



The Dark Five: A reconsideration of the Short Dark Tetrad (SD4)

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ABSTRACT

The measurement of ‘dark’ personality traits has been shown to be susceptible to error. In particular, the Dark Tetrad is theorized to fit poorly to the 4-factor structure within the SD4 (Paulhus et al., 2021). The present study examined the structural validity of the SD4 by using a dataset of internet users ($n = 604$). A robust approach to confirmatory factor analysis revealed that the 4-factor model proposed by Paulhus et al. (2021) did not appropriately reflect the data. Alternatively, an exploratory 5-factor model (*The Dark Five*; including coalition-building, grandiose exhibitionism, psychopathy, violent voyeurism, and indirect sadism) resulted in better statistical fit than the 4-factor model. Moreover, the Dark Five allowed the successful discrimination of psychopathy and sadism and explained more variance in attachment orientation than had the 4-factor model. Future research using the SD4 to measure ‘dark’ personalities or to explore differences between psychopathy and sadism may therefore benefit by testing the 5-factor model or opting for a different measure of the Dark Tetrad.

1. Introduction

Contemporary ‘dark’ personality research stems from Paulhus and Williams’s (2002) Dark Triad. The Dark Triad consists of Machiavellianism, narcissism, and psychopathy. Machiavellianism was defined as the inclination towards manipulation for one’s own benefit, with a ‘means to an end’ morality (Christie & Geis, 1970), narcissism as the inflated sense of one’s own ego (Jones & Paulhus, 2014), and psychopathy as impulsive callous disinhibition (Jones & Paulhus, 2014). While autocratic thought (i.e., Machiavellianism; see Machiavelli, 2011) and categorization of psychopathology (e.g., narcissism & psychopathy; see Raskin & Hall, 1979; Hare, 1985) have formed the basis of the Dark Triad, contemporary research on these ‘dark’ traits explores their manifestation as a spectrum within subclinical populations. More recently the Dark Triad has been expanded to include a fourth component, everyday sadism, characterized by pleasure in others’ suffering (Paulhus et al., 2021).

Despite the Dark Tetrad’s apparent theoretical parsimony, Kowalski et al. (2021) and Kay and Arrow (2022) highlight inconsistencies in ‘dark’ research depending on the scales used. Such reviews support the view of a ‘measurement crisis’. Moreover, the psychometric properties of Paulhus et al.’s (2021) Short Dark Tetrad may be of concern. Both issues are elaborated below.

1.1. Elemental neglect

Kay and Arrow (2022) outline three prominent issues. ‘Jingle’ refers to scales that are intended to measure the same construct but yield different outcomes. ‘Jangle’ refers to when measures of different constructs overlap. ‘Conceptual Centrality’ describes the lack of consensus on what unifies ‘dark’ personalities. To rectify these issues, Kay and Arrow (2022) proposed an ‘elemental approach’, operationalizing dimensions.

Jingle and Conceptual Centrality can be treated/thought of as quasi-interdependent problems. For instance, Jones and Figueredo (2013) suggested that callous-manipulation unified the Dark Tetrad. Indeed, Heym et al. (2019) found support for this unifier for Machiavellianism and psychopathy by demonstrating their association with apathy. However, narcissism was positively associated with aspects of empathy. This contradiction may be a manifestation of the Jingle issue—the Narcissistic Personality Inventory (Raskin & Hall, 1979) used by Jones and Figueredo (2013) is more comprehensive than the Short Dark Triad (SD3; Jones & Paulhus, 2014) used by Heym et al. (2019).

Concerns about Jangle between Machiavellianism and psychopathy persisted in the literature (see Kowalski et al., 2021). Yet, Paulhus et al. (2021) states the SD4 resolves this Jangle. However, Blötner et al. (2022) suggest that psychopathy and sadism within the SD4 converge,

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an issue also noted outside of the SD4 (e.g., Roy et al., 2021), highlighting a broader empirical overlap.

Welsh et al. (2024) highlighted the SD4's lack of comprehensiveness, noting the unidimensional treatment of constructs. Other brief measures of 'dark' traits have faced criticism for conceptual redundancy and trait overlap (Kowalski et al., 2021). However, recognizing potential item redundancy and using extant scales may help with development of a more comprehensive measure (e.g., Ackerman et al., 2011). For instance, the SD3 (Jones & Paulhus, 2014) was altered to form the SD4's narcissism and psychopathy scales (Paulhus et al., 2021). The SD3 has labels for facets for both constructs, such as 'Leadership' and 'Exhibitionism' for narcissism, and 'Antisocial Behavior', and 'Erratic Lifestyle' for psychopathy (Jones & Paulhus, 2014), like dimensions previously established for these constructs (see Ackerman et al., 2011; Hare, 2003).

