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Beyond (low) Agreeableness: Toward a more comprehensive understanding of antagonistic psychopathology

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Abstract

In clinical psychopathology research, up to seven traits have been suggested as instances of antagonistic psychopathology. Those antagonistic traits, in turn, are commonly viewed as reflections of low Agreeableness as per the Big Five (BF-AG). However, specific theoretical differences between antagonistic traits suggest that other broad, basic dimensions beyond BF-AG ought to provide further points of correspondence. Specifically, whereas primarily affective antagonistic traits are closely aligned with BF-AG, primarily behavioral antagonistic traits are better aligned with Honesty-Humility (HH) from the HEXACO model and primarily cognitive antagonistic traits are better aligned with the common core of aversive traits (the Dark Factor of Personality, D). Indeed, from a theoretical perspective, D seems to be the only candidate sufficiently covering all aspects of antagonistic traits (affect, behavior, and cognition) to a comparable extent and thus affording a balanced representation of antagonistic psychopathology. We critically test these conjectures in a large and heterogeneous online sample (N = 3,396), investigating the overlap between antagonistic traits and basic personality via structural equation modeling. Results show that BF-AG, HH, and D each yield particularly strong ties to one group of antagonistic traits (affective, behavioral, and cognitive, respectively), while D offers the most balanced representation of all (groups of) antagonistic traits.

KEYWORDS

Agreeableness, Antagonism, Dark Factor of Personality, Honesty-Humility, psychopathology

1 | INTRODUCTION

Recent years have seen notable shifts within clinical psychology toward the constructs and frameworks more traditionally studied in personality science. Specifically, there has been a shift from categorical to dimensional models of (personality) disorders (Hopwood et al., 2018; Kotov et al., 2017; Widiger et al., 2019). The underlying idea is that clinically relevant tendencies represent maladaptive variants or levels of more general traits, such as those defined in models of basic personality structure, especially the Five-Factor Model (Samuel & Widiger, 2008).

In the realm of socially and/or ethically aversive psychopathology, seven clinically relevant traits have been

suggested in the American Psychiatric Association's Diagnostic and Statistical Manual of Mental Disorders (DSM-5; American Psychiatric Association, 2013), all of which are currently used for personality disorder (PD) diagnoses according to the DSM-5 alternative model: attention-seeking, callousness, deceitfulness, grandiosity, hostility, manipulativeness, and suspiciousness. Despite some ongoing discussions on which of these traits actually define the higher-order domain of Antagonism in the sense of a hierarchical model (see e.g., Al-Dajani et al., 2016; Kotov et al., 2017; Sleep et al., 2020), there is consensus that the most prominent aspect shared by these seven traits is Antagonism and they thereby "put the individual at odds with other people" (American Psychiatric Association, 2013). Following the terminology used in psychopathology, we term these seven "antagonistic traits", that is, traits that share the aspect of antagonistic psychopathology (see Widiger & Simonsen, 2005). These traits and their definitions are presented in Table 1 along with example items from the most prominent corresponding measure, the Personality Inventory for DSM-5 (PID-5; Krueger et al., 2012).

In line with the view that clinically relevant tendencies represent maladaptive variants of broad and general basic traits, these seven antagonistic traits – through their common aspect of Antagonism – have been suggested to reflect low Agreeableness (AG; see, e.g., American Psychiatric Association, 2013; Krueger et al., 2012; Krueger & Markon, 2014; Sleep et al., 2020; Widiger et al., 2019) as per the Big Five (BF; McCrae & Costa, 2008). In other words, it is assumed that the common feature of these seven antagonistic traits, Antagonism, essentially reflects (extremely) low BF-AG. BF-AG is defined as the "motivation to maintain positive relations with others" (Graziano & Tobin, 2009, p. 46)[1] and by adjectives such as kind, sympathetic, undemanding, and warm versus harsh, unsympathetic, demanding, and cold (Saucier, 2002). Thus, it indeed appears antithetical to the Antagonism aspect shared by all seven antagonistic traits.

Following this reasoning, the seven antagonistic traits should all be strongly reflected in (low) BF-AG. However, on closer theoretical inspection, it appears that, whereas some of the antagonistic traits are more clearly aligned with BF-AG, other represent features that are not (as comprehensively) covered by BF-AG and indeed systematically so. Therefore, they may be better understood as reflections of broad personality traits other than BF-AG.

In essence, we argue that BF-AG cannot account for all antagonistic traits *alike*. Instead, we will theoretically derive that BF-AG should primarily reflect those antagonistic traits that are focused on affect, whereas it is less strongly aligned with traits that are focused on behavior and (social) cognition. These latter aspects, in turn, are key to other broad personality traits, namely Honesty-Humility from the HEXACO model (Ashton & Lee, 2007) and the Dark Factor of Personality (Moshagen et al., 2018). The

TABLE 1 Antagonistic traits with definitions and example items, sorted by their primary aspect

Primary aspect	Trait	Definition DSM-5 (American Psychiatric Association, 2013)	Example item PID-5
Affect	Callousness	Lack of concern for the feelings or problems of others; lack of guilt or remorse about the negative or harmful effects of one's actions on others	I don't care about other peoples' problems.
	Hostility	Persistent or frequent angry feelings; anger or irritability in response to minor slights and insults; mean, nasty, or vengeful behavior	I have a very short temper.
Behavior	Manipulativeness	Use of subterfuge to influence or control others; use of seduction, charm, glibness, or ingratiation to achieve one's ends	Sweet-talking others helps me get what I want.
	Deceitfulness	Dishonesty and fraudulence; misrepresentation of self; embellishment or fabrication when relating events	I'll stretch the truth if it's to my advantage.
	Attention-Seeking	Engaging in behavior designed to attract notice and to make oneself the focus of others' attention and admiration	I like to draw attention to myself.
Cognition	Grandiosity	Believing that one is superior to others and deserves special treatment; self-centeredness; feelings of entitlement; condescension toward others	I'm better than almost everyone else.
	Suspiciousness	Expectations of – and sensitivity to – signs of interpersonal ill-intent or harm; doubts about loyalty and fidelity of others; feelings of being mistreated, used, and/or persecuted by others	Plenty of people are out to get me.

goal of the current work is to test this proposition empirically so as to avail a more thorough understanding of the (maladaptive) dispositional basis of antagonistic psychopathology.

