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Dark Triad Traits, Social Position, and Personality: A Cross-Cultural Study

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Abstract

This research explores the Dark Triad traits in 18 cultures from Europe, America, Africa, and Asia. We examined the relationships among Dark Triad traits, as measured by the SD3, with gender, age, social status, and two personality models, HEXACO and Zuckerman's alternative five factor model (AFFM). There were 10,298 participants (5,410 women and 4,888 men) with a mean age of 40.31 (*SD* = 17.32) years old. Between 6% and 16% of the variance in the Dark Triad traits was accounted by culture. Men scored higher than women on all three traits in most cultures, but gender differences were generally larger in European countries. The relationship between the Dark Triad traits dimensions and age is negative, but the largest effect size is small

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(Psychopathy; $\eta^2 = .018$). Psychopathy is associated with low Social Position, and Narcissism with high Social Position. In regard to Personality traits, Narcissism is positively related to Extraversion, and Psychopathy is negatively related to Conscientiousness for the HEXACO, and Narcissism is positively related to Activity and Sensation Seeking, and Machiavellianism and Psychopathy are positively related to Aggressiveness and Sensation Seeking for the AFFM.

Keywords
Dark Triad traits, SD3, HEXACO, AFFM, cross-cultural, personality

Introduction

In the last 19 years, a large number of publications have appeared revealing an integrated constellation of malevolent personality traits called the Dark Triad traits (Paulhus & Williams, 2002), based on the interrelated maladaptive personality traits of Machiavellian, Narcissism, and Psychopathy. During this time, numerous articles have also analyzed their psychometric properties as well as the relationships with other psychological constructs, including personality traits (Bucher et al., 2020; Furnham et al., 2013; Muris et al., 2017; O'Boyle et al., 2015; Vize, Collison et al., 2018; Vize, Lynam et al., 2018; Włodarska et al., 2021). From the same standpoint, other authors have investigated the relationships between the Dark Triad and sociographic variables such as age, gender, and socioeconomic status. With regard to gender differences, men scored higher than women in all three Dark Triad traits, but when the shared variance among the Dark Triad traits was controlled, only Psychopathy remained statistically significantly associated with gender (Muris et al., 2017). In this way, men scored higher than women on all scales of the Dark Triad traits in a recent macro study conducted in a large sample in different countries (Rogoza et al., 2021). The Dark Triad also present some relationships with age. Younger women were more attracted to the Dark Triad traits than were older women (Qureshi et al., 2016) and Machiavellianism and Narcissism were associated with good current socioeconomic status even in children (Jonason et al., 2016, 2020).

Dark Triad Traits and Personality

Regarding relationships with personality traits, the Dark Triad traits have been intensively studied in relation to the Five Factor Model (FFM) and HEXACO personality model. To a lesser extent, the Dark Triad traits have also been tested in relation to Gray's Reinforcement Sensitivity Theory (RST) and the Eysenck personality model (Lee & Ashton, 2005; Włodarska et al., 2021), especially the Extraversion scale of Eysenck's Personality Questionnaire (Jones & Paulhus, 2011). Zuckerman's model is closely related to Eysenck's (Zuckerman & Glicksohn, 2016) and Gray's personality models. For instance, Psychoticism and Gray's behavioral approach system (BAS) are related to Zuckerman's Aggressiveness and Sensation Seeking traits (Aluja et al., 2013). Therefore, it could be expected that Psychopathy, and to a lesser extent Machiavellianism, will be located together with Aggressiveness and Sensation Seeking (Hare, 1982), while Narcissism should be associated with Extraversion (Aluja et al., 2012).

Lee and Ashton (2005) originally found that the Dark Triad traits had a strong negative correlation with the HEXACO Honesty-Humility factor. Later, Hodson et al. (2018), found that the Dark Triad traits obtained a near-complete overlapping latent correlation −0.95 between a general Dark Triad factor Honesty-Humility, suggesting that the Dark Triad overlaps with the low pole of the HEXACO Honesty-Humility factor composed of traits of sincerity, fairness, greed avoidance, and modesty. Psychopathy and Machiavellianism showed negative correlations with Big Five Agreeableness. On the other hand, Narcissism was positively correlated with Big Five Extraversion and HEXACO Extraversion. A meta-analysis by Muris et al. (2017) reinforced the