1.2. Factor validity

Welsh et al. (2024) rate the SD4's internal structure as moderate, by stating Paulhus et al.'s (2021) parceling fit indices. Parceling, in the context of confirmatory factor analysis (CFA), involves combining items into composites and loading them onto factors (Kline, 2023). This method often provides favorable assessment of internal structure by masking multidimensionality (Bandalos, 2002).

Paulhus et al.'s (2021) unparcelled fit indices fail to meet criteria laid down in Hu and Bentler (1999). This pattern of fit was also evident in other versions of the SD4 (e.g., Blötner et al., 2022; Pechorro et al., 2023; Qaderi Bagajan et al., 2024; Wertag et al., 2023). Addressing this, Paulhus et al. (2021) relies on Hopwood and Donnellan's (2010) paper, specifically the 'Henny Penny' problem. The Henny Penny problem proposes that many personality inventories do not show acceptable fit through CFA, nonetheless this crux does not suggest that all personality measures should be dismissed. Hopwood and Donnellan's (2010) argument centers on cross-loadings. Since items are imperfect reflections of hypothetical psychological constructs, they may inadvertently assess more than one construct. These errors manifest as cross-loadings and, when unspecified, oppose the assumptions of CFA resulting in poor fit. However, following Hopwood and Donnellan's (2010) recommendations we suggest that further evidence is needed to support Paulhus et al.'s (2021) factor structure.

1.3. Current study

Given the concerns surrounding the SD4's factor structure and the 'measurement crisis', this paper aimed to test the 4-factor model (4FM) of the SD4, as proposed by Paulhus et al. (2021). Using a robust factor analytical approach (see Section 2.3.1), this paper set out to determine if there is underlying concern with the internal structure of the 4FM, rather than unspecified cross-loadings as Hopwood and Donnellan (2010) may suggest. Should the 4FM exhibit poor fit, alternative dimensional representations will be explored. Previous literature investigating dimensionality, such as Ackerman et al. (2011), has prioritized theoretically important factors to a greater extent than high internal reliability. Likewise, this present study adopted the same stance and sought, in part, to establish dimensions for each 'dark' trait due to the importance of the 'elemental approach' (Kay & Arrow, 2022). In addition, avoidant and anxious attachment orientations (see Fraley et al., 2011) were used to explore criterion validity between constructs and models emerging from our analysis, as Nickisch et al. (2020) notes they may be considered maladaptive attributes and have shown unique associations with 'dark' traits.

2. Method

2.1. Participants and procedure

The dataset used is from an existing project which had obtained prior

ethical approval (Waldeck et al., 2024). All participants consented to take part in the original study and agreed for anonymized data to be used for analysis. Participants ($N = 604$) were recruited using an online survey distributed through emails to Universities within the UK, Internet platforms, and Internet data collection sites (e.g., <https://www.callforparticipants.com>). They ranged from 18 to 78 years of age ($M = 26.3$; $SD = 10.6$). Most reported that they were students at academic institutions (67.1 %) or were employed (28.1 %). The majority were either British (62.1 %) or American (16.2 %) and identified as white (68.5 %) or Asian (10.8 %).

2.2. Materials

2.2.1. Short Dark Tetrad (SD4; Paulhus et al., 2021)

The 28-item SD4 was administered as published without sub-headings. Measuring Machiavellianism ($\alpha = 0.61$), narcissism ($\alpha = 0.76$), psychopathy ($\alpha = 0.77$), and sadism ($\alpha = 0.80$). Participants responded using a 5-point Likert scale ranging from 1 ("strongly disagree") to 5 ("strongly agree").

2.2.2. Attachment orientation

Fraley et al.'s (2011) 9-item Experiences in Close Relationships-Relationship Structures Questionnaire (Global Domain) was used to measure both avoidant ($\alpha = 0.76$; e.g., "I don't feel comfortable opening up to others") and anxious ($\alpha = 0.89$; e.g., "I'm afraid other people may abandon me") attachment orientation. Participants responded using a 7-point Likert scale ranging from 1 ("strongly disagree") to 7 ("strongly agree"). Higher scores reflect greater insecurity.

2.3. Analysis

The validity of Paulhus et al.'s (2021) 4FM was tested using CFA, following a sequential framework. First, fit indices for the 4FM and its constituent 1-factor models were examined to ensure no fundamental structural issues were present (see Section 2.3.1). Second, if the model was rejected, dimensionality was explored (see Section 2.3.2) and the emerging models were retested as above. Third, predictive utility of models was compared based on discriminant validity (see Section 2.3.3) and criterion validity (see Section 2.3.4). Analyses were conducted using Rosseel's (2012) "lavaan" R package.

