Article

Revisiting the Structure of the Short Dark Triad

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Abstract

In the past decade, extensive interest has been directed toward the Dark Triad (i.e., Machiavellianism, narcissism, and psychopathy), popularly assessed by the Short Dark Triad (SD3). Nevertheless, relatively little research has been conducted on the SD3's factor structure. We investigated the SD3's psychometric properties in three studies with three independent samples, using exploratory and confirmatory factor analyses (N_1 = 1,487; N_2 = 17,740; N_3 = 496). In all three studies, Machiavellianism and psychopathy items displayed large general factor loadings, and narcissism larger specific factor loadings. In subsequent studies, two- and three-factor models fitted the data similarly, with the best fitting model being a bifactor model with items from Machiavellianism and psychopathy modelled as one specific factor, and narcissism as a second specific factor. On this basis, we suggest that the SD3 does not seem to capture the different mental processes theorized to underlie the similar behaviors generated by Machiavellianism and psychopathy. Additionally, we recommend the use of a single SD3 composite score, and not subscale scores, as subscales contain small amounts of reliable variance beyond the general factor.

Keywords

Dark Triad, SD3, factor analysis, psychopathy, Machiavellianism, narcissism

In recent years, a great deal of interest has been directed toward abnormal personality traits and so-called "dark" patterns of behavior, goals, and values (i.e., character). One of the more popular constructs is the Dark Triad (DT; Paulhus & Williams, 2002), which encompasses Machiavellianism, narcissism, and psychopathy. These three traits are characterized by glib social charm, manipulativeness (i.e., Machiavellianism), entitlement, superiority, dominance (i.e., narcissism), callous social attitudes, impulsivity, and interpersonal antagonism (i.e., psychopathy). The DT has proved valuable in studies pertaining to impulsivity (Jones & Paulhus, 2011), unethical behavior (Roeser et al., 2016), personal values (Garcia & Rosenberg, 2016; Kajonius, Persson, & Jonason, 2015), work-related behaviors (O'Boyle, Forsyth, Banks, & McDaniel, 2012), as well as antisocial behaviors (for reviews, see Furnham, Richards, & Paulhus, 2013; Paulhus, 2014).

Despite its popularity, assessment of the DT has not been without difficulties. Most research has used separate measures for each of the DT constructs, predominantly the Mach-IV (Christie & Geis, 1970), the Self-Report Psychopathy Scale (SRP-III; Paulhus, Neumann, & Hare, 2014), and the Narcissistic Personality Inventory (NPI; Raskin & Hall, 1979), in combination constituting more than 120 items (Maples, Lamkin, & Miller, 2014). In efforts to shorten the time required for data collection, measures such as the Dirty Dozen (DD; Jonason & Webster, 2010) and Short Dark Triad (SD3; Jones & Paulhus, 2014), consisting of 12 and 27 items, respectively, have been created. Previous studies on the DD have arrived at contrasting conclusions. For instance, its construct validity has been disputed, as using merely four items per factor may remove essential content in relation to longer measures (Miller et al., 2012). Others have argued that there is a fine line between efficiency and accuracy, and that the DD could be said to walk that fine line (Jonason & Luévano, 2013). A recent study has proposed that the DD may be more two-dimensional than three-dimensional in its structure, and that Machiavellianism and psychopathy may be sharing the same core, namely callous exploitation of others (Kajonius, Persson, Rosenberg, & Garcia, 2016; see also, Miller, Hyatt, Maples-Keller, Carter, & Lynam, 2016). Thus far, the SD3 has not been subjected to the same level of scrutiny, despite its increasing popularity in recent research.

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The three DT traits reflect complex psychological phenomena, which gives rise to difficulties in both conceptualization and assessment. Both theoretical and structural evidence reflect these problems in all three constructs. Regarding Machiavellianism, there is a lack of agreement concerning the factor structure of the most commonly used measure, the Mach-IV (see e.g., Christie & Geis, 1970; Hunter, Gerbing, & Boster, 1982; Panitz, 1989; Rauthmann, 2013; Rauthmann & Will, 2011). The most commonly used measure of narcissism in subclinical samples has been the NPI (Raskin & Hall, 1979), which has been criticized for being used too frequently (R. P. Brown, Budzek, & Tamborski, 2009; Cain, Pincus, & Ansell, 2008). Furthermore, there is an ongoing discussion about the role of vulnerability contra grandiosity and how those trait expressions relate to the narcissism construct as a whole (Cain et al., 2008; Egan, Chan, & Shorter, 2014; Miller, Lynam, & Campbell, 2016; Wright, 2016). Finally, psychopathy is arguably the most successfully assessed of the dark traits, but problems arise when clinical and subclinical conceptualizations are juxtaposed. For instance, there is a lack of consensus concerning what subclinical (or successful) psychopathy actually refers to (Glenn & Raine, 2014), as well as substantial disagreement, even among experts, about which traits are central to psychopathy (see e.g., Crego & Widiger, 2016; Lilienfeld, Watts, & Smith, 2015; Miller & Lynam, 2015).

An overarching problem is that all three constructs partially overlap, and arguments have been made that some psychopathy measures mistakenly subsume Machiavellianism and narcissism (Furnham et al., 2013). Others have argued that Machiavellianism and psychopathy are conceptually similar, even to the point of being the same thing (see, Garcia & Rosenberg, 2016; Glenn & Sellbom, 2015; McHoskey, Worzel, & Szyarto, 1998). This supposed relation between Machiavellianism and psychopathy has recently been explicitly tested, resulting in negligible changes in model fit when Machiavellianism and psychopathy items were subsumed under the same factor (Miller, Hyatt, et al., 2016). A limitation of this study was that composite scores were modelled, which may remove essential item-level variance from the analysis.

Keeping these problems in mind, one of the points made in the seminal DT article (Paulhus & Williams, 2002), was that the three DT dimensions, although similar, reflect different psychological phenomena. This is supported by the fact that the DT constructs relate to different outcomes (e.g., Birkás, Gács, & Csathó, 2016; Furnham et al., 2013; Kajonius et al., 2015; Roeser et al., 2016). However, much of this research has been conducted on moderate sample sizes, which may result in spurious correlations. Additionally, the partialling of variance that is commonly used in DT analyses may be insufficient if the underlying variables are multicollinear to begin with.

Overview of the Present Studies

With controversy abound, assessment of the DT requires sophisticated statistical treatment. Accordingly, we extend the validation process (Cronbach & Meehl, 1955; Strauss & Smith, 2009) of the SD3 by the application of both exploratory and confirmatory factor analytic models. We put particular focus on the relation between Machiavellianism and psychopathy and explicitly test whether these two constructs can be viewed as a single construct. We present three studies (Study 1: $N = 1{,}487$; Study 2: $N = 17{,}740$; Study 3: $N = 496$) aimed at exploring the construct validity of the SD3. In Study 1, we use exploratory factor analysis (EFA) as a first step in describing the SD3's dimensionality, which includes replicating the original factor structure (Jones & Paulhus, 2014), and investigating a bifactor structure, which has been applied in previous DT research (Jonason & Luévano, 2013; Kajonius et al., 2016). In Study 2, we use confirmatory factor analysis (CFA) to test five specific models: Model A—a unidimensional model with all 27 items loading on one factor, Model B—a correlated two-factor model where items from psychopathy and Machiavellianism were subsumed under one factor, Model C—a correlated three-factor model, Model D—a bifactor model with two specific factors, and Model E—a bifactor model with three specific factors (see Figure 1). No previous study has compared prespecified confirmatory models of the SD3. In Study 3, we replicate and compare the two best fitting CFA models (Models D and E) in relation to stand-alone measures of the DT. In this way, the present studies were designed to provide insight into the nature of the latent factors underlying the SD3.

Statistical Treatment

As the central question of concern is whether Machiavellianism and psychopathy are distinguishable, we calculate a number of statistical indices aimed at evaluating subscale reliability and unidimensionality. A commonly used strategy is to use Cronbach's alpha for calculation of both total and subscale estimates of reliability. Despite its frequent use, many have documented the issues with Cronbach's alpha (e.g., Dunn, Baguley, & Brunsden, 2014; Schmitt, 1996). For the present purposes, the main issue with Cronbach's alpha is that it reflects the reliability of all sources of variance, as opposed to partitioning reliable variance from different sources (i.e., general, group, and specific sources; see Rodriguez, Reise, & Haviland, 2016b).