relationships between the Dark Triad traits and FFM/HEXACO. Psychopathy and Machiavellianism (but not Narcissism) related negatively to the FFM factor of Agreeableness and the HEXACO factor of Honesty-Humility. Machiavellianism and Psychopathy were negatively associated with the Honesty-Humility facets of sincerity and equity, while Narcissism was most associated with deficits in greed avoidance and modesty. In addition, since the Dark Triad shows quite a large negative relationship with the Honesty-Humility factor of the HEXACO, and recent papers show that women score higher than men in Honesty-Humility (García et al., 2021; Lee & Ashton, 2020), it is expected that men will score higher than women in the Dark Triad. This effect is expected to be larger in western cultures, given the previous evidence of larger gender differences in these countries (García et al., 2021), compared to non-western ones. This is the so-called Gender-Equality-Personality Paradox.

Cross-Cultural Exploration of Dark Triad

Although there are many studies about the Dark Triad traits (measured with different instruments, in many cultures independently); there are relatively few cross-cultural studies (Cooke & Michie, 1999; Foster et al., 2003; Jonason et al., 2013, 2017). These studies are generally based only on a few cultures and are mainly limited to small samples. Jonason et al. (2013) found that the Dark Triad traits is associated with different culturally-based sociological constructs. For example, the Dark Triad traits correlated with individual differences in life history strategies. Some cross-cultural work on the Dark Triad traits has focused on gender. For example, a recent psychometric study examined the structure of the Dark Triad Dirty Dozen (DTDD; Jonason & Webster, 2010) in 49 countries and several regions all around the world (Rogoza et al., 2021). In Japan and Korea, the authors found no statistically significant differences in Psychopathy for men and women. They suggest that Psychopathy is a socially aversive trait that could be understated in these countries because of strong cultural pressure, and that the power of this self-regulatory pressure could bridge gender differences (Rogoza et al., 2021).

Rogoza et al. (2021) also concluded that culture had a strong effect on Narcissism, and that cultures with integrated and hierarchical cultural systems were more narcissistic. Gender differences in Narcissism were greater in more developed societies, as women had less propensity for Narcissism in these countries (Jonason et al., 2020). Moreover, the cultural context may shape how people express their personality traits (Thalmayer & Rossier, 2019), and cultural context may also shape the clinical presentation of some disorders (Paris & Lis, 2013). For example, the expression of aggressive behaviors seems to vary across cultures (Cooke, 1996). This may be because more individualistic cultures value self-control, whereas more collectivistic cultures value the importance of maintaining a reputation (Severance et al., 2013).

Similarly, the behavioral pattern associated with Psychopathy or antisocial personality disorders seems to be observed in most cultures (Rossier & Rigozzi, 2008; Rossier et al., 2017), but the prevalence rate seems to vary quite a lot across cultures, being higher in individualistic than collectivistic cultures (Cooke, 1996). Although all these studies suggest that culture has an important impact on the behavioral expression of some maladaptive personality and sub-clinical traits, the impact of culture on this expression has yielded some inconsistent results (Canino et al., 2010), even allowing for the possibility that the Dark Triad traits might be less expressed in collectivistic cultures characterized by strong social control. For this reason, the study of Dark Triad traits cultural differences deserves much more attention.

Dark Triad Traits and Socioeconomic Status

Socioeconomic Status (SES) or Social Position (SP) is a construct based on an individual's economic, and sociological position. On the whole, socioeconomic status has been a powerful

determinant of health. People of high social status tend to be in better health than people with low social status (Erreygers, 2013). This significant impact of socioeconomic status on health includes a multitude of health deficits, some of which are psychological. As evidence of this, numerous studies have demonstrated inverse relationships between SES and mental health (de Vries et al., 2020; Kivimäki et al., 2020; Tyagi & Ranga, 2018), particularly in children and adolescents (Quon & McGrath, 2014; Reiss et al., 2019). Also, socioeconomic-status or social position has been inversely associated with the development and prevalence of personality disorders (Cohen et al., 2008; Grant et al., 2004; Torgersen et al., 2001; Walsh et al., 2013), including antisocial personality disorder (ASPD) and psychopathic personality (Compton et al., 2005; Hare, 2003). In regard to the Dark Triad, although initial results were positive (Turner & Martinez, 1977), the overall literature is more congruent with the idea that Machiavellianism is unrelated with occupational status and job success (Fehr et al., 1992). There is also little research about the relationship between Narcissism and socioeconomic status, although one study showed that narcissistic personality tendencies are stronger in upper-class individuals (Piff, 2014). Narcissism has also been positively linked to physical and mental health (Jonason, Baughman et al., 2015). Childhood socioeconomic status has been correlated positively with Narcissism, and current socioeconomic status has been correlated positively with Narcissism and Machiavellianism. Current income also correlated positively with Narcissism. These correlations did not differ much between men and women (Jonason et al., 2016). All these findings provide indirect evidence for SES associations with the Dark Triad traits, but few studies have evaluated this relationship with direct measures of SES.

