying a set of person-centered latent clusters based on the information from a larger set of observed variables and to estimate the probability that each observation would fall into each of the latent profile (Collins & Lanza, 2009).

Because a sound examination and interpretation of group variations requires metric invariance of the applied instruments, we first ran multi-group Confirmatory Factor Analysis (CFA), using maximum likelihood estimation with robust standard errors. For the baseline solution, we considered the following fit indices as indicative of satisfactory fit: CFI ≥ 0.90 , RMSEA < 0.06 , SRMR < 0.08 (Kline, 2016). We then proceeded with testing and comparing the configural model to a model with constrained factor loadings (metric invariance). We used changes in CFI ($\Delta\text{CFI} \leq 0.010$ paired with changes in RMSEA ($\Delta\text{RMSEA} \leq 0.015$ and in SRMR ($\Delta\text{SRMR} \leq 0.030$ to establish the metric invariance of the model (Chen, 2007).

Subsequently, we tested, evaluated, and compared a series of LPA models, accounting for a total number of estimated profiles ranging from 2 to 7 (i.e., $k - 1$ observed variables), and compared the models' fit to determine the top-performing model based on the following fit indices: the Bayesian Information Criteria (BIC), the Sample-size adjusted BIC (SABIC), the Akaike Information Criterion (AIC), and Entropy (values > 0.8 indicating a satisfactory level of distinctiveness between latent profiles) (Spurk et al., 2020). We also plotted SABIC values from all the models (the so-called ‘elbow’ plot), and considered the appearance of a major inflection as an indicator of the threshold for optimal model

retention (Ma, 2021). Finally, profiles' membership probabilities and mean latent profiles' scores were calculated on the retained model, across all the observed variables.

In order to establish whether the retained LPA model was invariant across the two samples (Romania and the UK), we first ran and evaluated an unconstrained model in each, which we then aimed to compare to a series of progressively constrained and nested models, specifically: (i) a configural model, in which mean, variances, and profile sizes were allowed to vary between samples; (ii) a semi-constrained model, in which latent profiles' means were constrained to be equal between the samples; (iii) a further semi-constrained model, in which means and variances were constrained to equality; and (iv) a fully-constrained model, in which latent profiles' means, variances, and group sizes were constrained to be equal between the samples. We used the BIC, SABIC, AIC, and the Likelihood Ratio Test ($\alpha = 0.001$) to test for differences between the nested models and evaluate whether the assumption of invariance was met across the multiple steps (Olivera-Aguilar & Rikoon, 2017).

After applying a cluster prediction for multivariate observations, we ran a series of univariate linear models to test for differences between latent profile memberships in each of the PID-5 maladaptive personality domains, using Tukey HSD corrected tests when appropriate.

3. Results

Table 1 presents self-reported age and sex of participants by linguistic context. We found no unengaged responses and 3 multivariate outliers, which were removed from the sample. All the subsequent analyses were run on a total sample including 533 observations.

3.1. Latent Profile Analysis

The results from CFA showed that the baseline model had satisfactory fit to the data ($CFI = 0.90$, $RMSEA = 0.05$ [90 % $CI = 0.04$ – 0.05], $SRMR = 0.06$). We then proceeded with a multi-group CFA, with the model showing metric invariance ($\Delta CFI = 0.006$, $\Delta RMSEA = 0.001$, $\Delta SRMR = 0.004$).

Subsequently, we ran and compared a series of models estimating from 2 to 7 latent profiles in the overall sample. Table 2 presents the relevant fit indices showing the lowest values of AIC and BIC for the 7-profile model, whereas the 2- and 3-profile models were the ones with highest values of entropy. The plot of the models' SABIC identified a major inflection in correspondence of the 3-profile model. For this reason, the 3-profile model was retained for further inspection. We explored the fit indices and relative 'elbow' plots obtained in the Romanian and the UK data, separately, confirming that the 3-profile (henceforth: LP1, LP2, LP3) solution was the best to represent the data from both samples (Fig. 1).