Accordingly, we compute omega (ω) indices, which are model-based reliability indices that can be calculated using either exploratory or confirmatory factor analytic models. The benefits of omega over alpha are well-documented (e.g., Dunn et al., 2014; Revelle & Zinbarg, 2009; Rodriguez et al., 2016b; Zinbarg, Revelle, Yovel, & Li,

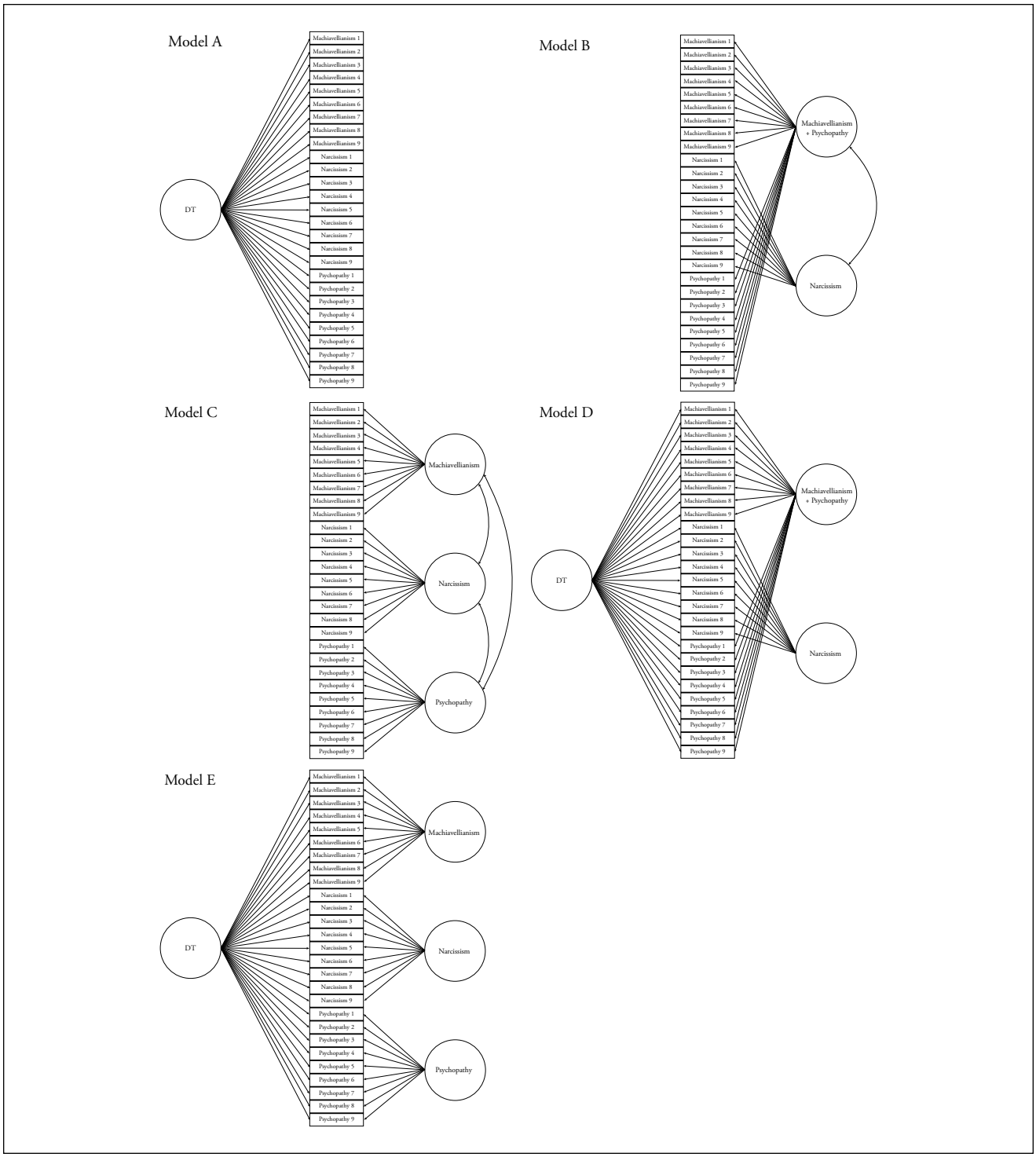

Figure 1. Five confirmatory factor analytic models tested for the Short Dark Triad (SD3).

2005). One benefit with omega is that variance from different sources can be partitioned to assess reliable variance in subscales (see, Rodriguez et al., 2016b), which can be used for scoring recommendations (e.g., Gignac, Palmer, & Stough, 2007).

In all three studies we computed: (a) *omega total* (ω_{Total}), which is an estimate of the proportion of total score variance attributable to all sources of common variance in a given model, (b) *omega hierarchical* ($\omega_{Hierarchical}$ or ω_H), which provides information about the proportion of

variance in total scores accounted for by the general factor, and (c) *omega hierarchical subscale* (ω_{HS}), which reflects the reliability of a subscale after reliable variance from the general factor has been removed.

In addition to the omega indices, we computed *explained common variance* (ECV) and *item explained common variance* (I-ECV). The ECV is a measure of the percent of common variance explained by the general factor. When the ECV is high, the general factor accounts for most of the common variance. Tentative guidelines have been proposed that ECV values >.70 indicate that factor loadings are relatively unbiased when multidimensional data are forced into a unidimensional framework (Rodriguez, Reise, & Haviland, 2016a). Accordingly, ECV is a measure for what is sometimes referred to as "essential unidimensionality" (Rodriguez et al., 2016b). The I-ECV is the percent of common variance for each item that is attributable to the general factor and can be used at the item level for determining to what extent an item taps into general (e.g., general dark trait) and specific domains (e.g., narcissism). These indices are described in greater detail in Rodriguez et al. (2016b).

Study 1: Exploratory Factor Analysis

Although exploratory models have already been tested by others (Jones & Paulhus, 2014), we decided to attempt a replication of their results, as we believe that EFA can be an informative statistical procedure (Gerbing & Hamilton, 1996; Reise, 2012), if interpreted with appropriate caution (Costello & Osborne, 2005). Additionally, we were interested in exploring a bifactor structure on the basis of previous theorization suggesting a common DT core, such as callousness (Jones & Figueredo, 2013), deceptiveness (Giammarco, Atkinson, Baughman, Veselka, & Vernon, 2013), low agreeableness (Jakobwitz & Egan, 2006), or low Honesty-Humility (Lee & Ashton, 2005). While a general factor will not provide information about common etiology, it can provide information about common themes inherent in the construct. Furthermore, bifactor models are particularly apt for assessing the presence of a general factor (Revelle & Wilt, 2013), and consequently assessing the multidimensionality beyond a general factor (Reise, 2012). The general factor is referred to as DT, or the general factor, throughout this article.

Method

Ethical Statement. After consulting with the Network for Empowerment and Well-Being's Review Board the consensus was that the design of the present study (e.g., all participants' data were anonymous and will not be used for commercial or other nonscientific purposes) required only informed consent from the participants.

Table 1. Descriptive Statistics for the Short Dark Triad Divided by Sex (Men/Women) in Study 1.

	M	*SD*	*t*	*d*
Machiavellianism	3.19/2.92	0.68/0.66	7.48	0.39
Narcissism	2.88/2.63	0.66/0.65	7.36	0.39
Psychopathy	2.18/1.72	0.64/0.53	14.69	0.80

Note. N_{men} = 608, N_{women} = 879. Pooled variance for Cohen's *d* was used. Men are listed first. All *t*-values are significant at $p < .001$.

Participants. The participant data (N = 1,487, n_{men} = 608, n_{women} = 879) was collected through Amazon's Mechanical Turk (MTurk), which has demonstrated reliability and validity, providing a wider range of socioeconomic backgrounds compared with, for instance, student samples (Casler, Bickel, & Hackett, 2013). However, recent research has shown that MTurk participants differ from the general population, especially in terms of being more socially anxious (Arditte, Çek, Shaw, & Timpano, 2016).

The MTurk workers received 50 cents (U.S. dollars) as compensation for participating and only residents of the United States were allowed to accept participation. Two control questions were added to the survey, to control for inattention. A total of 20 participants responded erroneously to one or both of the control questions and were thus eliminated. Mean age was 33.28 years, SD = 11.66. A preliminary validating sample characteristic was that men scored higher on all DT traits than women, as summarized in Table 1.

Measures

Short Dark Triad (SD3). The SD3 (Jones & Paulhus, 2014) consists of 27 items that are rated on a 5-point Likert-type scale (1 = *Strongly disagree* and 5 = *Strongly agree*). The items consist of statements such as "Most people can be manipulated" (i.e., Machiavellianism) and "Many group activities tend to be dull without me" (i.e., narcissism). The items were averaged to create indices for Machiavellianism, narcissism, psychopathy, and a composite score for the entire SD3. Machiavellianism correlated r = .31 with narcissism and r = .53 with psychopathy. Narcissism and psychopathy correlated r = .39. The SD3 composite correlated r = .83, .73, and .81 with Machiavellianism, narcissism, and psychopathy, respectively. Descriptive statistics for the SD3 are reported in Table 1.