Aims of the Present Study

This study has several aims: (a) to study the differences on Dark Triad traits across different cultures all over the world, (b) to investigate the relationship between Dark Triad traits and gender and age using the SD3 to overcome the limitations of the DTDD used in previous studies (Rogoza et al., 2021), and provide more robust findings, (c) to assess the relationship between social status and Dark Triad traits, and (d) to test the pattern of Dark Triad traits associations with two different personality models (HEXACO and AFFM). Based on prior research, Narcissism is expected to be associated with high social position and Psychopathy with low social position. The expected relationship between Machiavellianism and social position is uncertain, as we have not found strong evidence in the literature. The relationships between Dark Triad traits and HEXACO have been evaluated extensively in past studies (for meta-analyses, see Muris et al., 2017; Vize, Lynam et al., 2018). The current research is expected to confirm the reported pattern of results using large samples in different countries. Specifically, all three Dark Triad traits scales are expected to be related negatively to Honesty–Humility. Machiavellianism is also expected to correlate negatively with Agreeableness and positively with Extraversion. Narcissism is additionally expected to associate positively with Extraversion and Psychopathy and negatively with Conscientiousness. Psychopathy, and to a lesser extent Machiavellianism, is also expected to relate to AFFM Aggressiveness and Sensation Seeking traits (as measured by the ZKA-PQ/SF).

Method

Participants

The participants in this study were a total of 10,298 subjects (5,410 women and 4,888 men), from 18 cultures/national contexts (Spain [Catalan and Spanish], Germany, Italy, Hungary, Switzerland [French-speaking and German-speaking], Belgium, Bosnia-Herzegovina, Poland, United States, Chile, China, Qatar, Israel, Tunisia, Senegal, and Togo, and 13 languages (Spanish, Catalan,

German, Italian, Hungarian, French, Bosnian, Polish, English, Chinese [Mandarin], Arabic, and Hebrew).[1] Table 1 provides the mean and standard deviation of age, and the number of men and women by culture. The mean age was 40.31 ($SD = 17.32$) years for the total sample, excluding Senegal, which only provides the age ranges. In most cultures, the average age was around 40 years old, except for China and Togo, which had mean ages of 24.75 and 30.03 respectively. Total sample frequencies for age ranges were: (18–30 years: 3,758 [36.5%]; 31–45 years: 2,378 [23.1%]; 46–60 years: 2,413 [23.4%] and >60 years old: 1,748 [17%], with one missing). Average age was 39.81 years ($SD = 17.37$) for women, and 40.87 years ($SD = 17.41$) for men. Although the age difference for gender was statistically significant ($t[1] = 2.83$, $p < .005$), the effect size was negligible (Cohen's $d = -0.12$) (Cohen, 1988). The 18 cultures studied were divided between the "High income" or "Europe/US/Israel" and "Other cultures."

Measures

Short Dark Triad (SD3). The SD3 is a 27-item Dark Triad questionnaire developed by Jones and Paulhus (2014), which has a factor structure of three factors with nine items each: Machiavellianism (MA), Narcissism (NA), and Psychopathy (PS). The response format is presented in a Likert-type format with anchors of 1 (*strongly disagree*) and 5 (*strongly agree*). SD3 has obtained strong convergent validity with other Dark Triad questionnaires. Cronbach's Alpha internal consistencies for MA, NA, and PS were about .70 in the original study (Jones & Paulhus, 2014).