When testing for the invariance of the LPA solution, all the fit indices pointed to significant differences in fit at the level of models accounting

Table 1
Age and sex of participants by linguistic context.

	Romania (<i>n</i> = 313)	UK (<i>n</i> = 223)	Overall (<i>N</i> = 536)	<i>p</i> ^a
Age				
Mean (SD)	20.8 (4.08)	20.5 (2.87)	20.7 (3.63)	0.447
Min, Max	18, 54	18, 41	18, 54	
Sex				
Female	260 (83.1 %)	180 (80.7 %)	440 (82.1 %)	0.126
Male	53 (16.9 %)	39 (17.5 %)	92 (17.2 %)	
Non-binary	0 (0 %)	2 (0.9 %)	2 (0.4 %)	
Prefer not to report	0 (0 %)	2 (0.9 %)	2 (0.4 %)	

^a Independent-sample t-tests and Chi-square tests were used for continuous and categorical variables, respectively.

Table 2
Results from the latent profile analysis (*N* = 533).

Profiles	AIC	BIC	SABIC	Entropy
2	11,887.76	11,994.73	11,915.37	0.821
3	11,539.7	11,685.17	11,577.25	0.812
4	11,425.43	11,609.41	11,472.91	0.775
5	11,346.61	11,569.09	11,404.03	0.769
6	11,272.27	11,533.26	11,339.62	0.788
7	11,222.43	11,521.93	11,299.73	0.784

for constrained means, variances, and group sizes between the two samples, indicating that the person-centred solution was non-invariant (Table 3).

For LP1, the Romanian sample showed lower values of Machiavellianism compared to the UK sample. For LP2, higher values of use of emotions were observed in the Romanian compared to the UK sample. LP3 was characterized by higher scores in narcissism and psychopathy in the Romanian sample compared to the UK sample, whereas the latter showed higher values of sadism and lower values of use of emotions and emotion regulations (Fig. 2).

Table 4 below reports proportions of observations by profile, sample, age, and sex.

3.2. Relationship between latent profiles and PID-5 trait domains

Table 5 presents unstandardized descriptive statistics and reliability estimates for all the variables, based on the overall sample data.

Given the non-invariance of the LPA solution, we ran a series of five univariate tests regressing, respectively, antagonism, detachment, disinhibition, negative affect, and psychoticism onto profile membership and sample (Romania, UK), including main effects and interactions.

No significant interaction of sample and profile membership was found, but significant main effects of profile membership across all models: antagonism ($F_{(2, 527)} = 82.54$, $p < .001$, $\omega_p^2 = 0.23$), detachment ($F_{(2, 527)} = 42.94$, $p < .001$, $\omega_p^2 = 0.14$), disinhibition ($F_{(2, 527)} = 45.93$, $p < .001$, $\omega_p^2 = 0.14$), negative affect ($F_{(2, 527)} = 27.70$, $p < .001$, $\omega_p^2 = 0.09$), and psychoticism ($F_{(2, 527)} = 41.47$, $p < .001$, $\omega_p^2 = 0.13$).

Tukey HSD post hoc tests showed significantly higher estimated marginal means in LP1 compared to LP2 for antagonism ($MD = 0.20$ [95 % $CI = 0.07$ – 0.33], $p < .01$), detachment ($MD = 0.49$ [95 % $CI = 0.34$ – 0.65], $p < .001$), disinhibition ($MD = 0.37$ [95 % $CI = 0.21$ – 0.53], $p < .001$), negative affect ($MD = 0.54$ [95 % $CI = 0.35$ – 0.72], $p < .001$), and psychoticism ($MD = 0.44$ [95 % $CI = 0.26$ – 0.62], $p < .001$), and in LP3 compared to LP2 for antagonism ($MD = 0.70$ [95 % $CI = 0.58$ – 0.82], $p < .01$), detachment ($MD = 0.47$ [95 % $CI = 0.32$ – 0.61], $p < .001$), disinhibition ($MD = 0.56$ [95 % $CI = 0.42$ – 0.71], $p < .001$), negative affect ($MD = 0.38$ [95 % $CI = 0.21$ – 0.55], $p < .001$), and psychoticism ($MD = 0.64$ [95 % $CI = 0.48$ – 0.81], $p < .001$). Significantly higher estimated marginal means were also found in LP3 compared to LP1 for antagonism ($MD = 0.50$ [95 % $CI = 0.35$ – 0.65], $p < .001$) and disinhibition ($MD = 0.19$ [95 % $CI = 0.01$ – 0.38], $p < .05$). Fig. 3 shows estimated marginal means from all the models.