2.3.1. Fit interpretation

Interpretation of fit indices is illustrated in Supplementary material A. Chi-square was reported but interpreted cautiously due to interactions with sample size (Kenny, 2020). Due to anticipated cross-loadings within multi-construct models, incremental fit statistics were not emphasized in interpretation due to their sensitivity to unspecified cross-loadings (Beauducel & Wittmann, 2005). Instead, maximum cut-offs of 0.06 and 0.09 were used for the Root Mean Square Error of Approximation (RMSEA) and Standardized Root Mean Square Residual (SRMR), respectively (Hu & Bentler, 1999). Importantly, model fit for multi-construct models were conditional upon the demonstration of model fit by the constituting independent construct models. This step ensured that poor incremental fit measures could be attributed to cross-loadings, rather than fundamental issues with model structure. The constituting models were more conventionally evaluated using cutoffs of CFI (>0.95), TLI (>0.95), and SRMR (<0.08) (Hu & Bentler, 1999). A less stringent RMSEA cutoff of 0.08 was used at this stage as Kenny et al. (2014) demonstrated the impact low degrees of freedom have on RMSEA reliability.

2.3.2. Exploration of dimensionality

This study employed a deductive approach to CFA to examine dimensionality, wherein model respecifications were only made if they were consistent with prior literature. Correlation residual matrices from each constituent model were utilized to inform respecifications (Kline,

2023). Specifically, positive residuals >0.10 indicated that the relationship between items was underestimated, suggesting that these items ought to be grouped into their own factor. Conversely, negative residuals greater than -0.10 indicated that the relationship was overestimated, implying that these items should be placed in separate factors. However, if the correlation residuals indicated that an item belonged to a factor unrelated to its content, a determination was made about whether to remove the item entirely based on insights from the EFA results reported by Paulhus et al. (2021). Specifically, if the item loading in the EFA was <0.30 it was removed (Floyd & Widaman, 1995). Furthermore, factors consisting of less than three items were only retained if the inter-item correlation exceeded $r > 0.70$ (Yong & Pearce, 2013)—a model retaining all factors with two items is available in Supplementary material B.

2.3.3. Discriminant validity

To assess if different constructs are being captured, the Fornell-Larcker criterion (FLC) was calculated. This involves checking that the square root of the average variance extracted (AVE) for each factor is greater than its inter-factor correlations (Fornell & Larcker, 1981). As per Cheung et al. (2024), upper 95 % confidence intervals for CI-CFA approach to discriminant validity can be found in Supplementary material C and E.

2.3.4. Criterion validity

To explore the unique predictive properties of each factor, structural equation modelling (SEM) was used to regress the factors of the multi-construct models onto manifest covariates (i.e., avoidant & anxious attachment orientation). Bivariate analyses are also reported in Supplementary material G.

3. Results

Anderson-Darling tests and Mardia tests were calculated to assess normality of the SD4's 28 items, using Korkmaz et al.'s (2014) "MVN" R package. As the tests provided significant p -values ($p < .001$) the sample distribution was determined to be non-normal. Consequently, maximum likelihood robust estimation was used for the subsequent analyses (Kline, 2023). Supplementary material H provides fit indices for the 4FM using WLSMV.

3.1. Confirmatory testing of the 4FM

Fit indices for the 4FM and the constituting 1-factor models are reported in Table 1. The constituent narcissism and psychopathy models demonstrated acceptable fit, only marginally falling short of the TLI cutoff. The constituent Machiavellianism and sadism models failed to demonstrate fit. Consequently, despite the 4FM producing acceptable RMSEA and SRMR values, it was rejected because the constituent models did not all have acceptable fit.

The 4FM is illustrated in Fig. 1. Additional model estimates can be found in Supplementary material C. Descriptive statistics, AVE, FLC and reliability coefficients of the 4FM are reported in Table 2.

All factors, except for psychopathy, had FLC greater than any of their inter-factor correlations, which are displayed in Fig. 1. Psychopathy's correlation with sadism ($r = 0.61$, $p < .001$) was greater than its FLC.

Despite rejecting the 4FM due to its poor fit indices, it was decided to proceed with SEM to assess its criterion validity insofar as avoidant ($M = 22.75$, $SD = 6.17$) and anxious ($M = 14.63$, $SD = 4.78$) attachment orientations are concerned. The RMSEA and SRMR were both 0.06 for both SEMs, all other indices performed worse than the CFA models and can be found in Supplementary material D. The model explained 11.40 % and 13.60 % of the variance of both avoidant and anxious attachment, respectively. Table 3 reports the estimates of each factor regressed onto both attachment orientations.

3.2. Exploration of constituent constructs

Correlation residual matrices for all 1-factor constituent models from the previous confirmatory phase of the 4FM are reported in Table 4.

3.2.1. Machiavellianism

Items M5 and M7 exhibited an underestimated relationship. However, their correlation ($r = 0.20$, $p < .001$) was less than Yong and Pearce's (2013) recommendation, so the factor was not retained. M6, which was expected to reflect a 'coalition-building' dimension, had an unexpected underestimated relationship with M7 and was therefore excluded. This exclusion was supported by the poor EFA loading (0.24) reported by Paulhus et al. (2021), which is less than Floyd and Widaman's (1995) cutoff. Consequently, a 1-factor 'coalition-building' model was formed, consisting of M1, M2, M3, and M4, which demonstrated acceptable fit (see Table 1).