1.1 | Theoretical differences between antagonistic traits

Personality traits, maladaptive or not, by most common definitions encompass typical tendencies related to affect, behavior, and/or cognitions to some degree (Funder, 2001). Nonetheless, traits can encompass one or more of these three aspects to different degrees. For example, BF Neuroticism primarily encompasses affective aspects (anxious, touchy, nervous versus unemotional, relaxed; Goldberg, 1992). By comparison, BF Openness subsumes far more – though not exclusively – cognitive aspects (creative, bright, artistic versus unimaginative, imperceptive; Goldberg, 1992). In other words, any trait can have a specific theoretical focus on affect, behavior, or cognition.

Likewise, antagonistic traits – despite their shared prominent aspect of being socially aversive – also arguably differ in how strongly they reflect affect, behavior, or cognition. For example, manipulativeness, defined as the use of subterfuge or ingratiation to achieve one's ends, primarily describes a *behavior* associated with an antagonistic disposition, hardly referring to any affect or cognitions accompanying such behavior. By comparison, grandiosity, defined as the belief of superiority, primarily refers to the *cognition* aspect of traits. Specifically, it constitutes a justification for antagonistic behavior, namely, one's perceived higher value and deservingness (Calvete, 2008; Calvete & Orue, 2013).

Due to the different focus of antagonistic traits on affect, behavior, and cognition, we will refer to traits focusing primarily on the same aspect as a *group of traits* in what follows. More specifically, we will refer to callousness and hostility as primarily affective antagonistic traits, to manipulativeness, deceitfulness, and attention-seeking as primarily behavioral antagonistic traits, and to grandiosity and suspiciousness as primarily cognitive antagonistic traits. Note that these labels are not meant to imply that any of the antagonistic traits is purely or exclusively affective, behavioral, or cognitive - let alone that traits can be grouped into three empirical factors. Indeed, a trait with one particular focus may nonetheless correlate more strongly with traits involving a different focus than with traits involving the same. For example, although grandiosity and suspiciousness have a cognitive focus, grandiosity usually correlates much stronger with deceitfulness than with suspiciousness (Bo et al., 2016; Crego et al., 2015; Quilty et al., 2013). This is highly plausible because the belief that one is superior to others and deserves special treatment will often facilitate dishonest behavior, but has no similarly obvious connection with how strongly one assumes ill intent of others, i.e., trait suspiciousness. Nevertheless, the antagonistic traits systematically differ in which of the three aspects is primary in their definition and operationalization.

1.2 | Antagonistic traits focusing on affect: The role of Agreeableness

Given that antagonistic traits differ in these primary defining aspects (i.e., their focus on affect, behavior, or cognition), one might question whether low BF-AG serves as an *equally* suitable counterpart for all these traits. BF-AG has a strong focus on affect, as is apparent from adjectives defining the BF-AG domain. As, for example, noted by Tobin et al. (2000) the "best Agreeableness markers are emotion terms like 'kind', 'considerate', 'empathic', and 'tender-minded'" (pp. 656–657). Consequently, the primarily affective antagonistic traits most closely align with BF-AG on a theoretical level. Specifically, callousness (defined as "lack of concern for the feelings or problems of others"; American Psychiatric Association, 2013) resembles adjectives like warm, empathic, and tender-minded. Likewise, hostility (defined as "persistent or frequent angry feelings"; American Psychiatric Association, 2013) relates closely to adjectives such as kind or harsh. Supporting this reasoning, the observed correlations of BF-AG with these primarily affective antagonistic traits are particularly strong ($r \leq -0.58$, Quilty et al., 2013; Watson et al., 2013).

By comparison, traits related to the behavioral manifestation of an antagonistic disposition, e.g., exploitative (manipulativeness), dishonest (deceitfulness), and admiration-seeking behavior (attention-seeking), are more distal to BF-AG (Ashton & Lee, 2005; Lee & Ashton, 2005). Those aspects are arguably more aligned with other broad trait dimensions beyond BF-AG as we will reason in what follows.

1.3 | Antagonistic traits focusing on behavior: The role of Honesty-Humility

A broad personality trait well-suited to particularly capture behavioral aspects of socially aversive psychopathology, namely exploitation, dishonesty, and admiration seeking, is Honesty-Humility (HH) from the HEXACO model (Ashton & Lee, 2007; Ashton et al., 2004). It is defined as "the tendency to be fair and genuine in dealing with others in the sense of cooperating with others

even when one might exploit them without suffering retaliation" (Ashton & Lee, 2007, p. 156) and defined by adjectives such as sincere, fair-minded, unassuming, and modest versus hypocritical, sly, greedy, and boastful (Ashton & Lee, 2007).

Thus, by its very definition, (non-)exploitation is central to HH which renders it distinct from BF-AG (Ashton & Lee, 2020). Indeed, HH typically outperforms BF-AG in the prediction of exploitative and dishonest behaviors (Ashton & Lee, 2008, 2020; Heck et al., 2018; Thielmann et al., 2020). Likewise, greed and actively searching for social attention or status is a defining feature of (low) HH (Ashton et al., 2014), whereas these aspects are largely absent in BF-AG (Ashton & Lee, 2005). Therefore, HH constitutes a prime candidate for traits emphasizing the behavioral expressions of a socially aversive disposition. For the primarily affective antagonistic traits, by contrast, HH bears little conceptual overlap; indeed, affective aspects are beyond the scope of HH in the HEXACO model and assigned to the Emotionality and (HEXACO-)Agreeableness dimensions (see Ashton & Lee, 2005).

Although HH conceptually encompasses aspects beyond the realm of BF-AG (the primarily behavioral antagonistic traits of manipulativeness, deceitfulness and attention-seeking), and vice versa (the primarily affective antagonistic traits hostility and callousness), *both* involve only limited theoretical focus on the more cognitive aspects of traits relating to beliefs about others (suspiciousness) and oneself (grandiosity). These tendencies, in turn, are a defining aspect of the Dark Factor of Personality (D), the common core of so-called dark traits (Moshagen et al., 2018), i.e., socially and/or ethically aversive traits.