4. Discussion

The present research used a person-centred approach to (i) explore the latent profiles derived from the tetradic model of 'Dark' personality Traits (DT; Jones & Paulhus, 2014) and trait Emotional Intelligence (EI) (Wong & Law, 2002), (ii) replicate the solution and test for its invariance across two samples (Romania, United Kingdom), and (iii) test the relationships between the derived profiles and maladaptive PID-5 trait domains (Krueger et al., 2012). We found that a 3-profile solution represented the data best, with two profiles showing values of DT measured through the Dark Tetrad (Paulhus et al., 2021) that were close to the mean and high (LP2) and low (LP1) values across Wong and Law

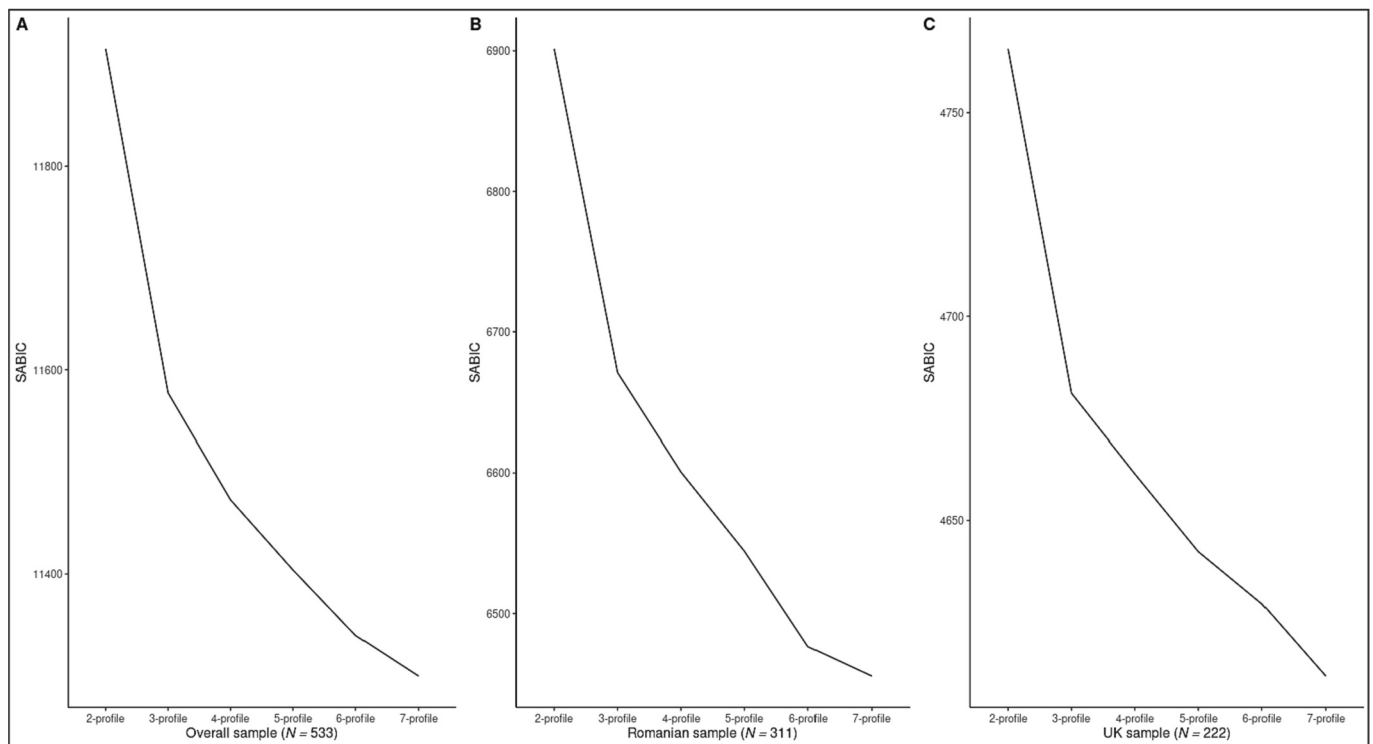


Fig. 1. ‘Elbow’ plots of Sample-size-adjusted BIC values in the overall sample (A), Romanian sample (B), and UK sample (C), respectively.

Table 3
Invariance testing from Latent Profile Analysis (N = 533).

Profiles	AIC	BIC	SABIC	Entropy	Likelihood Ratio Chi-square difference _(df)	p
Configural	12,050.76	12,345.98	12,126.95	0.90		<0.001
Constrained means	12,190.58	12,383.11	12,240.27	0.88	154.41 ₍₂₄₎	<0.001
Constrained means and variances	12,218.11	12,376.42	12,258.97	0.89	36.51 ₍₈₎	<0.001
Fully constrained (means, variances, profile sizes)	12,265.67	12,415.41	12,304.31	0.88	342.56 ₍₂₎	<0.001