Statistical Analysis and Results

The first purpose was to replicate the original factor structure (Jones & Paulhus, 2014) of the SD3 using the same EFA procedure used in their first study. Second, we applied an exploratory bifactor analysis, which is the application of a Schmid–Leiman (Schmid & Leiman, 1957) rotation, to

Table 2. Model Fit Comparison of Exploratory Factor Analytic Models in Study 1.

Model	χ^2	*df*	TLI	RMSEA [90% CI]
Two-factor	3780.047	298	.763	.077 [.074, .079]
Three-factor	1565.815	273	.847	.062 [.059, .064]
Four-factor	1131.574	249	.872	.056 [.053, .059]
Five-factor	797.429	226	.897	.050 [.047, .053]
Six-factor	611.682	204	.909	.048 [.044, .050]
Seven-factor	474.523	183	.921	.044 [.040, .047]

Note. TLI = Tucker–Lewis index, RMSEA = root mean square error of approximation; CI = confidence interval.

investigate the influence of a general factor on a test (Revelle & Wilt, 2013).

To deal with the issue of how many factors to extract, we followed Jones and Paulhus (2014) in using two recommended techniques (O'Connor, 2000), both available in the R library *psych* (Revelle, 2015). First, a parallel analysis of the polychoric correlation matrix suggested that seven factors was the best solution. The first seven eigenvalues from the parallel analysis were 6.50, 1.79, 1.12, 0.43, 0.31, 0.20, and 0.12. Second, Velicer's MAP indicated that a three-factor solution was optimal.[1]

We subsequently generated promax-rotated solutions on the polychoric correlation matrix (see, Holgado-Tello, Chacón-Moscoso, Barbero-García, & Vila-Abad, 2010), ranging from two to seven factors using the minimum residual method. We did not manage to meaningfully interpret any of the solutions beyond three factors. Using more than three factors created structures in which the items from the three theorized factors essentially split into, as far as we can determine, arbitrary dimensions with several cross-loadings (e.g., a five-factor solution in which the psychopathy items load onto all five factors). The three-factor solution explained 36% of the variance in the indicators. We report fit indices for the EFA models in Table 2. With the inclusion of more factors the model fit increases, which is expected, as more nuisance variance is fitted.

Previous research has shown that SD3 factor intercorrelations are always positive and generally large (Furnham, Richards, Rangel, & Jones, 2014). Although we had similar results with composite score correlations, our three-factor EFA solution generated more modest latent variable correlations. The Machiavellianism factor correlated .06 with psychopathy, and .21 with narcissism.[2] Narcissism and psychopathy correlated .48. Furthermore, the communalities were generally low (M_{h2} = .36, range: [.14, .62]), indicating that the variables share relatively little variance. The factor loadings were similar to those of Jones and Paulhus (2014).[3] We report these results in Table 3.

Having replicated Jones and Paulhus's (2014) EFA results, we expanded the study by conducting an exploratory bifactor analysis using the command "omega" in the R library *psych* (Revelle, 2015). This type of analysis can be used for determining general factor saturation (Revelle & Wilt, 2013). Using the omega command it is possible to generate a Schmid–Leiman transformation in which each scale (i.e., SD3 specific factors) is represented by a general factor and a residualized group factor. Using this procedure, we generated a solution with a general factor and three specific factors based on the polychoric correlation matrix. The model fit was acceptable: $\chi^2(273) = 1794.55$, $p < .001$, RMSEA = .062 (90% CI [.059, .064]).

Model-based full-scale reliability, or ω_{Total} was .90 (Cronbach's alpha was .88) in our analysis, meaning that 10% of the variance in total score was attributable to random error. We found that general factor saturation was relatively high, with an ω_H of .73, compared with many other personality trait instruments where ω_H tends to be estimated around .30 to .40 (Revelle & Wilt, 2013). Although no strong guidelines have been advocated, a tentative proposal of ω_H values above .50 and preferably closer to .75, could be used as indication of a general factor (Reise, Bonifay, & Haviland, 2013). On the subscale level ω_{HS} was .50 for the narcissism factor, but 0 and .01 for the other two factors. This indicates that when the general factor is controlled for, reliable subscale variance for Machiavellianism and psychopathy is lacking. The low ω_{HS} values on the Machiavellianism and psychopathy factors are caused by loadings smaller than .10 on the psychopathy factor, and orthogonality on the Machiavellianism factor, where positive and negative loadings cancel each other out (cf. Table 3).

Whereas ω_H informs us about the reliable variance in composite scores that can be attributable to the general factor, we also calculated ECV, which tells us about the relative strength of general and specific factors. The ECV in our analysis was .62, which means that the general factor accounts for 62% of the common variance, with 38% attributable to specific factors. Higher ECV values indicate higher influence of a general factor. An ECV of .62 indicates that the general factor accounted for more than half of the common variance, but the ECV is not high enough to reach tentative guidelines of .70 or higher (Rodriguez et al., 2016a), suggesting that the SD3 is not essentially unidimensional.

When examining the factor structure closely, we found that the relatively high ECV and ω_H values were caused by the Machiavellianism and psychopathy items. This result can be described in two different ways. First, the mean of all the general factor loadings was .42, but only .23 for the narcissism items. Second, the mean I-ECV for all items was .54, but a modest .21 for narcissism, .63 for Machiavellianism and .78 for psychopathy. Taken together with the factor loadings (cf. Table 3), this pattern can be interpreted as the presence of a general factor. However, what is also evident is that the Machiavellianism and psychopathy items contribute more to the general factor than the narcissism items. On the basis of these analyses, we concluded that a bifactor model may be

Table 3. Oblique and Bifactor Exploratory Factor Analysis of the SD3 in Study 1.

	Oblique Model				Bifactor Model (Omega)				
	Mach	Narc	Psych	h^2	DT	Mach	Narc	Psych	I-ECV
Machiavellianism 1	.45	-.07	-.07	.20	.24	.37	-.05	.01	.28
Machiavellianism 2	.47	-.01	.08	.22	.38	.27	.02	.02	.66
Machiavellianism 3	.42	.35	.00	.36	.44	.25	.34	.02	.54
Machiavellianism 4	.37	.29	-.17	.24	.26	.34	.27	.01	.27
Machiavellianism 5	.67	-.01	.37	.62	.75	.22	.05	.05	.91
Machiavellianism 6	.64	-.11	.46	.59	.75	.15	-.04	.05	.95
Machiavellianism 7	.55	-.07	-.04	.29	.34	.41	-.04	.02	.39
Machiavellianism 8	.52	.09	.14	.33	.51	.26	.12	.03	.77
Machiavellianism 9	.48	.05	.24	.33	.54	.17	.08	.03	.89
Narcissism 1	-.09	.61	-.12	.30	.09	-.05	.53	-.01	.03
Narcissism 2	-.22	.53	.07	.32	.10	-.27	.47	.00	.03
Narcissism 3	.04	.55	.13	.40	.35	-.13	.51	.01	.30
Narcissism 4	.05	.62	-.10	.35	.22	.02	.55	.00	.13
Narcissism 5	.18	.68	-.17	.47	.28	.16	.61	.00	.17
Narcissism 6	-.21	.52	-.07	.24	.01	-.16	.45	-.01	.00
Narcissism 7	.10	.36	.20	.26	.36	-.11	.34	.02	.50
Narcissism 8	-.06	.29	.24	.20	.25	-.24	.27	.01	.31
Narcissism 9	.30	.48	-.03	.36	.39	.16	.44	.01	.41
Psychopathy 1	.41	-.16	.69	.57	.73	-.15	-.08	.06	.94
Psychopathy 2	-.18	.07	.46	.27	.24	-.45	.08	.02	.21
Psychopathy 3	.54	-.11	.55	.56	.74	.02	-.04	.05	.99
Psychopathy 4	.27	-.08	.65	.47	.64	-.24	-.02	.05	.88
Psychopathy 5	.15	.12	.50	.36	.52	-.24	.15	.03	.76
Psychopathy 6	.51	.11	.38	.51	.69	.08	.15	.04	.94
Psychopathy 7	-.05	-.01	.38	.14	.24	-.29	.02	.02	.41
Psychopathy 8	.29	.00	.50	.36	.58	-.13	.04	.04	.94
Psychopathy 9	.44	.13	.44	.50	.68	.00	.17	.04	.94

Note. N = 1,487, h^2 = communalities, DT = general factor, I-ECV = Item explained common variance. The pattern matrix is reported in the Promax solution, and Schmid-Leiman rotated loadings in the case of the bifactor model. Loadings smaller than .20 have been marked in gray.

appropriate for the SD3, and further that Machiavellianism and psychopathy may be subsumable under one factor. We explicitly test these hypotheses in Study 2.