1.4 | Antagonistic traits focusing on cognition: The role of D

D is conceptualized as the underlying disposition from which all aversive traits arise as specific, flavored manifestations. In other words, it is the common core of all aversive traits, defined as "the general tendency to maximize one's individual utility – disregarding, accepting, or malevolently provoking disutility for others – *accompanied by beliefs that serve as justifications*" (Moshagen et al., 2018, p. 657, emphasis added). As per this definition, D places strong focus on the beliefs and attitudes which serve to justify one's behavior, including grandiosity and suspiciousness. By comparison, BF-AG only peripherally reflects modesty (vs. grandiosity) and trust (vs. suspiciousness), and HH only captures beliefs of superiority or entitlement (grandiosity), without any direct reference to trust versus suspiciousness. Correspondingly, it has been shown that D is strongly associated with several (classes of) justifying beliefs and predicts incremental variance over and above BF-AG and HH (and even the entire HEXACO space) in distrust and hierarchy-related beliefs in particular (Hilbig, Moshagen, Thielmann, et al., 2022; Horsten et al., 2021; Moshagen et al., 2018, 2020). Moreover, D predicted incremental variance beyond the HEXACO space in instances of aversive psychopathology that are primarily related to beliefs, especially narcissism (for which believing in one's superiority is integral) and paranoia (for which suspicion toward others is integral; Hilbig, Thielmann, et al., 2021). Therefore, D is arguably a prime candidate (per se and as compared to BF-AG and HH) to account for the primarily cognitive antagonistic traits, that is, grandiosity and suspiciousness.

1.5 | A balanced view of antagonistic psychopathology

Overall, both BF-AG and HH correspond primarily to one of the three groups of antagonistic traits. Specifically, BF-AG mostly represents the primarily affective antagonistic traits with notably less theoretical overlap with behavioral traits both in absolute terms and *in comparison* to HH and D. In turn, HH mostly represents the primarily behavioral antagonistic traits, with practically no theoretical reference to affective aspects, both in absolute terms and *in comparison* to BF-AG and D. Moreover, both BF-AG and HH show only limited theoretical overlap with the primarily cognitive antagonistic traits both in absolute terms and *in comparison* to D.

Thus, in contrast to BF-AG and HH, D does not primarily represent (only) one group of antagonistic traits, but actually yields comparable theoretical overlap with all three.[2] By definition, D encompasses cognition (justifying beliefs), behavior (serving the aim of utility maximization), *and* affective aspects (lack of concern for the disutility in others). By implication, D offers a relatively balanced representation of antagonistic traits overall – and more so than BF-AG or HH – involving correspondence with traits from all three groups to a relatively similar extent. This claim is supported by findings indicating that D predicts incremental variance in regard to dishonest and cheating behavior over and above BF-AG and incremental variance in outcomes related to aggression and insensitivity over and above HH (Moshagen et al., 2018). Stated simply, D should essentially cover affect, behavior, and cognition comparably – whereas the reasoning above suggests that BF-AG and HH should not (each corresponds more closely with a particular subset of antagonistic traits).

1.6 | Hypotheses

Given the reasoning above, our **first set of hypotheses (H1)** maintains that each broad trait "candidate" (BF-AG, HH, D) will be substantially related to one group of antagonistic traits overall, and also with the respective traits of that group individually. Specifically, we expect BF-AG to be substantially correlated with primarily affective antagonistic traits (**H1a**), whereas HH will correlate substantially with primarily behavioral antagonistic traits (**H1b**) and D will correlate substantially with primarily cognitive antagonistic traits (**H1c**). Following common standards (Cohen, 1992), we consider a large effect size of approximately $r = 0.50$ (and thus $R^2 = 0.25$) or higher to be substantial.

Second, it follows from the above that each candidate (BF-AG, HH, D) ought to predict their respective trait group and the individual traits (as per H1) better than the respective other two candidates, which is our **second set of hypotheses (H2)**. Specifically, *out of all candidates,* BF-AG should relate most strongly to primarily affective antagonistic traits (**H2a**), whereas HH should relate most strongly to the behavioral antagonistic traits (**H2b**), and D most strongly to the cognitive antagonistic traits (**H2c**).

Third, as argued above, D theoretically represents all groups of traits (affective, behavioral, and cognitive) to a comparable extent and indeed more so than BF-AG and HH. Thus, our **third set of** hypotheses (**H3**) predicts that D entails *unique* shared variance with primarily behavioral antagonistic traits over and above BF-AG (**H3a**) and with primarily affective antagonistic traits over and above HH (**H3b**). Finally, D should predict unique variance in primarily cognitive antagonistic traits over both BF-AG and HH, respectively (**H3c**). The hypotheses were not pre-registered.

2 | METHOD

2.1 | Participants

Data for all analyses were collected as part of the Prosocial Personality Project, which contained six waves of data collection for the base study. The data used here come from the first two waves. Participants were recruited via a professionally managed online panel in Germany to take part in the first wave (T1) and re-invited 41 days later on average to wave 2 (T2). A detailed documentation of the project as well as the a priori specified exclusion criteria and other publications using (other subsets of) data from the project are available on the Open Science Framework (OSF; https://osf.io/c9kma/). Applying the specified exclusion criteria to the data used herein led to a final sample of $N = 3{,}396$ for the current analyses (1,694 female, 1,696 male, 6 diverse; aged 18–74 years, $M = 42.0$, $SD = 12.8$). Participants were financially remunerated (time-based) by the panel provider. The present study was conducted in full accordance with the Ethical Guidelines of the American Psychological Association (APA). The study was run based on approval from the local ethics committee.