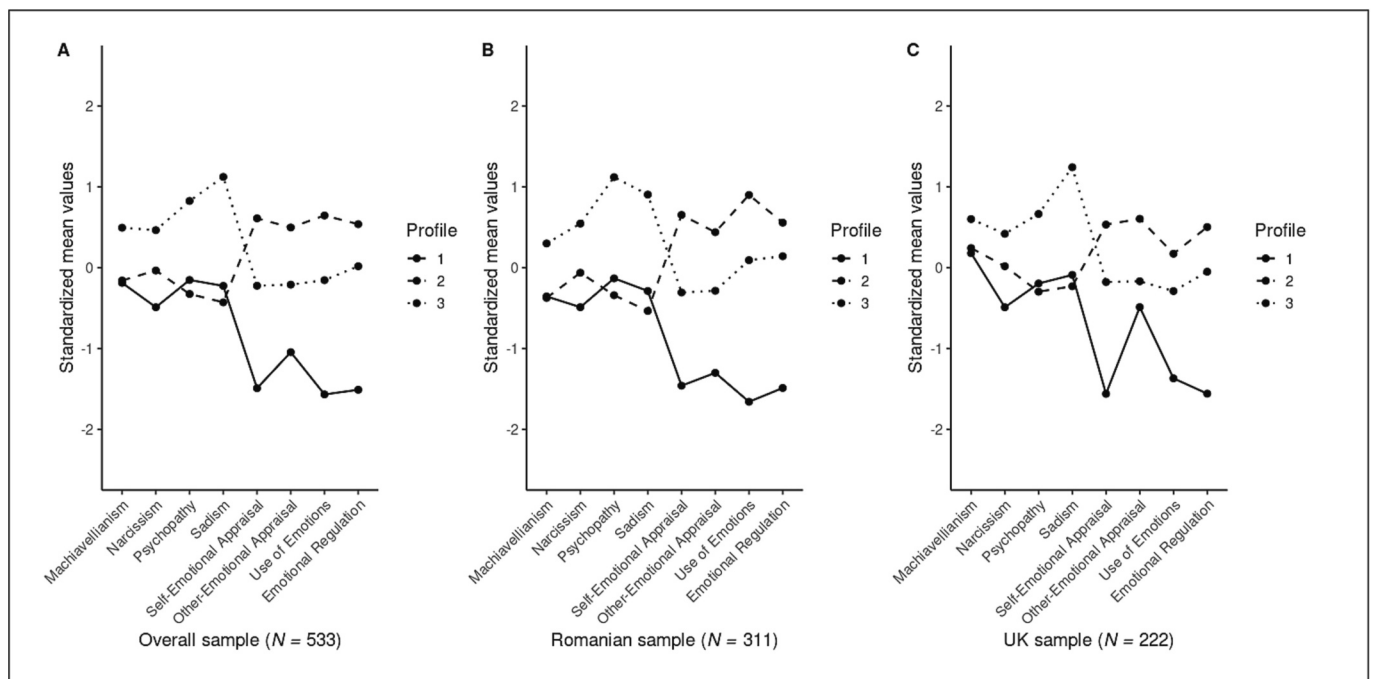


Fig. 2. LPA plots of estimated mean values in the overall sample (A), Romanian sample (B) and UK sample (C), respectively.

Table 4
Proportions of observations by profile, linguistic context, age, and sex.

	Romanian sample (N = 311)			UK sample (N = 222)			Overall sample (N = 533)		
	Profile 1 (n = 72)	Profile 2 (n = 192)	Profile 3 (n = 47)	Profile 1 (n = 33)	Profile 2 (n = 103)	Profile 3 (n = 86)	Profile 1 (n = 105)	Profile 2 (n = 295)	Profile 3 (n = 133)
Age									
Mean (SD)	20.0 (1.32)	21.1 (4.80)	20.7 (3.68)	19.8 (1.62)	20.8 (3.68)	20.5 (1.99)	19.9 (1.41)	21.0 (4.43)	20.6 (2.70)
Sex									
Female	65 (90.3 %)	168 (87.5 %)	25 (53.2 %)	27 (81.8 %)	97 (94.2 %)	56 (65.1 %)	92 (87.6 %)	265 (89.8 %)	81 (60.9 %)
Male	7 (9.7 %)	24 (12.5 %)	22 (46.8 %)	3 (9.1 %)	6 (5.8 %)	30 (34.9 %)	10 (9.5 %)	30 (10.2 %)	52 (39.1 %)
Non-binary	0 (0 %)	0 (0 %)	0 (0 %)	1 (3.0 %)	0 (0 %)	0 (0 %)	1 (1.0 %)	0 (0 %)	0 (0 %)
Prefer not to report	0 (0 %)	0 (0 %)	0 (0 %)	2 (6.1 %)	0 (0 %)	0 (0 %)	2 (1.9 %)	0 (0 %)	0 (0 %)