Study 2: Confirmatory Factor Analysis

In Study 2, we specify five different CFA models aimed at testing whether Machiavellianism and psychopathy can be subsumed in one factor, or are better modeled as two distinct factors. In the personality context, there are well-known problems with the application of CFA (see Hopwood & Donnellan, 2010). For instance, common standards for model fit are often violated, even for constructs that are theoretically unidimensional (e.g., Slocum-Gori, Zumbo, Michalos, & Diener, 2009). These violations occur because of substantial cross-loadings not accounted for, correlated residuals that are not explicitly modelled, and more generally because standards for model fit are somewhat arbitrary. In spite of these problems, personality trait instruments show remarkable criterion-related validity (Grucza & Goldberg, 2007).

Method

The data used in this study are publicly available (http://www.personality-testing.info/_rawdata). A total of 18,192 respondents have filled out the SD3 (Jones & Paulhus, 2014). The only information available about the respondents is a country variable (based on IP address) and how they accessed the website. Although participants originated from a great number of countries, substantial contributors were the United States (n = 8,679), Great Britain (n = 2,688), Canada (n = 1,126), and Australia (n = 720). We removed all cases of missing values as a method of removing inattentive participants, yielding a final sample of N = 17,740.

Statistical Treatment

Before testing the five prespecified models, we first conducted unidimensional CFA models for each DT construct, respectively. We were interested in the degree of misfit in unidimensional models, because of the ambiguity shown in

Table 4. Model Fit Comparison of Confirmatory Factor Analytic Models in Study 2.

Model	χ^2	SBχ^2	*df*	CFI	TLI	RMSEA [90% CI]
Machiavellianism	2395.76	5212.69	27	.981	.974	.104 [.101, .108]
Narcissism	1642.00	2999.39	27	.974	.965	.079 [.076, .082]
Psychopathy	2381.01	4383.88	27	.966	.954	.095 [.092, .099]
Model A	49756.81	86801.30	324	.923	.916	.123 [.122, .124]
Model B	35834.36	62246.65	323	.945	.940	.104 [.103, .105]
Model C	33550.79	58684.09	321	.948	.943	.101 [.100, .102]
Model D	**16651.80**	**32897.71**	**297**	**.971**	**.966**	**.079 [.078, .080]**
Model E	17878.13	34204.64	297	.970	.964	.080 [.079, .081]

Note. Machiavellianism, narcissism, and psychopathy refers to the three initial unidimensional models with nine items, respectively. Model A is a unidimensional model fitting all 27 items. Model B is a correlated two-factor model with Machiavellianism and psychopathy as one factor, and narcissism as a second factor. Model C is a correlated three-factor model. Model D is a bifactor model with two specific factors (bifactor variant of Model B). Model E is a bifactor model with three specific factors. Models A to E are depicted in Figure 1. SBχ2 = Satorra–Bentler scaled chi-square; CFI = comparative fit index; TLI = Tucker–Lewis index; RMSEA = root mean square error of approximation; CI = confidence interval. Boldface denotes the best fitting model.

the factor extraction in Study 1. We subsequently generated five different CFA models (see Figure 1): Model A—a unidimensional model with all 27 items loading on one factor, Model B—a correlated two-factor model where psychopathy and Machiavellianism items were subsumed under one factor, Model C—a correlated three-factor model, Model D—a bifactor model with two specific factors (i.e., the same logic as Model B), and Model E—a bifactor model with three specific factors. At first, Model D did not converge and factor variances had to be fixed to one for convergence.

Because SD3 items are assessed on a 5-point Likert-type scale, they were treated as categorical and were analyzed using a diagonally weighted least squares (DWLS) estimator with robust standard errors and a Satorra–Bentler scaled test-statistic (SBχ^2), which is appropriate when multivariate normality is not met.[4] This approach assumes a normally distributed continuous latent variable. All analyses were conducted in the R library *lavaan* Version 0.5-20 (Rosseel, 2012), in which the estimator is called "WLSM."

Results

The three initial unidimensional CFAs for each respective factor yielded good, but not great, model fit. Because the χ^2 is sensitive to sample size it is not used as a sole indication of model fit here. Instead, we rely on the robust versions of the Tucker–Lewis index (TLI; Tucker & Lewis, 1973), comparative fit index (CFI; Bentler, 1990), and root mean square error of approximation (RMSEA; Steiger, 1990). Traditional cutoffs for good model fit for TLI and CFI are > .95, and RMSEA values < .06 (Hu & Bentler, 1999), although strict reliance on fit indices do not guarantee correct model specification (Ropovik, 2015). In the three initial models, model fit for each respective factor was acceptable but not excellent (see Table 4). On closer inspection, it was evident that the relatively high RMSEAs were caused by local strain (i.e., relatively large residuals), which we believe is caused by multidimensionality within each construct (cf. Study 1, where EFA models with more than three factors yield uninterpretable, but statistically superior, solutions and consequently expected misfit in CFA). Rather than applying ad hoc modifications or dropping indicators, which are known to be problematic (MacCallum, 1986), we decided to continue with the model testing procedure, but we caution the reader that model fit must be interpreted with care.

The five main CFAs demonstrate that a bifactor model with two specific factors (i.e., Model D) best fits the data (model fit indices are reported in Table 4). Models D and E are on the borderline of conventional standards for fit adequacy (Hu & Bentler, 1999), with TLI and CFI > .95, but RMSEA > .06. The differences in fit between Models D and E is negligible. Accordingly, for the remainder of the "Results" section we compare Models D and E, as they are both informative representations of the data. Before going into details, it is noteworthy that the factor correlation between Machiavellianism and psychopathy was .90 in Model C, which is arguably high enough to call into question "the notion that the factors represent distinct constructs" (T. A. Brown, 2015, p. 116). However, advocates of exploratory structural equation modelling (ESEM) have argued that factor covariance is often inflated in CFA solutions in the personality domain (Marsh, Morin, Parker, & Kaur, 2014). Additionally, all four models used for comparing two- and three-factor models (i.e., Models B and C, and Models D and E) are roughly equivalent in terms of fit, which is consistent with a previous study that has called into question the distinction between psychopathy and Machiavellianism (Miller, Hyatt, et al., 2016). It should be emphasized that similar model fit does not prove a model to be correct, although in this case the better fitting model is also more parsimonious. Even when model fit is perfect,

one can only conclude that the model is a plausible representation of the data (Roberts & Pashler, 2000; Tomarken & Waller, 2003).

In Model D, six out of nine psychopathy items had small loadings on the combined Machiavellianism and psychopathy factor, and the other three loadings were negative. The Machiavellianism items loaded more significantly on the combined factor, with five items having loadings above .40. R^2-statistics suggest that indicators in Model E deliver slightly more information, as the mean R^2 is .44 in Model D, and .46 in Model E. We also calculated ω_H, which for Model D was .85, and .83 for Model E. In both cases, this number suggests that a large proportion of reliable variance is attributable to the general factor. In fact, ω_{total} was .94 in both models, which means that for Model D the reliable variance in total scores attributable to the general factor is .85/.94 = 90% (and 88% for Model E). These numbers suggest that almost all the reliable variance in the total score can be attributed to the general factor, and that 8% to 10% of the variance (e.g., .94 − .85 = .09) is caused by group factors, and 6% by random error.

Additionally, we calculated ω_{HS}. In Model D, ω_{HS} for the Machiavellianism–psychopathy factor was .06, and .40 for the narcissism factor. In Model E, ω_{HS} were .19, .41, and .14 for Machiavellianism, narcissism, and psychopathy, respectively. These results suggest that little reliable variance in subscales is accounted for by Machiavellianism and psychopathy, whereas narcissism contains more reliable variance beyond the general factor. The general factor in Models D and E behaved similarly, with narcissism items showing larger loadings on its specific factor than both Machiavellianism and psychopathy, which both loaded mostly on the general factor.

The ECV was .72 in Model D and .70 in Model E, large enough to reach tentative guidelines for unidimensionality (ECV > .70; Rodriguez et al., 2016a), thus suggesting the presence of a strong general factor. However, the mean I-ECV for the narcissism items was .51, and .74 for both Machiavellianism and psychopathy in Model E. Evaluation of general factor saturation thus becomes slightly ambiguous, as the largest general factor loadings come from the Machiavellianism and psychopathy items, while narcissism displays more specific factor variance. It is evident from the factor loadings that the Machiavellianism items have more substantial specific factor loadings than the psychopathy items, but according to the I-ECVs, the majority of that variance is attributable to the general factor. Additionally, the ECV values would have been even higher had narcissism been excluded as well. Taken together, we argue that these findings support the idea that psychopathy and Machiavellianism were subsumable into one factor.