3.2.2. Narcissism

Items N1 and N2 exhibited an underestimated relationship. However, the inter-item correlation ($r = 0.38$, $p < .001$) was less than Yong and Pearce's (2013) recommendation, so the factor was not retained. As a result, a 1-factor 'grandiose exhibitionism' model was formed, consisting of N3, N4, N5, N6, and N7, which demonstrated acceptable fit (see Table 1).

3.2.3. Psychopathy

The 1-factor psychopathy model consisting of all seven extant items was retained as the correlation residual matrix did not indicate the presence of underestimated or overestimated relationships.

3.2.4. Sadism

Items S3, S5, and S7, which were deemed to constitute an 'indirect sadism' dimension, exhibited underestimated relationships. However, S6, which was also expected to constitute an 'indirect sadism' dimension, did not have underestimated or overestimated relationships. Inspecting EFA results published by Paulhus et al. (2021), S6 had a factor loading (0.24) less than Floyd and Widaman's (1995) cutoff and was therefore excluded.¹ As a result, a 2-factor sadism model was constructed, consisting of 'indirect sadism' (Items S3, S5, & S7) and 'violent voyeurism' (Items S1, S2, & S4), which demonstrated acceptable fit (see Table 1).

3.3. Bringing together the 5-factor model

Fig. 2 depicts the 5-factor model that integrates the three previously respecified models with the 1-factor psychopathy model. This model exhibited acceptable fit indices, as detailed in Table 1, and the independent constituent models also showed acceptable fit.

Additional model estimates can be found in Supplementary material E. Descriptive statistics, AVE, FLC and reliability coefficients of the 5-factor model are reported in Table 2.

All factors, except for psychopathy and indirect sadism, had FLC greater than any of their inter-factor correlations, which are displayed in Fig. 2. Psychopathy's FLC did not exceed its correlation with indirect sadism ($r = 0.58$, $p < .001$), and indirect sadism had a greater correlation with violent voyeurism ($r = 0.69$, $p < .001$) than its FLC.

3.4. Criterion validity

The RMSEA and SRMR were both 0.06 for both SEMs exploring the 5-factor model's relationships with avoidant and anxious attachment

¹ Item S3 has an EFA loading (0.27) less than Floyd and Widaman's (1995) recommendation. However, it performed well in terms of factor loading and fit in the current model, so was retained.

Table 1
Fit indices for all models.

Model	χ^2	df	<i>p</i>	CFI	TLI	RMSEA	CI	SRMR
Multi-construct								
4-Factor	992.08	344	<0.001	0.823	0.806	0.058*	0.052–0.060	0.063*
5-Factor	548.38	199	<0.001	0.883	0.864	0.057*	0.051–0.062	0.059*
4-Factor – constituting constructs								
Machiavellianism	51.89	14	<0.001	0.882*	0.823*	0.069*	0.049–0.089	0.048*
Narcissism	45.19	14	<0.001	0.953*	0.929*	0.067*	0.046–0.089	0.039*
Psychopathy ^a	41.01	14	<0.001	0.960*	0.940*	0.064*	0.042–0.087	0.037*
Sadism	89.71	14	<0.001	0.924*	0.886*	0.102*	0.083–0.123	0.058*
5-Factor – constituting constructs								
Coalition-building	5.00	2	0.084	0.986*	0.959*	0.047*	0.000–0.102	0.020*
Grandiose exhibitionism	15.33	5	0.009	0.977*	0.954*	0.065*	0.029–0.103	0.028*
2-Factor sadism	10.26	8	0.247	0.998*	0.996*	0.023*	0.000–0.058	0.020*

Note. CFI = Comparative Fit Index, TLI = Tucker Lewis Index, RMSEA = Root Mean Square Error of Approximation, CI = RMSEA confidence intervals at 90 %, and SRMR = Standardized Root Mean Square Residual.

* Displays fit indices used to determine model fit, recalling that multi-construct fit is conditional on constituting construct fit.

^a Also a constituting construct of the 5-factor model.