Table 5
Descriptive statistics (N = 533).

Variable	M	SD	Min	Max	Skewness	Kurtosis	SE	Omega	95 % CI		N
									Lower	Upper	
Antagonism	1.56	0.57	1.00	3.80	1.22	1.13	0.02	0.89	0.87	0.90	
Detachment	1.90	0.62	1.00	4.00	0.42	-0.35	0.03	0.86	0.83	0.88	
Disinhibition	1.91	0.64	1.00	4.00	0.47	-0.38	0.03	0.91	0.89	0.92	
Negative Affect	2.47	0.73	1.00	4.00	-0.18	-0.73	0.03	0.86	0.83	0.88	
Psychoticism	2.13	0.73	1.00	4.00	0.19	-0.89	0.03	0.74	0.70	0.77	
Self-Emotion	4.72	1.36	1.00	7.00	-0.38	-0.58	0.06	0.82	0.79	0.84	
Other-Emotion	5.25	1.17	1.00	7.00	-0.72	0.09	0.05	0.82	0.79	0.85	
Use of Emotion	4.81	1.39	1.00	7.00	-0.37	-0.62	0.06	0.84	0.82	0.87	
Emotion Regulation	4.43	1.49	1.00	7.00	-0.26	-0.74	0.06	0.77	0.73	0.80	
Machiavellianism	2.91	0.74	1.00	4.57	-0.09	-0.43	0.03	0.70	0.66	0.74	
Narcissism	2.67	0.80	1.00	5.00	0.09	-0.47	0.03	0.64	0.59	0.69	
Psychopathy	1.84	0.74	1.00	4.71	1.01	0.60	0.03	0.59	0.53	0.66	
Sadism	1.93	0.85	1.00	4.86	0.90	-0.03	0.04	0.74	0.70	0.77	