HEXACO-60. HEXACO-60 is a short 60-item inventory that assesses the six personality factors of the HEXACO model of personality: Honesty-Humility (HH), Emotionality (EM), Extraversion (EX), Agreeableness versus anger (AG), Conscientiousness (CO), and Openness to Experience (OE) (Ashton & Lee, 2009) The response format is a Likert scale of 5 points: 1 (*strongly disagree*) to 5 (*strongly agree*). Correlations between the HEXACO-60 and long form of HEXACO range from .87 to .93 in the college sample, and from .83 to .92 in the community sample. The internal consistency reliabilities ranged from .77 to .80 in a college sample, and from .73 to .80 in a community sample (Ashton & Lee, 2009).

The Zuckerman-Kuhlman-Aluja personality questionnaire-short version. The ZKA-PQ shortened version (ZKA-PQ/SF; Aluja et al., 2018) is an 80-item shortened form derived from the 200-item ZKA-PQ long form (Aluja et al., 2010). The response format is a 4-point Likert-type scale ranging from *strongly disagree* (1) to *strongly agree* (4) in both formats. The ZKA-PQ/SF has 20 facets (four items per facet) and five factors: Aggressiveness (AG), Activity (AC), Extraversion (EX), Neuroticism (NE), and Sensation Seeking (SS). Validity and reliability indexes of the ZKA-PQ shortened version were appropriate, as was reported in the cross cultural ZKA-PQ study (Aluja et al., 2020).

Procedure

Researchers from Belgium, Bosnia-Herzegovina, Spain (Catalan and Spanish speakers) Chile, China, Germany, Hungary, Israel, Italy, Poland, Senegal, Spain, Switzerland (French- and German-speaking), Tunisia, the United States, Qatar and Togo accepted the invitation to collaborate in the study. Information about age, gender, educational level, and professional level was gathered in the same protocol. Data was collected between 2016 and 2018. For the last two variables, Hollingshead's Social Position Index was calculated (SPI; Hollingshead, 1957; Hollingshead & Redlich, 1958). This index is based on two 7-point scales: An Occupation Scale (1: -higher executives- to 7: -unskilled employees-) and an Education Scale (1: -graduate

Table 1. Means, Standard Deviations, and Internal Reliabilities for Women and Men by Culture and SD3 Scale.