2.2 | Measures

All measures and items used are provided in the documentation of the Prosocial Personality Project (see participants). At T1, scales for D, HH, and BF-AG were administered. To measure D, we used the German version of the 70-item set (D-70; Moshagen et al., 2020). To measure HH, we relied on the German version (Moshagen et al., 2014) of the 60-item HEXACO Personality Inventory-Revised (HEXACO-60; Ashton & Lee, 2009) which measures each of the six HEXACO dimensions (including HH) with 10 items. BF-AG was measured by AG scales from four well-established and widely used BF inventories, namely the NEO Five Factor Inventory (NEO-FFI; 12 items; Costa & McCrae, 1992; McCrae & Costa, 2004; German translation by Borkenau & Ostendorf, 2008), the Big Five Aspects Scales (BFAS; 20 items; DeYoung et al., 2007; German translation by Mussel & Paelecke, 2018), the International Personality Item Pool (IPIP) Big Five scales (8 items[3]; Goldberg, 1992; German translation by Treiber et al., 2013), and the Big Five Inventory 2 (BFI-2; 12 items; Soto & John, 2017; German translation by Danner et al., 2019). Thus, BF-AG was indicated by 50 items in total. To account for the imbalance in the number of items used to measure BF-AG and D in comparison to HH, additional analyses with fewer indicators for BF-AG and D were conducted (for details see the modeling section). All responses at T1 were given on five-point Likert-type scales ranging from "strongly disagree" to "strongly agree". The order of the scales at T1 was randomized between participants.

At T2, the antagonistic traits were measured using the 100-item version of the PID-5 (Maples et al., 2015) with the German translation from Zimmermann et al. (2014). Thus, each antagonistic trait was measured using four items. The PID-5 is the most widely used inventory for measuring maladaptive traits according to the alternative model for personality disorders of the DSM-5 (Krueger & Hobbs, 2020; Watters & Bagby, 2018). For the PID-5, responses were given on a four-point Likert-type scale ranging from "does not apply at all" to "totally applies".

2.3 | Modeling

All models were identified using reference indicators and raw item scores were used for model estimation. For BF-AG and D, a bi-factor modeling approach was chosen (e.g. Reise, 2012; for additional analyses with each AG scale as a single latent factor, please see Supplement 3 on the OSF). Bi-factor models decompose the shared variance of the manifest indicators between (typically) one general factor and multiple orthogonal specific factors or facets, respectively. The general factor extracts the shared variance across all observed indicators, whereas the specific factors capture the remaining shared variances between certain items. Although for both BF-AG and D a higher-order model can also be appropriate, higher-order models require more assumptions than bi-factor models (Bader & Moshagen, 2021).

In the case of BF-AG (see Figure 1), all 50 items of the four AG scales served as indicators (for similar approaches modeling a general AG-factor, see, e.g., Crowe et al., 2018; Moshagen, Zettler, Horsten, et al., 2020). Hence, the general factor extracted from the bi-factor model represents the broadest instance of BF-AG possible as compared to any single scale. The specific factors were orthogonal to the general factor and to each other so as to account for the residualized variance between the items of each BF-AG scale. Thus, the specific factors in this model capture the shared variance unique to items of a specific BF scale. In turn, given that residualized specific factors are generally difficult to interpret, especially in the presence of a strong general factor (Sellbom & Tellegen, 2019), we did not analyze them any further.

To control for the disbalance in the number of items used to measure BF-AG as compared to HH, a reduced set of items was also used to model BF-AG in a separate analysis. Specifically, the 15 items with the highest loading on the general BF-AG factor in the bi-factor model were selected (see Supplement 1 on the OSF for details). These items were then specified to load on a single BF-AG factor.

For D, we chose the bi-factor model as suggested by Bader et al. (2021). Here, D constitutes the general factor subsuming most of the variance of all items. The residualized covariances of the items are further subsumed by five specific factors (called themes), which are orthogonal to each other and to the general factor. Again, as residualized specific factors are generally difficult to interpret in the presence of a strong general factor such as D, we did not consider them any further. As for BF-AG, an additional analysis with a reduced set of 16 items for D, i.e., the D16 (Moshagen, Zettler, & Hilbig, 2020), was conducted, to control for the disbalance in the amount of items used to measure D and HH. As with the reduced BF-AG factor, the D16 was modeled as a single factor.

Finally, HH was modeled as a single factor, with all ten HH items loading on that factor. The antagonistic traits were modeled as single factors, too, with their four respective items as indicators.

2.4 | Analysis

All analyses were conducted using the lavaan package (version 0.6-6; Rosseel et al., 2021) in R (version 4.0.2; R Core Team, 2021) relying on the MLM estimator, which uses robust standard errors and a Satorra-Bentler scaled test statistic to address multivariate non-normal distributed data. As the chi-square statistic is uninformative in large samples with high statistical power,[4] we considered

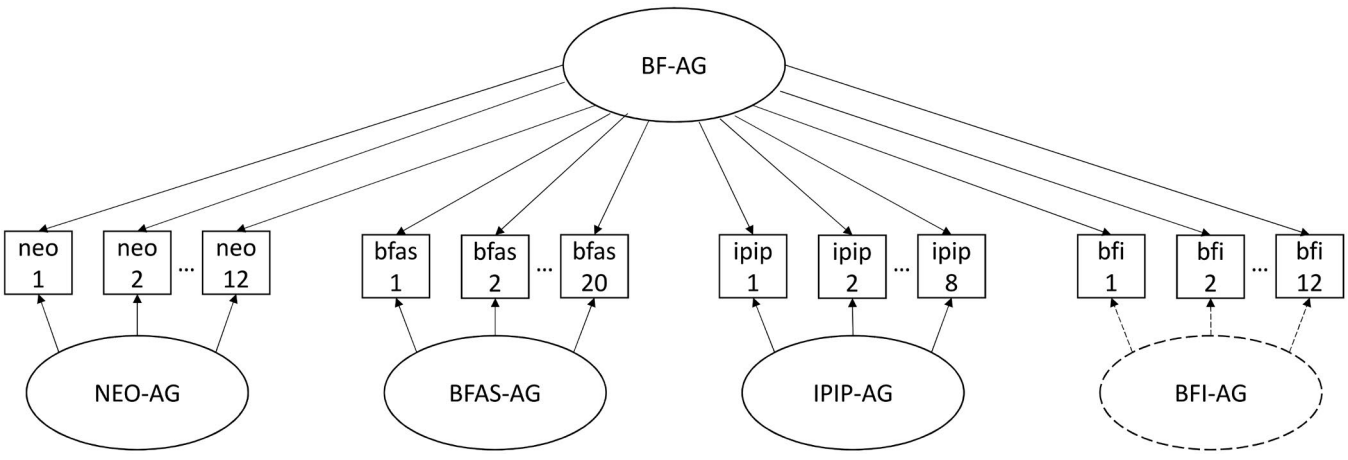

FIGURE 1 Structure of the bi-factor model for Big Five Agreeableness (BF-AG). Here, BF-AG represents the general factor affecting all items of the four Big Five inventories. The scales are modeled as specific factors capturing shared variance among their items that is not accounted for by the general BF-AG factor. The dashed lines for the BFI-AG specific factor indicate that it was omitted from all further analyses because its variance was close to zero.