It is also possible that the specific factor variance meaningfully separates the two constructs. Similarly to Study 1, Machiavellianism and psychopathy showed a degree of orthogonality when the general factor had been accounted for. In Model D, only three psychopathy items had meaningful loadings, all of which were negative loadings greater than −.20 (i.e., more negative). Standardized loadings are reported in Table 5. The three items could all be interpreted as being about harmful or dangerous situations where impulsive decision making may be involved (P2 [reversed]: "I avoid dangerous situations."; P4: "People often say I'm out of control."; P7 [reversed]: "I have never gotten into trouble with the law."). In contrast, the Machiavellianism items with highest loadings on the specific factor are about deliberate actions, such as "There are things you should hide from other people to preserve your reputation" (M7). The same pattern emerges in Model E, although the loadings are positive instead of negative, which likely reflects that the items were no longer constrained by the Machiavellianism items.

Taken together, out of the five tested models, a bifactor model with two factors best fits the data. In this model, the general factor saturation was large, and the reliable variance from the combined Machiavellianism and psychopathy factor was small. Narcissism was not as highly saturated by the general factor, consequently resulting in a more statistically meaningful subconstruct.

Study 3: Replication and External Validation

Despite the benefits with the large sample size in Study 2, we have little insight into the sample characteristics. Accordingly, in Study 3, we replicated the factor structure from Study 2 using an additional MTurk sample (N = 496). Specifically, we replicated the two best fitting models (Models D and E), as they were similar in terms of fit. As the contribution of Machiavellianism and psychopathy subscales was small after the general factor had been accounted for, we extract factor scores from both models to investigate how composite scores from stand-alone measures of the DT compare with model-based SD3 scores.

Method

Participants. The procedure was the same as in Study 1. MTurk was again used for data collection and a total of 500 participants were recruited. After having removed participants who did not accurately answer the control questions, the final sample was N = 496 (N_{men} = 195, N_{women} = 301).

Measures

Short Dark Triad. A full description of the SD3 (Jones & Paulhus, 2014) is available under the Study 1 "Method" section.

Dirty Dozen. The DD (Jonason & Webster, 2010) is a 12-item self-report questionnaire which measures the three

Table 5. Standardized Loadings from Confirmatory Bifactor Analyses of the SD3 in Study 2.

	Model D					Model E					
	DT	MP	N	R^2	I-ECV	DT	M	N	P	R^2	I-ECV
Machiavellianism 1	.42	.50		.43	.41	.43	.56			.50	.37
Machiavellianism 2	.77	.24		.64	.91	.79	.14			.65	.97
Machiavellianism 3	.68	.21		.50	.91	.70	.12			.50	.97
Machiavellianism 4	.33	.40		.26	.40	.35	.35			.25	.50
Machiavellianism 5	.74	.40		.72	.77	.78	.33			.71	.85
Machiavellianism 6	.69	.41		.63	.74	.72	.33			.62	.83
Machiavellianism 7	.47	.54		.51	.43	.48	.61			.60	.38
Machiavellianism 8	.66	.26		.50	.87	.68	.18			.50	.93
Machiavellianism 9	.67	.26		.52	.87	.68	.23			.52	.90
Narcissism 1	.36		.48	.37	.36	.36		.49		.37	.35
Narcissism 2	.20		.59	.39	.10	.19		.60		.39	.09
Narcissism 3	.54		.43	.48	.61	.54		.43		.48	.61
Narcissism 4	.45		.45	.41	.50	.45		.45		.41	.50
Narcissism 5	.61		.27	.44	.84	.60		.27		.44	.83
Narcissism 6	.29		.49	.32	.26	.28		.49		.32	.25
Narcissism 7	.44		.43	.38	.51	.44		.43		.38	.51
Narcissism 8	.42		.40	.34	.52	.42		.40		.34	.52
Narcissism 9	.62		.21	.43	.90	.62		.22		.43	.89
Psychopathy 1	.68	.08		.47	.99	.67			.19	.49	.93
Psychopathy 2	.48	-.35		.35	.65	.36			.45	.33	.39
Psychopathy 3	.60	.13		.37	.96	.61			.10	.38	.97
Psychopathy 4	.54	-.21		.34	.87	.45			.38	.35	.58
Psychopathy 5	.63	.15		.42	.95	.65			.09	.43	.98
Psychopathy 6	.75	.09		.56	.99	.75			.08	.58	.99
Psychopathy 7	.33	-.33		.22	.50	.20			.59	.39	.10
Psychopathy 8	.55	-.13		.32	.95	.49			.29	.33	.74
Psychopathy 9	.79	.14		.64	.97	.81			.01	.66	1.00
Mean	.54	.16	.42	.44	.69	.54	.32	.42	.24	.46	.66
Median	.55	.18	.43	.43	.77	.54	.33	.43	.19	.43	.74

Note. N = 17,740. Loadings smaller than .20 have been marked in gray. DT = General factor, MP = Machiavellianism and psychopathy factor, N = Narcissism, P = Psychopathy, I-ECV = Item explained common variance.

DT subfactors with four items per factor. Participants rated how much they agreed (1 = *Strongly disagree*; 7 = *Strongly agree*) with statements such as "I tend to manipulate others to get my way" (i.e., Machiavellianism). Items were averaged to create each dimension. All reliability (internal consistency) estimates for the stand-alone measures are ω_{Total} coefficients and were computed using the R library MBESS Version 4.0 (Kelley, 2015) with 5,000 bootstrap samples.[5] ω_{Total} reliability coefficients (with 95% CI in brackets) were .82 [.79, .85], .76 [.71, .80], and .83 [.80, .85], for Machiavellianism, narcissism, and psychopathy, and .86 [.84, .88] for the DD composite.

Mach-IV. The Mach-IV (Christie & Geis, 1970) consists of 20 items, 10 indicating high Machiavellianism and 10 indicating low Machiavellianism. The items reflect ways of thinking and opinions about people and things. Participants were requested to rate the extent to which they agreed or disagreed with the statements on a 5-point Likert-type scale ranging from (1 = *Strongly disagree*) to (5 = *Strongly agree*). Full scale ω_{Total} was .82 [.79, .85].

Narcissistic Personality Inventory. The NPI-16 (Ames, Rose, & Anderson, 2006) is a 16-item short form of the original 40-item NPI (Raskin & Hall, 1979). The 16 items are forced-choice agreements (or disagreements) with statements such as "I like having authority over people" or its counterpart "I don't mind following orders." The results are coded as 1s and 0s where the former indicates agreement with the narcissistic statement and the latter agreement with the nonnarcissistic statement. Full scale ω_{Total} was .83 [.80, .85].

Eysenck Personality Questionnaire–Revised Short Form (EPQR-S). The EPQR-S (Eysenck, Eysenck, & Barrett, 1985) is an instrument for measuring general personality. It consists of four scales (psychoticism, neuroticism,

extraversion, and a lie scale) with psychoticism being the only one which is reported here. In its original form, the EPQR-S consists of 48 items, 12 for each scale, consisting of questions participants answer by indicating "Yes" or "No," indicating agreement or lack thereof. Because of space requirements, we have chosen to only report psychoticism as a proxy measure for psychopathy. The ω_{Total} was .57 [.50, .62], which is considered poor.

Results

Confirmatory Factor Analysis. We began by replicating Models D and E from Study 2. We were able to confirm that a bifactor structure with two specific factors (i.e., Model D) had slightly better model fit than a model with three specific factors (i.e., Model E). Model fit for Model D was $SB\chi^2(297) = 1326.93$, $p < .001$, TLI = .931, CFI = .941, RMSEA = .084 (90% CI [.078, .090]). Model fit for Model E was $SB\chi^2(297) = 1351.65$, $p < .001$, TLI = .929, CFI = .940, RMSEA = .085 (90% CI [.079, .091]). Both models fit worse than in Study 2. Coefficient ω_H was lower in comparison with Study 2. In Model D, ω_H was .74, and it was .75 in Model E. In Model D, ω_{HS} was .15 for the combined Machiavellianism–psychopathy factor, and .58 for the narcissism factor. In Model E, ω_{HS} were .24, .60, and .18 for Machiavellianism, narcissism, and psychopathy. These numbers were slightly higher than in Study 2. The ECV was .61 for Model D and .60 for Model E, which are lower than in Study 2. Importantly, however, was that the same general pattern emerged, insofar as the largest general factor loadings came from the psychopathy factor, and the smallest from the narcissism factor. Standardized factor loadings from Study 3 are reported as supplementary information.