					N		Machiavellianism						Narcissism						Psychopathy					
			Age		Gender		Men		Women				Men		Women				Men		Women			
Culture		Language	*M*	*SD*	♂	♀	*M*	*SD*	*M*	*SD*	*d*	α	*M*	*SD*	*M*	*SD*	*d*	α	*M*	*SD*	*M*	*SD*	*d*	α
Europe/ US/Israel	Switz.	French	38.86	15.99	183	139	2.84	0.60	2.67	0.58	0.29	.73	2.81	0.56	2.58	0.52	0.42	.77	2.17	0.57	1.91	0.52	0.47	.74
	Switz.	German	36.41	17.15	237	372	2.93	0.61	2.68	0.58	0.42	.75	2.93	0.54	2.66	0.54	**0.50**	.67	2.25	0.53	1.87	0.49	0.75	.75
	Gernany	German	45.22	18.70	344	356	2.94	0.63	2.71	0.57	0.38	.81	2.82	0.56	2.67	0.54	0.27	.78	2.17	0.55	1.84	0.51	0.62	.83
	US	English	44.65	15.08	216	222	2.98	0.80	2.79	0.70	0.25	.85	2.59	0.72	2.46	0.69	0.18	.80	2.30	0.80	1.87	0.71	0.57	.84
	Belgium	French	45.16	17.09	169	168	2.94	0.52	2.90	0.55	0.08	.72	2.71	0.44	2.51	0.46	0.04	.71	2.23	0.55	1.91	0.49	0.06	.75
	Italy	Italian	40.54	14.85	205	209	3.04	0.63	2.77	0.56	0.45	.73	2.87	0.59	2.66	0.56	0.36	.75	2.43	0.56	2.11	0.54	0.58	.78
	Israel	Hebrew	43.43	17.46	136	143	3.02	0.61	2.71	0.66	0.49	.77	2.90	0.59	2.79	0.59	0.18	.76	2.07	0.67	1.78	0.55	0.47	.75
	Catalonia	Catalan	41.66	17.78	338	335	2.96	0.65	2.73	0.65	0.35	.73	2.73	0.55	2.60	0.54	0.24	.76	2.14	0.66	1.84	0.62	0.47	.75
	Spain	Spanish	40.44	20.71	409	468	2.93	0.63	2.71	0.61	0.35	.77	2.81	0.52	2.69	0.58	0.22	.74	2.11	0.60	1.89	0.59	0.37	.79
	Poland	Polish	37.80	13.31	178	332	3.12	0.64	2.70	0.59	0.69	.73	2.99	0.68	2.71	0.58	0.45	.75	2.19	0.59	1.96	0.59	0.39	.71
	Hungary	Hungarian	40.20	16.91	200	380	3.27	0.66	3.00	0.69	0.40	.79	3.05	0.67	2.84	0.60	0.34	.77	2.05	0.63	1.77	0.53	0.50	.77
	Bosnia H	B-C-S	45.73	16.88	229	217	2.75	0.62	2.67	0.61	0.13	.78	2.66	0.66	2.65	0.55	0.02	.70	2.11	0.66	1.95	0.59	0.26	.72
	Average		*46.68*	*16.83*	*2844*	*3341*	*2.98*	*0.63*	*2.75*	*0.61*	*0.36*	*.76*	*2.82*	*0.59*	*2.65*	*0.56*	*0.27*	*.75*	*2.19*	*0.61*	*1.89*	*0.56*	*0.46*	*.77*
Other cultures	Qatar	Arabic	44.40	16.91	401	398	2.99	0.57	2.97	0.54	0.03	.56	2.98	0.54	2.92	0.51	0.11	.57	2.56	0.57	2.47	0.59	0.15	.58
	Chile	Spanish	43.31	17.41	200	200	2.68	0.67	2.59	0.70	0.13	.75	2.74	0.50	2.70	0.50	0.08	.72	2.05	0.60	1.93	0.56	0.21	.76
	China	Mandarin	24.75	7.85	296	313	3.24	0.69	3.12	0.64	0.18	.79	2.71	0.57	2.63	0.53	0.15	.76	1.99	0.61	1.71	0.49	0.51	.71
	Tunisia	Arabic	44.13	16.63	196	196	2.94	0.60	2.85	0.61	0.15	.61	3.02	0.60	3.02	0.61	0.00	.65	2.52	0.50	2.40	0.52	0.23	.53
	Senegal	French	—	—	797	762	3.09	0.51	3.09	0.54	0.00	.52	3.30	0.47	3.37	0.48	−0.15	.58	2.41	0.59	2.44	0.66	−0.05	.68
	Togo	French	30.03	9.74	154	200	3.27	0.55	3.20	0.55	0.13	.63	3.17	0.46	3.16	0.46	0.02	.69	2.22	0.48	2.11	0.50	0.22	.66
	Average		*37.32*	*13.71*	*2044*	*2969*	*3.04*	*0.60*	*2.97*	*0.60*	*0.10*	*.64*	*2.99*	*0.52*	*2.97*	*0.52*	*0.04*	*.66*	*2.29*	*0.56*	*2.18*	*0.55*	*0.21*	*.65*

Note. M = Mean; SD; Standard deviation; Bosnia H. = Bosnia-Herzegovina; B-C-S = Bosinan-Croatian-Serbian; Switz. = Switzerland; US = United States of America.
Cohen's *d* equal to or higher than 0.50 in boldface. Cohen's *d*: 0.10: very small, 0.20: small, 0.50: medium, 0.80: large, 1.20: very large. The cultures are arranged.
According to the Gross Domestic Product Purchasing Power. https://www.gfmag.com/global-data/economic-data/richest-countries-in-the-world. *(S-1 Supplemental Material).*

professionals- to 7: -less than 7 years of school-). The formula for obtaining the SPI score was the following (SPI = [Occupation score × 7] + [Education score × 4]). The range of scores provided by the authors is: upper: <17; upper-middle: 17 to 31; middle: 32 to 47; low-middle: 48 to 63; and low: >63 (Hollingshead & Redlich, 1958). Note that lower scores represent higher Social Position. For more details, see Table S-1 in Supplemental Material.

Each researcher administered the protocol in paper and pencil form to adult volunteers in their community, except the American sample. Instructions were given to distribute the questionnaires to an equal number of men and women, within the following age ranges: (a) 18 to 30 years, (b) 31 to 45 years, (c) 46 to 60 years, and (d) more than 60 years old. In the United States sample, participants were recruited and paid through Amazon's Mechanical Turk crowd sourcing platform, using the same age and gender criteria as the other samples. Methodological files and details that support the findings of this study are available from the corresponding author.