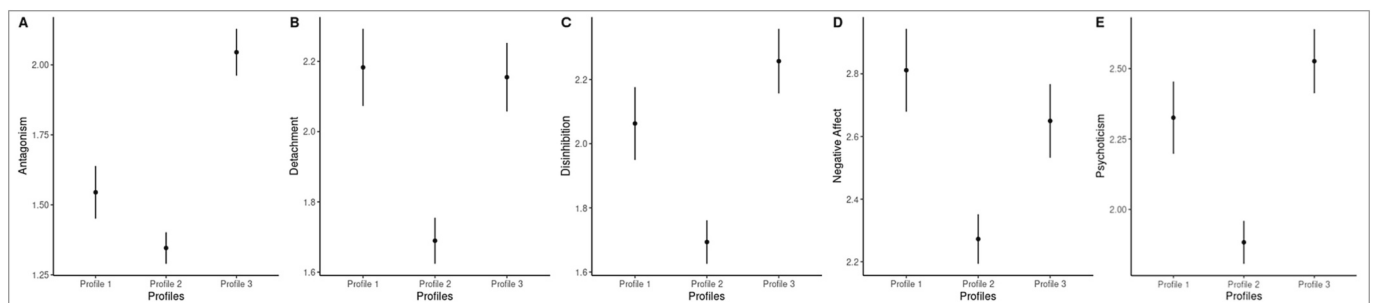


Fig. 3. Estimated marginal means (N = 533). A = Antagonism; B = Detachment; C = Disinhibition; D = Negative Affect; E = Psychoticism.

Emotional Intelligence Scale's (WLEIS; Wong & Law, 2002) facets, respectively, whereas the third profile was characterized by high DT and values of EI close to the mean across the WLEIS facets (LP3). The latent profile solution was non-invariant between Romanian and UK participants. The interaction of sample and profile was not significantly associated with differences in PID-5 trait domains, despite significant differences between the profiles in maladaptive personality trait domains.

4.1. Dark traits and Emotional Intelligence

The findings are in line with evidence of weak correlations between the Dark Triad traits and EI (Miao et al., 2019; Michels & Schulze, 2021; Petrides et al., 2011), although further extending to the tetradic DT model. Particularly, the LP3 profile was not associated with comparatively either low or high levels of EI, instead, with values close to the mean across all the WLEIS facets. This challenges the hypothesis according to which individuals characterized by high scores in DT would necessarily present deficits in EI, at least in non-clinical samples, whilst

it also overall rejects the hypothesis of a 'dark side' of EI (Miao et al., 2019), according to which EI might confer an advantage for emotional manipulation, deceit, and other antisocial behaviors in individuals high in DT.

In this regard, and of particular relevance, is the evidence presented recently by Heym et al. (2021) who, based on the results from a latent profile analysis of SD3 traits and cognitive and affective empathy, devised the 'Dark Empath', characterized by a combination of high DT and average-to-high empathy scores. Although some authors have argued that empathy may be best represented as a sub-facet of EI (Baudry et al., 2018; Fernández-Abascal & Martín-Díaz, 2019; Olderbak & Wilhelm, 2017; Petrides et al., 2007), given that the current study did not find evidence in support of a 'dark EI' profile, we must acknowledge that the Dark Empath cannot be extended to EI and it might only be characterized by a general empathic ability rather than a stable individual disposition to understand, use, and regulate one's own and others' emotions, which defines trait EI, instead. Nevertheless, such basic empathic capacity might serve as a basis for interpersonal functioning, to some extent, though still resulting in callousness (Davis & Nichols,

2016; Heym et al., 2021).