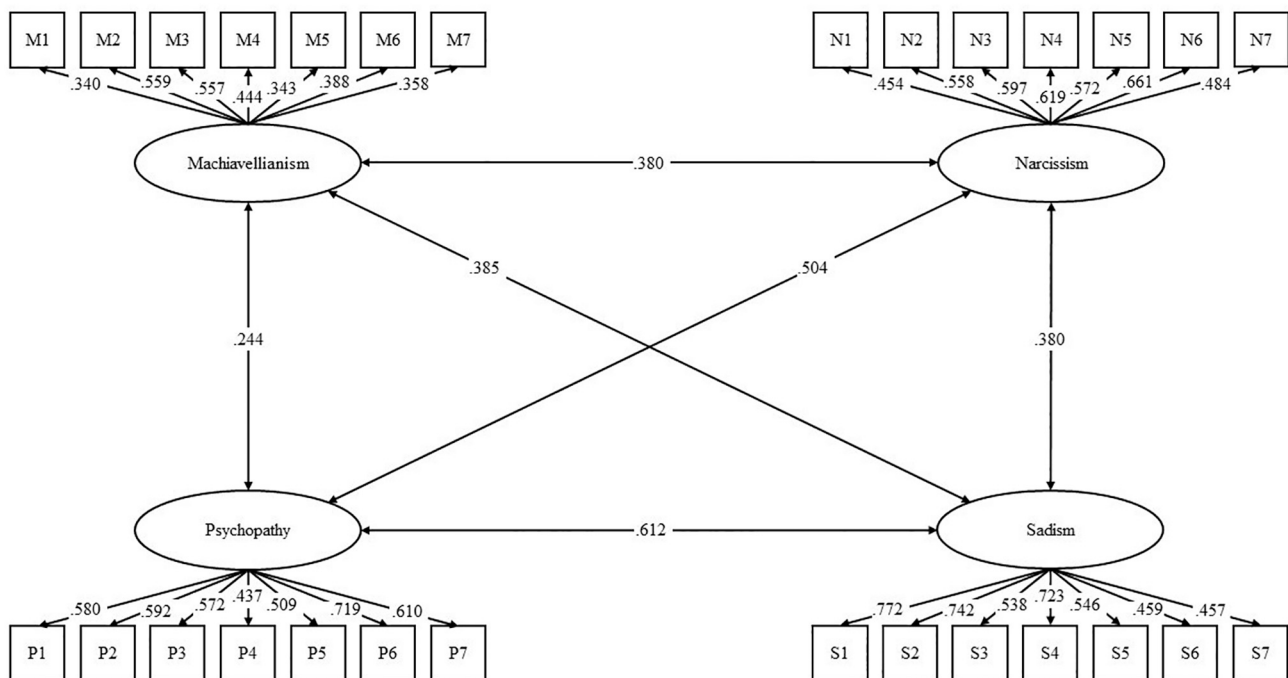


Fig. 1. 4-Factor model.

Note. All values are standardized and significant ($p < .050$). Double-headed arrows indicate inter-factor correlations; single-headed arrows indicate factor loadings. Item labels refer to Paulhus et al.'s (2021) scale.

orientations, other indices are reported in Supplementary material D. The model explained 12.90 % and 18.70 % of the variance of both avoidant and anxious attachment, respectively. Table 3 displays the estimates for each factor regressed onto both attachment orientations.

4. Discussion

This study sought to address concerns about the validity of the SD4's 4FM (Paulhus et al., 2021). Specifically, our goal was to determine whether poor fit indices could be explained by an underlying concern with the internal structure of the model rather than cross-loadings, as Hopwood and Donnellan (2010) might suggest. Moreover, this paper sets out to explore the dimensionality of each constituent construct of the 4FM to resolve any fit concerns that might arise.

4.1. The 4FM

Consistent with other studies employing CFA, the 4FM yielded incremental fit indices that are inconsistent with good model fit (Hu & Bentler, 1999). Although the RMSEA and SRMR indicated appropriate fit, not all constituent models achieved acceptable fit. Consequently, a 5-factor model was investigated as analysis suggested that the 4FM was characterized by internal structure misfit beyond what can be attributed to cross-loadings.

The FLC suggested that the 4FM corrected the overlap between Machiavellianism and psychopathy, as suggested by Paulhus et al. (2021). However, consistent with Blötner et al. (2022), there appeared to be a psycho-sadism Jangle issue, as psychopathy could not be differentiated from sadism according to the FLC. This suggests that both

Table 2
Descriptive statistics, average variance extracted, Fornell-Larcker criteria and reliability coefficients for all models.

Factor	Mean	SD	<i>t</i> (<i>d</i>)	AVE	F-L	α	ω_t
4-Factor							
Machiavellianism	3.30 (F = 3.27; M = 3.41)	0.56	2.42 (0.26)	0.19	0.44	0.61	0.61
Narcissism	2.66 (F = 2.61; M = 2.85)	0.69	2.31 (0.35)	0.32	0.57	0.76	0.76
Psychopathy ^a	1.94 (F = 1.88; M = 2.22)	0.65	4.89 (0.53)	0.34	0.58	0.77	0.78
Sadism	2.67 (F = 2.15; M = 2.74)	0.81	6.20 (0.77)	0.38	0.62	0.80	0.80
5-Factor							
Coalition-building	3.16 (F = 3.12; M = 3.35)	0.68	3.28 (0.35)	0.26	0.51	0.59	0.57
Grandiose exhibitionism	2.57 (F = 2.52; M = 2.78)	0.74	3.28 (0.35)	0.36	0.60	0.72	0.73
Violent voyeurism	2.00 (F = 1.82; M = 2.73)	1.01	7.64 (0.96)	0.60	0.77	0.82	0.82
Indirect sadism	2.78 (F = 2.70; M = 3.04)	1.00	3.25 (0.35)	0.39	0.62	0.65	0.66

Note. All means and SDs presented in this table have been averaged for comparisons. F = mean of females; M = mean of males. *t* = *t*-test between females and males (all significant *p* < .05); *d* = Cohen's *d*. AVE = Average Variance Extracted. F-L = Fornell-Larcker Criterion. Reliability statistics are Cronbach's alpha = α and McDonald's omega total = ω_t .