Translations

In regard to the ZKA-PQ/SF, a native language version of ZKA-PQ (long form) was available to all researchers from an earlier study (Rossier et al., 2016). The back-translation procedure for these versions was described in detail in Blanch and Aluja (2016). For HEXACO-60, validated translations available at www.hexaco.org were used, except for the Arabic, Polish and Hebrew versions, which were specially translated and adapted for this study. For the SD3, available translations for some cultures were also used. When prior translations were unavailable, the researcher of that culture had to translate the HEXACO-60 and/or the SD3 into that language with the help of a local team of specialists in validation studies and linguists. A psychologist fluent in English, and who did not contribute to the native translation, back-translated the translated version into English. The HEXACO-60 back-translation was then sent to Michel Asthon, and SD3 to Delroy L. Paulhus, both coauthors of respective questionnaires. When non-equivalent items were identified, a professional translator compared the back-translated English version and the original English version. Based on these two analyses, researchers received suggestions regarding the revision of items seemingly not equivalent in the translated and original versions.

Results

Dark Triad Traits factor Structure, Procrustes Matrix, and Factor Congruence Coefficients

We conducted a parallel analysis (Horn, 1965), based on minimum rank factor analysis (Timmerman & Lorenzo-Seva, 2011). We analyzed polychoric correlation matrices as performed by Jones and Paulhus (2014) in the original study. Polychoric correlation is advised when the univariate distributions of ordinal items are asymmetric or with excess of kurtosis (Muthén & Kaplan, 1985). The number of random correlation matrices was 500 and the method to obtain random correlation matrices was permutation of the raw data (Buja & Eyuboglu, 1992). Parallel analysis suggested that three factors be retained. Using the Unweighted Least Squares (ULS) with normalized Promax rotation, we obtained four adjusted eigenvalues: 5.80, 2.14, 2.02, 1.48. Eigenvalues of the reduced correlation matrix were 4.35, 1.22, 1.06, and 0.66. Determinant of the matrix values was 0.008, Bartlett's statistic 49806.5 ($df = 351$; $p = .000010$) and Kaiser–Meyer–Olkin (KMO) test 0.87 (Ferrando & Lorenzo-Seva, 2017). The goodness of fit statistics were Minimum Fit Function Chi square with 273 degrees of freedom (5833.482 [$p < .001$]), Chi-Square for independence model with 351° of freedom (107079.385), Comparative Fit Index (CFI) (0.948), Goodness of Fit Index (GFI) (0.98), Adjusted Goodness of Fit Index (AGFI) (0.97), and Root Mean Square of Residuals (RMSR) (0.04).

Table 2. Congruency Coefficients for Each SD3 Factor by Culture and Average Values.

	Machiavellianism	Machiavellianism	Machiavellianism	Average
Belgium	0.89	**0.84**	**0.84**	*0.86*
Bosnia H.	0.88	0.90	**0.70**	*0.83*
Catalonia	0.89	0.86	**0.82**	*0.86*
Chile	0.92	0.90	**0.63**	*0.82*
China	0.92	0.95	**0.86**	*0.91*
Germany	0.93	0.94	0.87	*0.91*
Hungary	0.93	0.92	0.89	*0.91*
Israel	0.91	0.95	**0.82**	*0.89*
Italy	0.93	0.92	**0.83**	*0.89*
Poland	0.93	0.93	**0.83**	*0.90*
Qatar	**0.82**	**0.78**	**0.67**	*0.76*
Senegal	**0.80**	**0.63**	**0.66**	*0.70*
Spain	0.93	0.93	**0.83**	*0.90*
Switzerland (F)	0.92	0.96	0.85	*0.91*
Switzerland (G)	0.90	0.96	**0.80**	*0.89*
Togo	**0.78**	0.88	**0.73**	*0.80*
Tunisia	**0.83**	0.85	**0.65**	*0.78*
US	0.90	0.95	0.90	*0.92*
Average	*0.89*	*0.89*	0.79	*0.86*

Note. Values lower .85 in boldface.