As a follow-up, we extracted factor scores from both Models D and E. We then computed zero-order correlations between factor scores and stand-alone measures of the DT. In this case, the factor scores essentially function as a partial correlation, where variance from the general factor has been partialled out from the specific factors. The correlations between both Machiavellianism and psychopathy scores with stand-alone measures were consistently lower than for the general factor, which was not true for narcissism in relation to the NPI. The difference in effect size between Machiavellianism and psychopathy factor scores with the respective DD composites is negligible and higher for the general DT factor for all three constructs. When Machiavellianism and psychopathy are modelled together in Model D, the effect size for the external correlates increase in comparison with when they are modelled separately. These correlations are presented in Table 6. Although factor scores are by no means infallible, taken together, these analyses suggest that the general factor delivers reliable information across all three constructs. Across all studies, ω_{HS} values indicate that narcissism provides slightly more subscale information than does Machiavellianism and psychopathy, but the reliable variance in narcissism (ω_{HS} = .40-.60) is still quite low. Most of the variance is attributable to the general factor, which means that reporting subscale composite scores is not recommended, although this recommendation needs additional validation in other samples. It should be noted that the ω_{HS} index has no established cutoff. Gignac and Watkins (2013) has stated that for "estimates substantially less than .50, the meaningful interpretation of index scores is arguably impossible" (p. 658). Accordingly, SD3 narcissism could be said to be on the borderline of being a meaningful subscale.

Table 6. Zero-order Correlations between Factor Scores and Standalone Dark Triad Measures in Study 3.

	Model D			Model E			
Composite Scores	DT	MP	N	DT	M	N	P
Mach-IV	.57	.44	-.02	.61	.34	-.03	.14
NPI	.46	.03	.64	.44	-.03	.64	.10
EPQRS-P	.43	.07	.13	.39	.03	.15	.30
DD Machiavellianism	.64	.28	.08	.63	.21	.09	.23
DD Narcissism	.50	.07	.37	.47	.03	.38	.08
DD Psychopathy	.59	.33	-.06	.61	.22	-.05	.21

Note. $N = 496$. DT = General factor, MP = Machiavellianism and psychopathy factor, N = Narcissism. DD = Dirty Dozen.

General Discussion

The purposes of the present studies were threefold: first, to replicate and extend findings regarding the internal structure of the SD3 using EFA (Study 1); second, to explicitly test different models of the internal structure of the SD3 using a confirmatory framework (Study 2); and third, replicating the confirmatory structure and assessing the SD3's external validity (Study 3). In Study 1, we arrived at similar results as those presented by Jones and Paulhus (2014), but we also extended them significantly. In the exploratory bifactor analysis, we found that the psychopathy items loaded onto the Machiavellianism factor, but not vice versa, whereas narcissism loaded consistently onto one factor. The psychopathy items had the highest loading on the general factor as seen by the percentage of variance accounted for (i.e., I-ECV) by the general factor on psychopathy items.

In Study 2, we tested five models and found that two- and three-factor models had similar model fit. The best-fitting model was a bifactor model with two specific factors, where Machiavellianism and psychopathy items were subsumed under one factor, with narcissism as a second factor. The best-fitting model was on the borderline of conventional standards for acceptable model fit. The factor loadings from the bifactor model were similar to Study 1, in the sense that Machiavellianism and psychopathy showed some

orthogonality after the general factor had been accounted for. In Model D, only three psychopathy items showed significant loadings on any specific factor beyond the general factor, and all three loaded negatively on the Machiavellianism factor. The Machiavellianism items manifested more specific factor variance, with five items having larger loadings than .40. A speculative interpretation of this orthogonality is that the psychopathy items pertain to impulsive behaviors (e.g., "I'm out of control") whereas the Machiavellianism items focus on deliberate, or calculated, behaviors (e.g., "It's wise to keep track of information that you can use against people later.") This distinction is essential for the demarcation of the respective constructs, but the majority of the variance is attributable to the general factor. In our opinion, the specific factor variance is not enough to make the case that Machiavellianism and psychopathy are meaningfully separable in the SD3. It may be possible to frame items in such a way that psychopathy is veiled in impulsivity and Machiavellianism in deliberation. However, we are skeptical that this distinction is tenable beyond something like two psychopathy profiles where one is more prone to deliberation and the other impulsivity. In traditional descriptions of psychopathy there is agreement that impulsivity is central to psychopathy (Miller & Lynam, 2015), whereas more modern contributors have argued that impulsivity is an independent component (Poythress & Hall, 2011; see also Yildirim & Derksen, 2015). The importance of impulsivity in distinguishing Machiavellianism from psychopathy is something that needs further study.

In Study 3, we replicated the factor structure from Study 2 in a smaller MTurk sample. We also investigated the factor scores from Models D and E. This analysis illustrates that the general factor yields large convergent validity estimates against stand-alone DT measures. The respective specific factors correlated lower with stand-alone measures in both Models D and E than did the general factor, with the exception of the correlation between the specific narcissism factor and the NPI. A common conclusion is that divergent correlations indicate that a subscale is measuring something distinct, but unless subscales (and indeed items) are perfectly correlated, divergent correlations should be expected (Rodriguez et al., 2016a).

In Studies 2 and 3, the omega indices suggest that reporting a total score, and not subscale scores, is preferable, when composite scores are used. This is admittedly undesirable as nuances among the three DT constructs are usually of central importance. A preferable alternative is the use of SEM, which allows true score variance and error variance to be decomposed into separate parts. This approach will also be of value for assessing whether the specific factor variance meaningfully predicts relevant external criteria, such as impulsivity (i.e., psychopathy) and long-term goal-oriented behavior (i.e., Machiavellianism), although we posit that such differences will be difficult to capture.

The data are slightly ambiguous with regard to the presence of a general factor. The ECV values were not large enough to conclusively say that the SD3 is unidimensional. The reason being that the I-ECV values indicate that narcissism provides some reliable variance beyond the general factor. This finding has consequences for future applications of latent variable models, as narcissism possibly violates the assumption of unidimensionality. In speculating about why narcissism deviated from the general factor, it may be because the item content is focused on the relatively benign feature self-centeredness but not callousness or manipulation. The SD3 measures grandiose narcissism, and not vulnerable narcissism (Maples et al., 2014), which one would likely assume to be the source of narcissistic aggression and hostility. However, research has suggested that vulnerable narcissism is a more likely source of aggression (Krizan & Johar, 2015). One could argue that the SD3—and indeed the DT more generally—could be made more theoretically parsimonious if grandiose and vulnerable narcissism were substituted, as all three constructs would assess hostile features.

Limitations

A common limitation in all three studies is the unknown sample characteristics. Samples 1 and 3 were MTurk samples, which can be both a benefit and a drawback (Arditte et al., 2016; Casler et al., 2013). Sample 2 was large, but little is known about the participants, which is why we wanted to alleviate doubt by confirming the results in an additional sample. Another limitation is that the model fit was only moderate. However, as model fit cutoffs are not perfect, we have attempted to follow sensible directions in not discarding models simply because of failure to reach recommended fit indices; nor have we chosen to report only good fit indices (Lai & Green, 2016). Neither did we want to inflate model fit by the use of arbitrary data-driven modification indices (Ropovik, 2015). As we noted already in Study 1, the factor extraction methods do not provide any clear answers.

Ultimately, we urge others to replicate our results and investigate other models (e.g., method factors, hierarchical models, parcels), or using different methods (e.g., ESEM, item response theory, Bayesian SEM). Finally, bifactor models should be interpreted with appropriate caution. No model is perfect, and bifactor models are prone to overfitting (see Bonifay, Lane, & Reise, 2016). In defense of the bifactor model, the other models (i.e., Models B and C) also displayed similar model fit, and in Model C, Machiavellianism and psychopathy were strongly positively correlated. These points give credence to the notion that Machiavellianism and psychopathy are subsumable constructs.

We have presented evidence to support that Machiavellianism and psychopathy are highly intertwined and can be modelled as the same construct. The issues notwithstanding, we believe that these findings are informative

and can be used to further our understanding of whether Machiavellianism and psychopathy are aspects of the same thing and also how and to what extent they differ from narcissism.

Conclusions

The SD3 was constructed on the basis of the seminal works from each respective research tradition. This is both necessary and intrinsically problematic, as assessment in all three domains have had their issues. Psychopathy—arguably the most successful construct in terms of measurement—is well validated in clinical settings, but not so when it comes to its subclinical counterpart, which is still conceptually unimpressive (see Glenn & Raine, 2014). Whether the DT simplifies or complicates the study of Machiavellianism, narcissism, and psychopathy is something that should be discussed more readily (cf. Glenn & Sellbom, 2015).

In conclusion, we suggest that Machiavellianism and psychopathy are very similar constructs that are possible to subsume under one factor. Narcissism is slightly more independent and SEM may prove especially useful for modelling variance unique to narcissism. Subscale composite scores for all three constructs contain relatively little specific variance and therefore we suggest reporting total scores, although this needs further study.