SRMR and RMSEA as primary indicators of model fit, as these are sensitive to different types of model misspecifications (Moshagen & Auerswald, 2018).

Additionally, to evaluate the proportion of variance that is captured by the general factor in contrast to the specific factors in each of the two bi-factor models (BF-AG and D), we considered the explained common variance (*ECV*; Berge & Sočan, 2004). The *ECV* varies between 0 and 1, with 0 indicating that no variance can be explained by the general factor and 1 indicating that all explained variance in the items is due to the general factor. Hence, higher values indicate a strong general factor (Rodriguez et al., 2016).

To test our hypotheses, we estimated latent regression models. First, to test H1 and H2, each of the antagonistic traits was regressed on the three candidates (i.e., BF-AG, HH, and D) separately to obtain zero-order effects (R^2). Next, to test H3, each antagonistic trait was regressed on the three candidates as predictors in a single model, assessing the unique effect of each candidate over and above the other two. Differences in explained variance are descriptively indicated by ΔR^2. Classical significance tests were supplemented by normalized Evidence Ratios (*ER*; Wagenmakers & Farrell, 2004; Wu et al., 2020) to inform the hypotheses of H3. An *ER* indicates the likelihood given the data that the more restricted model is superior to a less restricted comparison model and ranges from 0 to 1. For example, $ER = 0.90$ indicates that the less restricted model is 9 times ($0.90/(1–0.90) = 9$) more likely than the more restricted model given the data. To determine the *p*-value and *ER* of the incremental effects, we compared a model with BF-AG and D (H3a), a model with HH and D (H3b), and a model with BF-AG, HH, and D (H3c) as predictors, all freely estimating the effect of the three predictors, against a respective comparison model fixing one regression coefficient to zero. These analyses were not pre-registered.

3 | RESULTS

Latent correlations and internal consistencies of all traits are reported in Table 2. The data and analysis scripts are available on the OSF, along with the results of the supplementary analyses (https://osf.io/c9kma/). The supplementary analyses using the reduced (15- and 16-) item sets for BF-AG and D led to identical conclusions regarding all hypotheses.

The bi-factor model for BF-AG yielded satisfactory fit to the data, $\chi^2\,(1234) = 18{,}490$, $p < 0.001$, $SRMR = 0.070$, $RMSEA = 0.063$, 90% CI [0.062, 0.064]. All items loaded on the general BF-AG factor ($Mdn\ \lambda = 0.52$); thus, reliability of the general BF-AG factor was high ($\omega = 0.94$). Moreover, the ECV indicated that 81% of the common variance among all BF-AG indicators was accounted for by the general BF-AG factor. As the BFI-2 specific factor in the bi-factor model had practically no variance, it was omitted in all further analyses, which did not affect model fit in any meaningful way ($\Delta RMSEA = 0.001$, $\Delta SRMR = 0.001$). Moreover, the general BF-AG factor strongly subsumed the common explained variance of the indicators from all remaining specific factors ($ECV_{NEO} = 0.76$, $ECV_{IPIP} = 0.76$, $ECV_{BFAS} = 0.75$).

Similarly, for D, the bi-factor structure resulted in a good fit to the data, $\chi^2\,(2275) = 14{,}242$, $p < 0.001$, $SRMR = 0.046$, $RMSEA = 0.039$, 90% CI [0.039, 0.040]. All items loaded on the general factor ($Mdn\ \lambda = 0.46$). Thus, the observed reliability of D was also high ($\omega = 0.90$). Correspondingly, as indicated by the *ECV*, D explained 74% of common variances among all its indicators and was strongly reflected in all five themes ($0.62 \leq ECV \leq 0.79$). Finally, the single factor for HH yielded an acceptable fit to the data, $\chi^2\,(35) = 1{,}724$, $p < 0.001$, $SRMR = 0.088$, $RMSEA = 0.119$, 90% CI [0.115, 0.124] as did modeling the antagonistic traits as correlated single factors, $\chi^2\,(329) = 3{,}011$, $p < 0.001$, $SRMR = 0.062$, $RMSEA = 0.049$, 90% CI [0.048, 0.050].

Table 3 shows the zero-order effects of all antagonistic traits regressed on each of the candidates (BF-AG, HH, and D). First, as hypothesized (H1a), BF-AG was substantially related to both of the primarily affective antagonistic traits, that is, callousness and hostility, individually and on average. Second, HH was substantially related to the behavioral trait group, thus supporting H1b. Specifically, HH correlated substantially with two of the three behavioral traits, that is, manipulativeness and deceitfulness. A weaker (but still moderate) correlation was found for attention-seeking. Finally, D correlated substantially with grandiosity and suspiciousness individually and thereby with the primarily cognitive antagonistic traits on average, supporting H1c.

As per H2, we further expected each of the candidates to more strongly relate to their respective trait group than the other two candidates. In line with expectations, BF-AG explained most variance in the primarily affective antagonistic traits out of all candidates, both overall and in callousness and hostility individually, supporting H2a. In turn, HH explained more variance than BF-AG or D in all three primarily behavioral antagonistic traits, that is, manipulativeness, deceitfulness, and attention-seeking, therefore supporting H2b. Finally, in line with H2c, D related to the two primarily cognitive antagonistic traits, that is, grandiosity and suspiciousness, more strongly than BF-AG or HH.