Regarding the association between Machiavellianism and EI, we found two profiles outlining very different characterizations of their relationship. On the one hand, we observed a profile (LP1) characterized by levels of Machiavellianism close to the mean and low levels of trait EI, across all the WLEIS facets, whereas on the other hand, another profile (LP2) was characterized by comparable levels of Machiavellianism and relatively higher levels of trait EI, especially use of emotions in the Romanian sample and other-emotion appraisal in the UK sample. These results may be interpreted in light of evidence from previous research which showed variations in Machiavellianism at different levels of other personality traits, for example agreeableness. O'Connor and Athota (2013) discussed the potential role of agreeableness as a mediator and as a moderator of the relationships between Machiavellianism and EI. Therefore, we cannot exclude that the fluctuations in trait EI observed in the present study might underlie different dispositional agreeableness profiles, instead. O'Connor and Athota (2013) argued that individuals scoring lowly in agreeableness "will be more likely to use their high levels of emotional competence in more self-focused and Machiavellian ways", suggesting that "trait EI does not have a dark side, but has the potential to make 'dark' individuals more calculating and emotionally manipulative than they ordinarily would be" (p. 5). For these reasons, a follow-up LPA including a wider assessment of personality is warranted, including broadband personality models.

In the same vein, the association between different forms of narcissism and EI might also be mediated and/or moderated by other traits, in particular those that serve the function of protecting the self from perceived threats to a grandiose sense of it. Previous research showed that individuals scoring highly in grandiose narcissism also presented high levels of extraversion and low level of neuroticism (Jauk et al., 2017; Miller et al., 2011), as well as high levels of openness (Zajenkowski et al., 2016). Conversely, individuals scoring highly in vulnerable narcissism tend to score highly in neuroticism and anxiety, too (Miller et al., 2011). A recent study (Zajenkowski & Szymaniak, 2021) further characterized the two types of narcissism in terms of grandiose narcissism as being more highly differentiated than the vulnerable type, presenting positive correlations with the sub-facets of assertiveness (from extraversion), and intellect (from openness), and negative correlations with politeness (agreeableness), industriousness (conscientiousness), and withdrawal (neuroticism), whereas the latter presented a set of "less differentiated correlations within broad domains" (p. 2112). Overall, as already highlighted in previous paragraphs, this evidence suggests the need for a follow-up LPA including broadband personality, aiming to establish a more granular characterization of the latent profiles presented and discussed in the present study.

Another important finding of this research is the non-invariance of the latent profiles between the Romanian sample and the UK sample, implying the need for a systematic analysis of the expression and manifestation of DT across multiple contexts. In fact, our results highlighted important differences in the latent profile solution. The Romanian sample showed higher levels of psychopathy vs. sadism in LP3, conversely to what observed in the UK sample. In addition, UK LP2 showed lower levels of use of emotions compared to Romanian participants. These results suggest that although DT represent individuals' dispositions, which are theoretically meant to be invariant across cultural and linguistic contexts, their manifestation might vary as the result of environmental pressures and culture-specific affordances, as already known to play a role in the expression of 'broadband' personality traits (McCrae et al., 1996) and DT (Jonason et al., 2019, 2020). In light of the limited size and relative lack of representativity in our sampling strategy, we cannot rule out possible bias in our analyses. To avoid speculation around the specific cultural features that might have determined these results, we recommend future research to attempt to replicate these findings in the same as well as in other cultural contexts.