^a Also a constituting construct of the 5-factor model and provided the same values.

Table 3
Attachment orientation regressions.

Factor	Avoidant			Anxious		
	β	S.E.	<i>p</i>	β	S.E.	<i>p</i>
4-Factor						
Machiavellianism	0.06	0.08	0.440	0.36	0.08	<0.001
Narcissism	-0.34	0.06	<0.001	-0.27	0.07	<0.001
Psychopathy	0.22	0.08	0.005	0.21	0.08	0.006
Sadism	0.15	0.08	0.053	-0.07	0.07	0.333
5-Factor						
Coalition-building	0.13	0.08	0.094	0.17	0.08	0.027
Grandiose exhibitionism	-0.35	0.07	<0.001	-0.13	0.07	0.063
Psychopathy	0.21	0.08	0.009	0.06	0.09	0.512
Violent voyeurism	0.08	0.08	0.359	-0.32	0.08	<0.001
Indirect sadism	0.07	0.10	0.492	0.46	0.11	<0.001

Note. β = Standardized Estimate. S.E. = Standard Error.

measures may capture the same trait. This ambiguity could mislead researchers employing the 4FM, causing them to incorrectly attribute outcomes to psychopathy rather than sadism, or vice versa.

4.2. Dimensionality

Through the deductive use of CFA, it was discovered that Machiavellianism, narcissism, and sadism were arguably better expressed as refined or multidimensional models. After the removal of conceptually redundant items Machiavellianism and narcissism were refined into 'coalition-building' and 'grandiose exhibitionism', respectively. Coalition-building resembles aspects of manipulative Machiavellian behavior characterized by the forming and exploitation of interpersonal relationships for personal gain (see Christie & Geis, 1970) and has previously been assessed with measures such as the SD3 (Jones & Paulhus, 2014). Grandiose exhibitionism reflects the dimension of narcissism, of the same nature as the type identified by Ackerman et al. (2011) which is characterized by exhibitionistic theatrics, vanity, and egotism. Sadism was divided into 'violent voyeurism', which is characterized by the enjoyment of watching violent media, and 'indirect sadism', which is characterized by a pleasure in inflicting non-physical suffering on others. Although these sadism labels deviate from that of the CAST (Buckels, 2023), we argue that they are more suitable as the use of 'vicarious sadism' from the CAST might be ambiguous since it may be taken to imply either pleasure in watching suffering or in inflicting suffering through "vicarious rewards where a safe distance can be maintained" (Paulhus et al., 2021, p. 216). By contrast, our model differentiates spectators from actors, a dualism frequently discussed in sadism literature (e.g., Paulhus & Dutton, 2016). Our analysis suggested that psychopathy should continue to be treated as a unidimensional construct, which is consistent with Blötner et al.'s (2022) view that psychopathy, at least as it is assessed by the SD4, is a central trait.

A tentative 5-factor model was then composed, hereby referred to as the *Dark Five model of the SD4* (D5-SD4; for items see Supplementary material F). We have concluded that this model is arguably a more appropriate reflection of the data given its superior fit indices and those of its constituent models. Furthermore, this model partly resolved the psycho-sadism Jangle issue which we observed in the 4FM, as the FLC suggested that violent voyeurism could be successfully differentiated from psychopathy, although indirect sadism could not. In other words, the items measuring violent voyeurism seem to capture a construct which is empirically different from the items measuring psychopathy. Perhaps the lack of distinction between indirect sadism and psychopathy suggests that acting on sadistic tendencies requires the characteristic antisocial and callousness of psychopathy, hence the fact that violent voyeurism is by its very nature passive, allows it to be differentiated from psychopathy, unlike indirect sadism. This gives credence to models such as that proposed by Roy et al. (2021), who suggested that infliction of suffering is merely a facet of psychopathy. The FLC indicates that indirect sadism and violent voyeurism are not discriminant. However, this may reflect a shared theoretical origin (i.e., pleasure in others suffering) rather than pose a concern, as the CFA results for a two-factor model demonstrated superior fit relative to a one-factor sadism model. Moreover, these constructs exhibited contrasting associations with anxious attachment orientation (discussed below).