In reference to H3, Table 4 shows the unique variance of D over and above BF-AG and HH, respectively, for each antagonistic trait (group). As hypothesized (H3a),

TABLE 2 Latent correlations and internal consistencies (Cronbach's alpha, in bold on the diagonal)

	Man	Dec	Cal	Gran	Att	Hos	Sus	BF-AG	HH	D
Man	**0.69**									
Dec	0.97 [0.95, 0.99]	**0.81**								
Cal	0.68 [0.63, 0.72]	0.71 [0.68, 0.75]	**0.83**							
Gran	0.70 [0.67, 0.74]	0.70 [0.66, 0.73]	0.63 [0.59, 0.67]	**0.79**						
Att	0.51 [0.47, 0.55]	0.46 [0.42, 0.50]	0.22 [0.17, 0.26]	0.56 [0.52, 0.60]	**0.83**					
Hos	0.38 [0.33, 0.42]	0.47 [0.43, 0.51]	0.46 [0.43, 0.50]	0.35 [0.31, 0.40]	0.17 [0.12, 0.21]	**0.80**				
Sus	0.39 [0.35, 0.44]	0.52 [0.48, 0.56]	0.53 [0.48, 0.57]	0.51 [0.46, 0.55]	0.21 [0.17, 0.26]	0.64 [0.60, 0.67]	**0.70**			
BF-AG	−0.50 [−0.54, −0.46]	−0.54 [−0.57, −0.51]	−0.67 [−0.70, −0.64]	−0.46 [−0.50, −0.42]	−0.14 [−0.18, −0.10]	−0.48 [−0.52, −0.45]	−0.39 [−0.43, −0.34]	**0.94**		
HH	−0.58 [−0.62, −0.54]	−0.65 [−0.68, −0.62]	−0.47 [−0.50, −0.43]	−0.52 [−0.56, −0.49]	−0.35 [−0.39, −0.31]	−0.35 [−0.39, −0.31]	−0.32 [−0.37, −0.27]	0.55 [0.52, 0.58]	**0.75**	
D	0.52 [0.48, 0.55]	0.61 [0.57, 0.64]	0.64 [0.61, 0.67]	0.61 [0.58, 0.64]	0.25 [0.21, 0.29]	0.33 [0.29, 0.37]	0.46 [0.42, 0.50]	−0.70 [−0.73, −0.67]	−0.73 [−0.75, −0.70]	**0.95**

Note: Square brackets indicate a 95% confidence interval.

Abbreviations: Att, attention-seeking; BF-AG, Big Five Agreeableness; Cal, callousness; D, Dark Factor of Personality; Dec, deceitfulness; Gran, grandiosity; HH, Honesty-Humility; Hos, hostility; Man, manipulativeness; Sus, suspiciousness

TABLE 3 Explained variance (R^2) in each antagonistic trait (group) by BF-AG, HH, and D

Outcome	BF-AG (%)	HH (%)	D (%)
Primarily affective antagonistic traits (mean)	**35**	17	26
Callousness	**45**	22	41
Hostility	**24**	12	11
Primarily behavioral antagonistic traits (mean)	19	**29**	23
Manipulativeness	25	**33**	26
Deceitfulness	29	**42**	37
Attention-seeking	2	**12**	6
Primarily cognitive antagonistic traits (mean)	18	19	**29**
Grandiosity	21	27	**36**
Suspiciousness	15	10	**22**

Note: Hypothesized (and highest) explained variance in each trait (group) is printed in bold.

Abbreviations: BF-AG, Big Five Agreeableness; D, Dark Factor of Personality; HH, Honesty-Humility.

TABLE 4 Incremental variance (ΔR^2) in each antagonistic trait (group)

Outcome	D > BF-AG (%)	D > HH (%)
Primarily affective antagonistic traits (mean)	3	**10**[a]
Callousness	6	**19**[a]
Hostility	<1	**1**[a]
Primarily behavioral antagonistic traits (mean)	**7**[b]	2
Manipulativeness	**5**[b]	2
Deceitfulness	**11**[b]	4
Attention-Seeking	**4**[b]	<1
Primarily cognitive antagonistic traits (mean)	**12**[c]	**12**[c]
Grandiosity	**16**[c]	**11**[c]
Suspiciousness	**8**[c]	**12**[c]

Note: Hypothesized incremental variances are printed in bold. All effects ≥1% are significant ($p < 0.001$) and have an *ER* of ≥ 0.998.

Abbreviations: BF-AG, Big Five Agreeableness; D, Dark Factor of Personality; HH, Honesty-Humility.

[a]Effects related to Hypothesis 3a.

[b]Effects related to Hypothesis 3b.

[c]Effects related to Hypothesis 3c.

D predicted considerably more variance in primarily behavioral antagonistic traits over and above BF-AG (overall 7%), especially in deceitfulness. Moreover, in line with H3b, D predicted 10% incremental variance in the primarily affective antagonistic traits over and above HH, though almost exclusively in the callousness trait. Finally, as expected (H3c), D explained 12% incremental variance in the primarily cognitive antagonistic traits over and above both BF-AG and HH, respectively.

4 | DISCUSSION

In clinical psychopathology research, seven traits have been suggested to share the common aspect of Antagonism which, in turn, has repeatedly been equated with (extremely) low Agreeableness (AG) as per the Big Five (BF) approach. However, other broad traits, particularly Honesty-Humility (HH) from the HEXACO model and the Dark Factor of Personality (D), are reasonable candidates to reflect antagonistic traits that actually show only limited theoretical overlap with BF-AG. The present work set out to critically test the role of these broad, basic personality dimensions beyond BF-AG in accounting for the seven antagonistic traits reflecting primarily affective versus behavioral versus cognitive aspects.

As theoretically derived, affective traits (callousness and hostility) were best accounted for by BF-AG, whereas primarily behavioral antagonistic traits (manipulativeness, deceitfulness, and attention-seeking) were more

strongly related to HH. In turn, primarily cognitive traits (grandiosity and suspiciousness) were best covered by D. Moreover, D was the only broad trait that explained a similar proportion of variance in affective, behavioral, and cognitive antagonistic traits alike. Arguably, D thus offers the most balanced representation of the full spectrum of antagonistic traits.