4.2. Profile differences in PID-5 maladaptive trait domains

Another important implication of the present findings is relevant to the relationships that we found between the profiles and maladaptive personality. As hypothesised, the LP3 latent profile was characterized by elevated maladaptive trait levels, specifically in the PID-5 trait domains of antagonism and disinhibition, but also in psychoticism, compared to the other two profiles, yet non-significant differences in detachment and negative affectivity compared to LP1, likely reflecting social potency and stress immunity in DT (Latzman et al., 2020; Venables et al., 2014). On the other hand, detachment and negative affectivity might be more linked to severe deficits in EI – thus, appraising, regulating, and using one's own and others' emotions – rather than to callous and aversive tendencies observed in DT. In this vein, Ali et al. (2009) argued that EI plays a key role in interpreting emotional stimuli in terms of negative affect, thus, possibly superseding the facets of oddity and callousness played out by dark traits. However, further research is required to address the specific relationships of DT related callousness versus EI in the facets of these personality domains.

Notably, our results dovetail with previous research (e.g., Grigoras & Wille, 2017), in which positive and moderate correlations between antagonism, disinhibition, and psychoticism and, respectively, psychoticism, Machiavellianism, and psychopathy were evidenced. Moreover, in our study, LP3 showed relatively high values of sadism in both samples, and in this vein, Russell et al. (2017) presented positive correlations between sadism and psychoticism in non-clinical populations, possibly highlighting the implicit anti-social character involved in the experience of individuals scoring highly in sadism (Verbeke & De Clercq, 2014), which might explain the associations that we found with irresponsible, impulsive, and risk taking tendencies observed in antagonism, disinhibition, and psychoticism, respectively.

4.3. Limitations

This research has limitations. First, the limited sample size. Second, it was based on two specific measurements of both DT and EI, and in light of the plethora of available operationalizations of both models, research replicating these results in other samples and by means of alternative measures is warranted. Third, although the SD4 represents one of the most widespread and utilised measure of DT, research has shown a richer characterization of each individual DT in different subtypes, for example, distinguishing between primary vs. psychopathy (Lee & Salekin, 2010; Levenson et al., 1995) and between grandiose and vulnerable narcissism (Crowe et al., 2019), which the current research did not account for. Fourth, we used a short version of the PID-5, which although possesses satisfactory psychometric properties, representing a reliable and valid alternative to the more extensive version (Thimm et al., 2016), it might not fully capture the complexity of each of the trait domains and their sub-facets, and for this reason, the associations found between the latent profiles and the PID-5 trait domains require further investigation. Fifth, considering evidence from recent research that showed significant sex differences in the relationship between DT and EI (e.g., a greater tendency in males toward goal-oriented, relentless manipulation, vs. females showing greater deceptive tendencies; see Hyde et al., 2020), which might also putatively interact with the differences across the two samples identified in the present study, future research is warranted to investigate this important issue, and which we could not examine in view of sampling-related restrictions.

5. Conclusions

In conclusion, the results from the current study showed a non-invariant 3-profile latent solution combining DT and EI in non-clinical populations from Romania and the UK that does not support the hypothesis of a 'dark side of EI' nor the assumption of EI deficits in those scoring highly in DT. Moreover, although the results from the analyses of

the associations between the derived latent profiles and PID-5 trait domains showed consistently high scores in most of those domains for those characterized by high DT, they also highlighted exceptions for detachment and negative affect.

Ethical Statement

Informed consent was obtained for research with human subjects. The privacy rights of human subjects was always observed.

CRediT authorship contribution statement

Emanuele Fino: Conceptualization, Methodology, Software, Validation, Formal analysis, Investigation, Resources, Data curation, Writing – original draft, Writing – review & editing, Visualization, Supervision, Project administration. **Simona Andreea Popușoi:** Conceptualization, Validation, Investigation, Resources, Data curation. **Andrei Corneliu Holman:** Conceptualization, Validation, Investigation, Resources, Data curation. **Alyson Blanchard:** Writing – original draft. **Paolo Iliceto:** Writing – original draft. **Nadja Heym:** Conceptualization, Methodology, Validation, Writing – original draft, Writing – review & editing, Supervision.

Declaration of competing interest

None.

Data availability

Data is available upon reasonable request to the authors.

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