The D5-SD4 provided nuanced insights into both attachment orientations that were measured, compared to the 4FM. For instance, while narcissism showed a significant negative association with anxious attachment in the 4FM, there was no such association with grandiose exhibitionism (a component of the D5-SD4). Nickisch et al. (2020) suggested that narcissism's agentic nature might explain the negative association with anxious attachment. However, Ackerman et al. (2011) highlight an agentic and maladaptive divide between leadership and grandiose exhibitionism dimensions of narcissism. Thus, our version of grandiose exhibitionism may also lack this agentic component, explaining the change in predictive outcomes. Other explanations could arise from the partialling effect of regression analyses, perhaps violent voyeurism or indirect sadism share common variance with grandiose exhibitionism and this was removed by the regression analysis. Such variance could be explained partly by self-esteem and/or extraversion

Table 4
Correlation residual matrices for constituting models of the 4-factor model.

	Item 1	Item 2	Item 3	Item 4	Item 5	Item 6	Item 7
Machiavellianism							
Item 1	0.000						
Item 2	0.013	0.000					
Item 3	-0.001	0.011	0.000				
Item 4	0.035	-0.054	0.064	0.000			
Item 5	0.020	-0.009	-0.033	-0.018	0.000		
Item 6	-0.089	0.003	-0.004	-0.028	0.015	0.000	
Item 7	0.001	0.055	-0.096	-0.060	0.101	0.135	0.000
Narcissism							
Item 1	0.000						
Item 2	0.127	0.000					
Item 3	0.011	0.047	0.000				
Item 4	-0.066	-0.047	0.049	0.000			
Item 5	-0.001	-0.029	-0.068	0.054	0.000		
Item 6	-0.016	-0.031	-0.021	-0.010	0.034	0.000	
Item 7	-0.021	-0.007	-0.010	-0.008	-0.028	0.050	0.000
Psychopathy							
Item 1	0.000						
Item 2	0.006	0.000					
Item 3	-0.043	0.035	0.000				
Item 4	0.087	-0.038	0.007	0.000			
Item 5	-0.022	-0.070	-0.028	-0.057	0.000		
Item 6	0.016	0.009	-0.051	-0.003	0.069	0.000	
Item 7	-0.030	0.023	0.075	-0.005	-0.012	-0.031	0.000
Sadism							
Item 1	0.000						
Item 2	0.023	0.000					
Item 3	-0.062	-0.005	0.000				
Item 4	0.036	0.010	-0.029	0.000			
Item 5	-0.057	-0.029	0.163	-0.047	0.000		
Item 6	0.000	-0.033	0.028	-0.015	0.058	0.000	
Item 7	-0.033	-0.037	0.087	-0.055	0.185	0.051	0.000

Note. Values in bold display relationships that may justify respecifications (i.e. values exceeding ±0.10). Items refer to Paulhus et al.'s (2021) scale.

(Nickisch et al., 2020), however due to the lack of nomological explorations of the sadism factors, it is difficult to determine the reason conclusively. Additionally, the significance of psychopathy and sadism shifted from the 4FM to the D5-SD4. Psychopathy became non-significant, while the two sadism factors had inverse significant associations with anxious attachment. This finding may also highlight one of the shortcomings of scales with Jangle. As previously described, the fact that the 4FM does not discriminate between psychopathy and sadism may have led to the erroneous detection of a psychopathy-anxious attachment link. Sadism may have been harboring the association, as demonstrated by the D5-SD4. Furthermore, the inverse significant associations of both sadism factors with anxious attachment suggest that, beyond their similarities, these factors may be characteristically dissimilar. Perhaps indirect sadism's positive association with anxious attachment suggests it is the 'darker' facet given anxious attachment's association with maladaptive outcomes (see Nickisch et al., 2020).

4.3. Implications, limitations, and future directions

The model fit and psycho-sadism Jangle issues highlight concerns about the SD4's use in future research. Additionally, our interpretation of the 'Henny Penny' problem (Hopwood & Donnellan, 2010) and the factor-analytic approach focus on addressing fundamental structural issues, offering a framework for more comprehensive evaluations of factor validity in future personality studies.

Aligning with Kay and Arrow's (2022) 'elemental approach' the D5-SD4 was introduced, possibly enabling measurement of psychopathy, specific dimensions of Machiavellianism and narcissism, and a two-dimensional approach to sadism. This model appears to resolve the

psycho-sadism Jangle issue which may facilitate future research into these personalities as separate constructs. However, it is important to note that the D5-SD4 may have several limitations. First, the model remains exploratory, as it has not been replicated in other samples. Second, one might argue that the model lacks parsimony (see Andrews et al., 2024), although we believe that resolving the psycho-sadism Jangle problem justifies the increase in complexity. Third, our approach prioritized theoretically significant factors, as done in previous research (e.g., Ackerman et al., 2011), resulting in coalition-building and indirect sadism factors having low internal reliability values. Nonetheless, as Ziegler et al. (2014) notes, this is common with brief measures.