As an aside, none of the three candidates (BF-AG, HH, D) were exclusively related to one group of antagonistic traits (specifically those hypothesized in H1), but to others as well. This is to be expected, as neither of the candidates, nor the antagonistic traits, are exclusively affective, behavioral, or cognitive in content. By definition, all (broad) traits cover these aspects to some degree (Funder, 2001). Nonetheless, results clearly confirm that BF-AG, HH, and D reflect (groups of) antagonistic traits to varying degrees and indeed in line with their theoretical definitions.

Moreover, the present findings align with prior research. The high correlations of BF-AG with especially the primarily affective antagonistic traits has been noted before (Quilty et al., 2013; Watson et al., 2013). Also, the stronger relation of the primarily behavioral antagonistic traits, and thus behavior related to exploitation of others, with HH over BF-AG is in agreement with studies revealing HH as a stronger predictor of prosociality and (non-) exploitation than BF-AG (for a recent meta-analysis, see Thielmann et al., 2020). Furthermore, the present results indicating D to be most strongly related to the cognitive traits aligns with recent findings showing that D is a superior predictor (over and above BF-AG or HH) of justifying beliefs for socially aversive behavior (Hilbig, Moshagen, Thielmann, et al., 2022; Horsten et al., 2021; Moshagen, Zettler, Horsten, et al., 2020). Finally, the incremental effects of D over and above BF-AG in deceitfulness and manipulation (i.e., dishonesty and cheating) and the incremental effects of D over and above HH in hostility and callousness (i.e., aggression and insensitivity) are in line with prior findings (Moshagen et al., 2018).

Another noteworthy finding is that specifically those antagonistic traits which show relatively strong empirical overlap with all other antagonistic traits – that is manipulation, deceitfulness, callousness, and grandiosity – are also best explained by HH, AG, and D overall. By comparison, antagonistic traits involving less overlap with the other antagonistic traits overall and thus those with more specific variance – that is, suspiciousness, hostility, and attention-seeking – are accounted for less well by AG, HH, and D. This finding is generally aligned with the theoretical reasoning behind D that a common cause determines the *communalities* of aversive traits and that D will thus more strongly account for variance in exactly those aversive traits that entail more overlap with other aversive traits (Zettler et al., 2021).

As a clear exception, attention-seeking was the only antagonistic trait not *substantially* related to any of the three broad candidate traits considered here. In fact, attention-seeking only showed weak to moderate correlations with the candidates overall. As such, whereas it seems reasonable that such behavior can become *maladaptive* at some level, it seems questionable whether seeking attention is *antagonistic* per se. In fact, to gain others admiration and attention, one may be just as likely to show socially acceptable behavior rather than engaging in behavior which is at odds with others' interests. In line with this reasoning, the most recent conceptualization of a higher-order antagonistic psychopathology domain does not include attention-seeking as a lower level trait (Sleep et al., 2020). However, the conceptual decision whether a trait ought to be considered antagonistic is actually challenging in some cases. One notable problem in this respect is that Antagonism, as a domain, is defined so vaguely ("odds with others"). As a consequence, no clear-cut criteria exist by which one may determine whether a trait qualifies as antagonistic. For example, trait eccentricity can arguably place an individual at odds with others, e.g., when unusual experiences and beliefs are perceived as dangerous. However, eccentricity is not commonly considered antagonistic. Vice versa, attention-seeking sometimesis considered antagonistic, even though it need not, per se, places an individual at odds with others. Therefore, future work should investigate which maladaptive traits overlap conceptually – i.e., with respect to a specific definition of what makes a trait, say, antagonistic – rather than grouping traits by mere empirical overlap. Nevertheless, the correlation of attention-seeking and HH was still moderate in size and the highest among all candidates, thus supporting the prediction that primarily behavioral antagonistic traits are best reflected in HH.

Comparatively speaking, D yielded the most balanced coverage of explained variance in the antagonistic traits and, more importantly, added incremental predictive variance in those (mostly cognitive) trait aspects missed by BF-AG or HH. Crucially, this effect was not attributable to the larger number of items used to measure D as compared to HH or BF-AG, as the supplementary analyses using a reduced item set for D showed. Interestingly, there was rarely a case in which BF-AG explained meaningful variance over and above D in behavioral or cognitive traits, or in which HH explained meaningful variance over and above D for affective or cognitive traits (see Supplement 3 on the OSF for details). Overall, then, D not only explained more variance over and above BF-AG in behavioral and cognitive traits, and over and above HH in affective and cognitive traits, but D did also not miss out on relevant trait content of antagonistic traits that would best be covered by BF-AG or HH, respectively.[5]

4.1 | Implications

Taken together, the present findings imply that equating Antagonism exclusively with low BF-AG, as has been suggested at times (Kotov et al., 2017; Sleep et al., 2020; Widiger et al., 2019; Wright et al., 2012), is an oversimplification that comes with a primarily affective and much less behavioral or cognitive understanding of Antagonism. Similarly, equating Antagonism exclusively with low HH – although not as explicitly suggested so far – would imply a mostly behavioral understanding of Antagonism. Our findings thus echo the position that – in addition to BF-AG or HH – antagonistic traits involve features related to other trait dimensions. Indeed, Antagonism as identified by Widiger and Simonsen (2005) and conceptualized in the PID-5 (Krueger et al., 2012; Krueger & Markon, 2014) was never explicitly designed to be the low pole of only *one* basic trait dimension in isolation. Instead, to adequately represent antagonistic traits (and their shared aspect of Antagonism), a blend of multiple basic personality dimensions might be necessary. This aligns with our finding that D offered the most balanced representation of the seven antagonistic traits under scrutiny: In terms of basic personality models, D is best understood as a blend of several dimensions (BF: AG, Conscientiousness and to a smaller extent Neuroticism and Extraversion; HEXACO: HH, AG, Conscientiousness, and to a smaller extent Emotionality) and cannot be equated or reduced to any one dimension, not even those it is most strongly associated with, that is, BF-AG or HH (Horsten et al., 2021; Moshagen et al., 2018; Moshagen, Zettler, Horsten, et al., 2020).