Rauthmann and Will (2011, p. 402) advocated the creation of a multidimensional Machiavellianism inventory measuring the construct's "cognitive, emotional, motivational, and behavioral core themes." Whether such an instrument can be created remains to be seen. Until then, we are skeptical about the notion that Machiavellianism, thought of as something like "psychopathy without impulsivity," is a meaningful designation.

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Notes

1. Using the more traditional approach of treating the indicators as continuous (i.e., using the Pearson correlation matrix), did not alter any of the results in any meaningful way.
2. Changing the rotation to oblimin (instead of promax) yields a correlation of .36 instead of .06, but the other factor correlations become smaller as a consequence.
3. Jones and Paulhus (2014) used mean- and variance-adjusted WLS. The reported results in Table 3 are based on the minimum residual method as the software required for robust WLS is unavailable to the authors. However, using nonrobust WLS did not alter the results in any meaningful way.
4. The R library MVN (Korkmaz, Goksuluk, & Zararsiz, 2014) was used to assess multivariate normality in Machiavellianism, narcissism, psychopathy, and combined. Mardia's test showed that the data were multivariate nonnormal both in terms of kurtosis and skewness. For all items together, Mardia's test resulted in skewness (15.64, $p < .001$), and kurtosis (878.14, $p < .001$).
5. We followed the steps taken in Dunn et al. (2014). It should be noted that ω_{Total} and $\omega_{Hierarchical}$ differ. A discussion of the differences between ω_{Total} and $\omega_{Hierarchical}$ is available in multiple sources (e.g., Revelle, 2015; Revelle & Wilt, 2013; Rodriguez et al., 2016b). More technical treatments are also available (e.g., Kelley & Pornprasertmanit, 2016; McDonald, 1999).

Supplemental Material

Supplementary material for this article is available online.

References

Ames, D. R., Rose, P., & Anderson, C. P. (2006). The NPI-16 as a short measure of narcissism. *Journal of Research in Personality*, *40*, 440-450.

Arditte, K. A., Çek, D., Shaw, A. M., & Timpano, K. R. (2016). The importance of assessing clinical phenomena in Mechanical Turk research. *Psychological Assessment*, *28*, 684-691.

Bentler, P. M. (1990). Comparative fit indexes in structural models. *Psychological Bulletin*, *107*, 238-246.

Birkás, B., Gács, B., & Csathó, Á. (2016). Keep calm and don't worry: Different Dark Triad traits predict distinct coping preferences. *Personality and Individual Differences*, *88*, 134-138.

Bonifay, W., Lane, S. P., & Reise, S. P. (2016). Three concerns with applying a bifactor model as a structure of psychopathology. *Clinical Psychological Science*. doi:10.1177/2167702616657069

Brown, R. P., Budzek, K., & Tamborski, M. (2009). On the meaning and measure of narcissism. *Personality and Social Psychology Bulletin*, *35*, 951-964.

Brown, T. A. (2015). *Confirmatory factor analysis for applied research* (2nd ed.). New York, NY: Guilford Press.

Cain, N. M., Pincus, A. L., & Ansell, E. B. (2008). Narcissism at the crossroads: Phenotypic description of pathological narcissism across clinical theory, social/personality psychology, and psychiatric diagnosis. *Clinical Psychology Review*, *28*, 638-656.

Casler, K., Bickel, L., & Hackett, E. (2013). Separate but equal? A comparison of participants and data gathered via Amazon's MTurk, social media, and face-to-face behavioral testing. *Computers in Human Behavior*, *29*, 2156-2160.

Christie, R., & Geis, F. L. (1970). *Studies in Machiavellianism*. New York, NY: Academic Press.

Costello, A. B., & Osborne, J. W. (2005). Best practices in exploratory factor analysis: Four recommendations for getting the most from your analysis. *Practical Assessment, Research & Evaluation*, *10*(7). Retrieved from http://pareonline.net/getvn.asp?v=10&n=7

Crego, C., & Widiger, T. A. (2016). Cleckley's psychopaths: Revisited. *Journal of Abnormal Psychology*, *125*, 75-87.

Cronbach, L. J., & Meehl, P. E. (1955). Construct validity in psychological tests. *Psychological Bulletin*, *52*, 281-302.

Dunn, T. J., Baguley, T., & Brunsden, V. (2014). From alpha to omega: A practical solution to the pervasive problem of internal consistency estimation. *British Journal of Psychology*, *105*, 399-412.

Egan, V., Chan, S., & Shorter, G. W. (2014). The Dark Triad, happiness and subjective well-being. *Personality and Individual Differences*, *67*, 17-22.

Eysenck, S. B., Eysenck, H. J., & Barrett, P. (1985). A revised version of the psychoticism scale. *Personality and Individual Differences*, *6*, 21-29.

Furnham, A., Richards, S. C., & Paulhus, D. L. (2013). The Dark Triad of personality: A 10 year review. *Social and Personality Psychology Compass*, *7*, 199-216.

Furnham, A., Richards, S., Rangel, L., & Jones, D. N. (2014). Measuring malevolence: Quantitative issues surrounding the Dark Triad of personality. *Personality and Individual Differences*, *67*, 114-121.

Garcia, D., & Rosenberg, P. (2016). The dark cube: Dark and light character profiles. *PeerJ*, *4*, e1675. doi:10.7717/peerj.1675

Gerbing, D. W., & Hamilton, J. G. (1996). Viability of exploratory factor analysis as a precursor to confirmatory factor analysis. *Structural Equation Modeling*, *3*, 62-72.

Giammarco, E. A., Atkinson, B., Baughman, H. M., Veselka, L., & Vernon, P. A. (2013). The relation between antisocial personality and the perceived ability to deceive. *Personality and Individual differences*, *54*, 246-250.

Gignac, G. E., Palmer, B. R., & Stough, C. (2007). A confirmatory factor analytic investigation of the TAS–20: Corroboration of a five-factor model and suggestions for improvement. *Journal of Personality Assessment*, *89*, 247-257.

Gignac, G. E., & Watkins, M. W. (2013). Bifactor modeling and the estimation of model-based reliability in the WAIS-IV. *Multivariate Behavioral Research*, *48*, 639-662.

Glenn, A. L., & Raine, A. (2014). *Psychopathy: An introduction to biological findings and their implications*. New York: New York University Press.

Glenn, A. L., & Sellbom, M. (2015). Theoretical and empirical concerns regarding the dark triad as a construct. *Journal of Personality Disorders*, *29*, 360-377.

Grucza, R. A., & Goldberg, L. R. (2007). The comparative validity of 11 modern personality inventories: Predictions of behavioral acts, informant reports, and clinical indicators. *Journal of Personality Assessment*, *89*, 167-187.

Holgado-Tello, F. P., Chacón-Moscoso, S., Barbero-García, I., & Vila-Abad, E. (2010). Polychoric versus Pearson correlations in exploratory and confirmatory factor analysis of ordinal variables. *Quality & Quantity*, *44*, 153-166.

Hopwood, C. J., & Donnellan, M. B. (2010). How should the internal structure of personality inventories be evaluated? *Personality and Social Psychology Review*, *14*, 332-346.

Hu, L. T., & Bentler, P. M. (1999). Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. *Structural Equation Modeling: A Multidisciplinary Journal*, *6*, 1-55.

Hunter, J. E., Gerbing, D. W., & Boster, F. J. (1982). Machiavellian beliefs and personality: Construct invalidity of the Machiavellianism dimension. *Journal of Personality and Social Psychology*, *43*, 1293-1305.

Jakobwitz, S., & Egan, V. (2006). The dark triad and normal personality traits. *Personality and Individual Differences*, *40*, 331-339.

Jonason, P. K., & Luévano, V. X. (2013). Walking the thin line between efficiency and accuracy: Validity and structural properties of the Dirty Dozen. *Personality and Individual Differences*, *55*, 76-81.

Jonason, P. K., & Webster, G. D. (2010). The dirty dozen: A concise measure of the dark triad. *Psychological Assessment*, *22*, 420-432.

Jones, D. N., & Figueredo, A. J. (2013). The core of darkness: Uncovering the heart of the Dark Triad. *European Journal of Personality*, *27*, 521-531.

Jones, D. N., & Paulhus, D. L. (2011). The role of impulsivity in the Dark Triad of personality. *Personality and Individual Differences*, *51*, 679-682.

Jones, D. N., & Paulhus, D. L. (2014). Introducing the Short Dark Triad (SD3): A brief measure of dark personality traits. *Assessment*, *21*, 28-41.

Kajonius, P. J., Persson, B. N., & Jonason, P. K. (2015). Hedonism, achievement, and power: Universal values that characterize the Dark Triad. *Personality and Individual Differences*, *77*, 173-178.