We urge the authors of the SD4 to consider Kay and Arrow's (2022) 'elemental approach' and the promising results of the D5-SD4 by potentially adding items to improve internal reliability and additional dimensions. Future researchers should also test the 4FM using the framework established here and seek to replicate the D5-SD4 in diverse samples. Further exploration into the differences between violent voyeurism and indirect sadism is also warranted. We encourage, researchers studying the Dark Tetrad to consider alternative multi-dimensional measures.

5. Conclusion

The present paper provides evidence that the SD4 (Paulhus et al., 2021) fits poorly to the proposed 4FM. Preliminary evidence that an exploratory Dark Five model of the SD4 (D5-SD4) has superior fit is presented. This model differentiates psychopathy from sadism by introducing a violent voyeurism factor, which is distinct from indirect

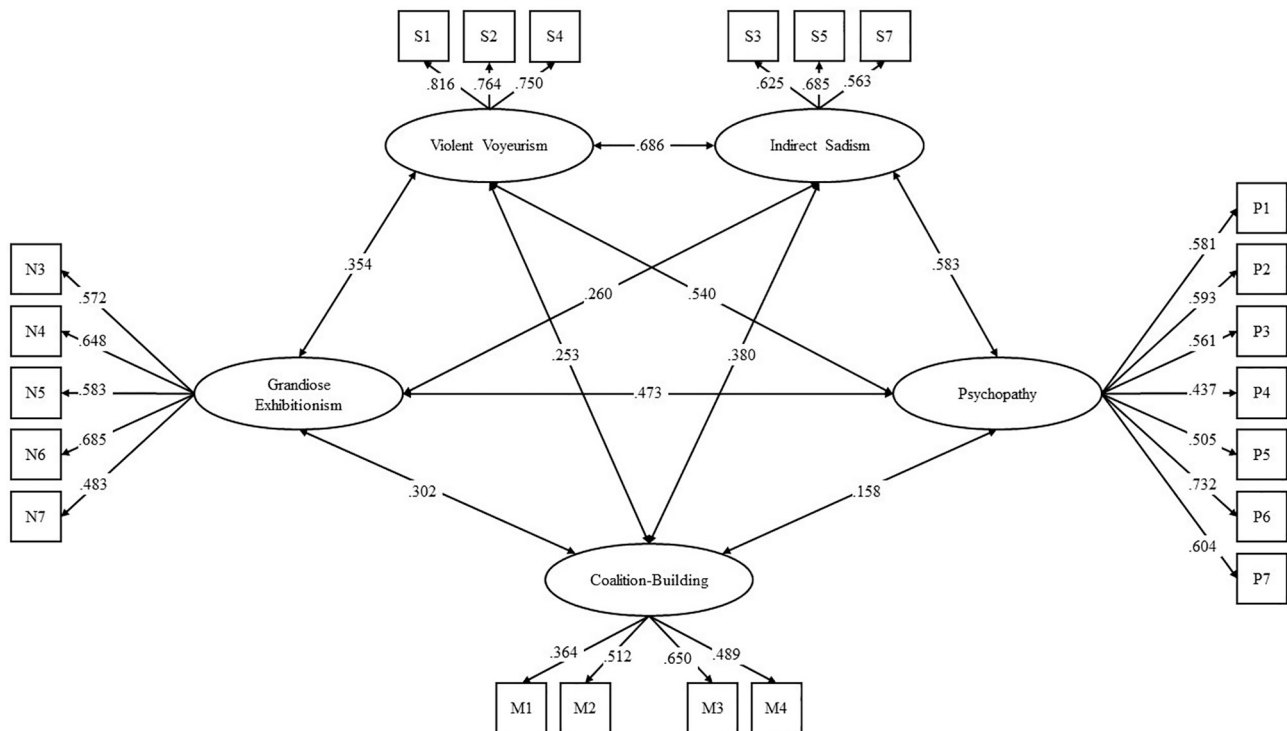


Fig. 2. 5-Factor model.

Note. All values are standardized and significant ($p < .050$). Double-headed arrows indicate inter-factor correlations; single-headed arrows indicate factor loadings. Item labels refer to Paulhus et al.'s (2021) scale.

sadism, as shown by their contrasting associations with anxious attachment orientation. We encourage further efforts to test the D5-SD4 in other samples. However, we recommend that future researchers exploring the Dark Tetrad consider using alternative measures.

CRedit authorship contribution statement

J.J. Crawford: Writing – review & editing, Writing – original draft, Methodology, Formal analysis, Conceptualization. **C. Smyth:** Writing – review & editing, Supervision. **B.P. Crossey:** Writing – review & editing. **D. Waldeck:** Writing – review & editing, Data curation.

Declaration of competing interest

None.

Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.paid.2024.112971>.

Data availability

Data will be made available on request.

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