Importantly, despite the promise of D to account for individual variation in antagonistic traits, the present findings also do not warrant the conclusion that D can be equated with Antagonism. Shared variance of 26% between D and the antagonistic traits (on average) is too low to consider the two constructs equivalent. In fact, aspects covered by D and antagonistic traits differ in relevant ways. First, D encompasses sadistic and spiteful tendencies, for which no antagonistic trait (or maladaptive trait in general in the DSM-5) has been suggested (Hilbig, Thielmann, et al., 2021). Second, tendencies described by D, although aversive by definition, are not necessarily maladaptive or strictly psychopathological by definition. Instead, aversive traits "do place individuals at risk for maladjustment, including psychopathology" (Thomaes et al., 2017, p. 836). Third, as argued before, behavior aimed at attention-seeking is partially incompatible with the disutility aspect of D because gaining others' attention and admiration may arguably involve positive behavior toward others, rather than causing them harm. In turn, as discussed before, one might question whether attention-seeking ought to be considered antagonistic per se, with more recent approaches to the structure of psychopathological traits actually excluding attention-seeking from the Antagonism domain (see Sleep et al., 2020).

4.2 | Limitations and directions for future research

Some limitations of the current research need to be acknowledged. First, reliance on the PID-5 inherently means measuring endorsement of highly undesirable, low-base-rate statements, all of which are scored in the direction of greater personality pathology (see Supplement 4 on the OSF). Thus, a substantial proportion of PID-5 scale variance will be attributable to trait-unrelated individual differences in the tendency to endorse such items (Ashton et al., 2017; Furnham, 1986). Moreover, we relied on the 100-item version of the PID-5 rather than using the full (220-item) inventory (Krueger et al., 2012), thus potentially limiting the breadth of trait content covered. However, the 100-item version shows almost the same reliability and validity on the facet level (Maples et al., 2015), suggesting at the very least that the current findings ought to replicate when using more comprehensive measures of antagonistic traits. Second and similarly, HH was measured with considerably fewer items than BF-AG and D and, thus, potentially less comprehensively. Importantly, however, the additional analysis with reduced item sets for BF-AG and D essentially yielded the same conclusions, thus ruling out that the comparison was generally biased against HH. Third, although the sample was large and diverse, we relied on a community rather than a clinical sample. Although the very notion underlying the shift toward dimensional models of psychopathology strictly implies that antagonistic traits are not restricted to some narrow clinical populations, the most extreme ends of the spectrum were likely underrepresented in our sample. Finally, one may argue that different operationalizations of BF-AG might have produced other findings. However, a particular strength of the present study is the reliance on a broad representation of BF-AG measured by multiple established AG scales and modeled as their common core. Thus, we maintain that our findings shed light on the role of a particularly broad AG dimension that is not limited to one specific operationalization of BF-AG. To our knowledge, this is the first study to do so.

However, we would also like to point out again that we implemented a broad operationalization of BF-AG that subsumes several particularly common conceptualizations and operationalizations. As a consequence, it does not perfectly conform to any one specific conceptualization and operationalization (which tend to differ, e.g., Hilbig et al., 2016; Thielmann et al., 2021) nor is

it equivalent to cross-dimension variants such as the construct suggested by Crowe et al. (2018), which comprises aspects of HH and the interstitial Altruism facet of the HEXACO model (see also Vize & Lynam, 2021; Vize et al., 2021). The latter, although also labeled Agreeableness, is actually incompatible with AG as a largely orthogonal factor within the BF or Five-Factor Model (Hilbig et al., 2021). In any case, we explicitly limit our conclusions to a construct that is meant to be one of five largely orthogonal factors (within the BF) and represented by the common variance of corresponding scales.

4.3 | Conclusion

As essentially intended by shifting toward a dimensional understanding of personality psychopathology, antagonistic traits are reflected in broad traits describing socially aversive behavior to a notable degree, thus supporting the general view that pathological traits can be understood as extreme levels of dimensions within the basic personality space. However, simply equating antagonistic traits with any one *single* basic dimension such as BF-AG is an oversimplification. Indeed, even D – which can be understood as a blend of dimensions such as BF-AG and HH (and others) – is not equivalent to Antagonism although it does offer the most comprehensive and balanced basic trait representation of all antagonistic traits so far.

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ETHICS APPROVAL

The present study was conducted in full accordance with the Ethical Guidelines of the American Psychological Association (APA). The study was run based on approval from the local ethics committee.

AUTHOR CONTRIBUTIONS

All authors contributed to and jointly wrote the present manuscirpt. Writing was headed by David D. Scholz and Benjamin E. Hilbig. Benjamin E. Hilbig and Isabel Thielmann collected the data. David D. Scholz analyzed the data together with Morten Moshagen and Benjamin E. Hilbig.

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ENDNOTES

[1] Note that definitions of BF-AG vary to some degree (Graziano & Tobin, 2017). For the current work, BF-AG is conceptualized as a largely orthogonal factor within the BF (Goldberg, 1992) and operationally defined by what is commonly measured by widely used BF-AG scales, e.g. the International Personality Item Pool Big Five scales (Goldberg, 1992); the NEO Five Factor Inventory (Costa & McCrae, 1992; McCrae & Costa, 2004); the Big Five Aspects Scales (DeYoung et al., 2007); and the Big Five Inventory-2 (Soto & John, 2017).

[2] The only antagonistic trait that is arguably beyond the scope of D is attention-seeking: Behavior shown to garner others' attention and admiration is not necessarily aversive and therefore beyond the definition of D.

[3] The IPIP-50 actually comprises 10 items for BF-AG. However, two of these items are identical to the BFAS-AG scale. Thus, we omitted these two items from the IPIP-AG scale.

[4] For example, a post-hoc power analysis for a global hypothesis test as described by Jobst et al. (2021) for the bi-factor model of D (df =2275) or BF-AG (df =1234) revealed an extremely high power of greater than 99.9% for detecting even negligible model misspecifications, i.e., *RMSEA* of 0.010, at an α-level of 0.05.

[5] Note that D correlates as strongly as BF-AG and HH with *all* other PID-5 traits, with median r (D) = 0.25, r (BF-AG) = −0.27, r (HH) = −0.22. Thus, the relatively high correlations of D with the antagonistic traits cannot be simply due to a similar framing of items measuring D and psychopathological traits in general.

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