Kajonius, P. J., Persson, B. N., Rosenberg, P., & Garcia, D. (2016). The (mis)measurement of the Dark Triad Dirty Dozen: Exploitation at the core of the scale. *PeerJ*, *4*, e1748. doi:10.7717/peerj.1748

Kelley, K. (2015). MBESS (Version 4.0.0 and higher) [computer software and manual]. Retrieved from http://cran.r-project.org

Kelley, K., & Pornprasertmanit, S. (2016). Confidence intervals for population reliability coefficients: Evaluation of methods, recommendations, and software for composite measures. *Psychological Methods*, *21*, 69-92.

Korkmaz, S., Goksuluk, D., & Zararsiz, G. (2014). MVN: An R package for assessing multivariate normality. *R Journal*, *6*, 151-162.

Krizan, Z., & Johar, O. (2015). Narcissistic rage revisited. *Journal of Personality and Social Psychology*, *108*, 784-801.

Lai, K., & Green, S. B. (2016). The problem with having two watches: Assessment of fit when RMSEA and CFI disagree. *Multivariate Behavioral Research*, *51*, 220-239.

Lee, K., & Ashton, M. C. (2005). Psychopathy, Machiavellianism, and narcissism in the Five-Factor Model and the HEXACO model of personality structure. *Personality and Individual Differences*, *38*, 1571-1582.

Lilienfeld, S. O., Watts, A. L., & Smith, S. F. (2015). Successful psychopathy: A scientific status report. *Current Directions in Psychological Science*, *24*, 298-303.

MacCallum, R. (1986). Specification searches in covariance structure modeling. *Psychological Bulletin*, *100*, 107-120.

Maples, J. L., Lamkin, J., & Miller, J. D. (2014). A test of two brief measures of the dark triad: The dirty dozen and short dark triad. *Psychological Assessment*, *26*, 326-331.

Marsh, H. W., Morin, A. J., Parker, P. D., & Kaur, G. (2014). Exploratory structural equation modeling: An integration of the best features of exploratory and confirmatory factor analysis. *Annual Review of Clinical Psychology*, *10*, 85-110.

McDonald, R. P. (1999). *Test theory: A unified treatment*. Mahwah, NJ: Lawrence Erlbaum.

McHoskey, J. W., Worzel, W., & Szyarto, C. (1998). Machiavellianism and psychopathy. *Journal of Personality and Social Psychology*, *74*, 192-210.

Miller, J. D., Few, L. R., Seibert, L. A., Watts, A., Zeichner, A., & Lynam, D. R. (2012). An examination of the Dirty Dozen measure of psychopathy: A cautionary tale about the costs of brief measures. *Psychological Assessment*, *24*, 1048-1053.

Miller, J. D., Hyatt, C. S., Maples-Keller, J. L., Carter, N. T., & Lynam, D. R. (2016). Psychopathy and Machiavellianism: A distinction without a difference? *Journal of Personality*. doi:10.1111/jopy.12251

Miller, J. D., & Lynam, D. R. (2015). Understanding psychopathy using the basic elements of personality. *Social and Personality Psychology Compass*, *9*, 223-237.

Miller, J. D., Lynam, D. R., & Campbell, W. K. (2016). Rejoinder: A construct validity approach to the assessment of narcissism. *Assessment*, *23*, 18-22.

O'Boyle, E. H., Jr., Forsyth, D. R., Banks, G. C., & McDaniel, M. A. (2012). A meta-analysis of the dark triad and work behavior: A social exchange perspective. *Journal of Applied Psychology*, *97*, 557-579.

O'Connor, B. P. (2000). SPSS and SAS programs for determining the number of components using parallel analysis and Velicer's MAP test. *Behavior Research Methods, Instruments, & Computers*, *32*, 396-402.

Panitz, E. (1989). Psychometric investigation of the Mach IV scale measuring Machiavellianism. *Psychological Reports*, *64*, 963-968.

Paulhus, D. L. (2014). Toward a taxonomy of dark personalities. *Current Directions in Psychological Science*, *23*, 421-426.

Paulhus, D. L., Neumann, C. F., & Hare, R. D. (2014). *Manual for the Self-Report Psychopathy (SRP) Scale*. Toronto, Ontario, Canada: Multi-Health Systems.

Paulhus, D. L., & Williams, K. M. (2002). The dark triad of personality: Narcissism, Machiavellianism, and psychopathy. *Journal of Research in Personality*, *36*, 556-563.

Poythress, N. G., & Hall, J. R. (2011). Psychopathy and impulsivity reconsidered. *Aggression and Violent Behavior*, *16*, 120-134.

Raskin, R. N., & Hall, C. S. (1979). A narcissistic personality inventory. *Psychological Reports*, *45*, 590-590.

Rauthmann, J. F. (2013). Investigating the MACH–IV with item response theory and proposing the Trimmed MACH*. *Journal of Personality Assessment*, *95*, 388-397.

Rauthmann, J. F., & Will, T. (2011). Proposing a multidimensional Machiavellianism conceptualization. *Social Behavior and Personality: An International Journal*, *39*, 391-403.

Reise, S. P. (2012). The rediscovery of bifactor measurement models. *Multivariate Behavioral Research*, *47*, 667-696.

Reise, S. P., Bonifay, W. E., & Haviland, M. G. (2013). Scoring and modeling psychological measures in the presence of multidimensionality. *Journal of Personality Assessment*, *95*, 129-140.

Revelle, W. (2015). *psych: Procedures for Personality and Psychological Research* (Version = 1.5.8). Evanston, IL: Northwestern University. Retrieved from http://CRAN.R-project.org/package=psych

Revelle, W., & Wilt, J. (2013). The general factor of personality: A general critique. *Journal of Research in Personality*, *47*, 493-504.

Revelle, W., & Zinbarg, R. E. (2009). Coefficients alpha, beta, omega, and the glb: Comments on Sijtsma. *Psychometrika*, *74*, 145-154.

Roberts, S., & Pashler, H. (2000). How persuasive is a good fit? A comment on theory testing. *Psychological Review*, *107*, 358-367.

Rodriguez, A., Reise, S. P., & Haviland, M. G. (2016a). Applying bifactor statistical indices in the evaluation of psychological measures. *Journal of Personality Assessment*, *98*, 223-237.

Rodriguez, A., Reise, S. P., & Haviland, M. G. (2016b). Evaluating bifactor models: Calculating and interpreting statistical indices. *Psychological Methods*, *21*, 137-150.

Roeser, K., McGregor, V. E., Stegmaier, S., Mathew, J., Kübler, A., & Meule, A. (2016). The Dark Triad of personality and unethical behavior at different times of day. *Personality and Individual Differences*, *88*, 73-77.

Ropovik, I. (2015). A cautionary note on testing latent variable models. *Frontiers in Psychology*, *6*. doi:10.3389/fpsyg.2015.01715

Rosseel, Y. (2012). lavaan: An R package for structural equation modeling. *Journal of Statistical Software*, *48*, 1-36.

Schmid, J., & Leiman, J. M. (1957). The development of hierarchical factor solutions. *Psychometrika*, *22*, 53-61.

Schmitt, N. (1996). Uses and abuses of coefficient alpha. *Psychological Assessment*, *8*, 350-353.

Slocum-Gori, S. L., Zumbo, B. D., Michalos, A. C., & Diener, E. (2009). A note on the dimensionality of quality of life scales: An illustration with the Satisfaction with Life Scale (SWLS). *Social Indicators Research*, *92*, 489-496.

Steiger, J. H. (1990). Structural model evaluation and modification: An interval estimation approach. *Multivariate Behavioral Research*, *25*, 173-180.

Strauss, M. E., & Smith, G. T. (2009). Construct validity: Advances in theory and methodology. *Annual Review of Clinical Psychology*, *5*, 1-25.

Tomarken, A. J., & Waller, N. G. (2003). Potential problems with "well fitting" models. *Journal of Abnormal Psychology*, *112*, 578-598.

Tucker, L. R., & Lewis, C. (1973). A reliability coefficient for maximum likelihood factor analysis. *Psychometrika*, *38*, 1-10.

Wright, A. G. (2016). On the measure and mismeasure of narcissism: A response to "Measures of narcissism and their relations to DSM-5 pathological traits: A critical reappraisal". *Assessment*, *23*, 10-17.

Yildirim, B. O., & Derksen, J. J. (2015). Clarifying the heterogeneity in psychopathic samples: Towards a new continuum of primary and secondary psychopathy. *Aggression and Violent Behavior*, *24*, 9-41.

Zinbarg, R. E., Revelle, W., Yovel, I., & Li, W. (2005). Cronbach's α, Revelle's β, and McDonald's ω_H: Their relations with each other and two alternative conceptualizations of reliability. *Psychometrika*, *70*, 123-133.