Second, we performed congruence coefficients after Procrustes rotation using the current SD3 total matrix and the original SD3 factor analysis matrix as reference (Jones & Paulhus, 2014). Table S-2 (Supplemental Material) shows the final Procrustes matrix (after targeted rotation) with the original SD3 exploratory factor matrix (Jones & Paulhus, 2014). Most of the items of the three factors have loads of 0.30 or more on their respective factor. Factor I obtains secondary loads of .30 or higher on items 1, 4, and 7 in factor III, item 9 of factor II loads on factor 3, and items 3, 5, 6 of factor II obtain secondary loads on factor I.

Third, in Table 2 we present the congruency coefficients of the factorial matrix of each culture in reference to the original factor matrix with the same extraction and rotation method used in the whole sample matrix. The average congruency coefficients of Machiavellianism and Narcissism was 0.89 and of Psychopathy 0.79 (total: 0.86). A value in the range 0.85 to 0.94 corresponds to a fair similarity (Lorenzo-Seva & Ten Berge, 2006). Differences in the three factors for each culture were observed, especially in regard to Psychopathy, where 13 cultures got values between 0.63 and 0.84. For Machiavellianism, Qatar (0.82), Senegal (0.80), Togo (0.78), and Tunisia (−0.83) obtained factorial congruence values below 0.85. Finally, Belgium (0.84), Qatar (0.78), Senegal (0.63), and Tunisia (0.85) got values below 0.85 in Narcissism. Congruence coefficients were lower than those observed for the Dark Triad Dirty Dozen in 49 countries (N = 11,723; 65.8% women; mean age: 21.53), but show the same profile since the worst result was reported for Psychopathy (0.88) compared to Machiavellianism (0.94), and Narcissism (0.96) (Jonason et al., 2020).

Invariance of the Dark Triad Traits (SD3)

In order to assess the level of invariance of the SD3, each dimension was defined as a latent and each item as observed variable. These dimensions were allowed to covary. A first CFA computed to evaluate the overall adequacy of this three-dimension structure for the entire sample showed

overall inadequate fit indices (χ^2[321] = 13,750.26, $p < .001$, $\chi^2/df = 42.84$, TLI = .703, CFI = .729, and RMSEA = .064). The level of invariance across our 18 samples was investigated by computing a Multi-Group Confirmatory Factor Analysis (MGCFA, see Rossier et al., 2016 for an example of this procedure). This analysis suggested that the SD3 reached cross-cultural does not reach configural (χ^2[5,778] = 21,547.18, $p < .001$, $\chi^2/df = 3.73$, TLI = .682, CFI = .709, RMSEA = .016), metric (χ^2[6,186] = 23,898.10, $p < .001$, $\chi^2/df = 3.86$, TLI = .666, CFI = .673, RMSEA = .017, $\Delta\chi^2(408) = 2{,}350.92$, $p < .001$, ΔTLI = .016, ΔCFI = .036, ΔRMSEA = .001), or scalar invariance (χ^2(6,288) = 24,767.76, $p < .001$, $\chi^2/df = 3.94$, TLI = .657, CFI = .659, RMSEA = .017, $\Delta\chi^2(102) = 869.66$, $p < .001$, ΔTLI = .009, ΔCFI = .014, ΔRMSEA < .001).

Results can be improved by considering that each latent variable results of three parcels using a systematic algorithm (Coffman & MacCallum, 2005; Little et al., 2002). The first CFA computed to evaluate the adequacy of this three-dimension structure for the entire sample showed overall adequate fit indices (χ^2[24] = 907.99, $p < .001$, $\chi^2/df = 37.83$, TLI = .930, CFI = 953, and RMSEA = .060). The level of invariance across the 18 samples computing a MGCFA suggested that the SD3 reached cross-cultural configural invariance (χ^2[432] = 1670.74, $p < .001$, $\chi^2/df = 3.87$, TLI = .906, CFI = .938, RMSEA = .017), and but not metric (χ^2[534] = 2042.58, $p < .001$, $\chi^2/df = 3.83$, TLI = .908, CFI = .924, RMSEA = .017, $\Delta\chi^2$[102] = 371.84, $p < .001$, ΔTLI = .002, ΔCFI = .014, ΔRMSEA < .001), or scalar invariance (χ^2[636] = 2918.99, $p < .001$, $\chi^2/df = 4.59$, TLI = .883, CFI = .885, RMSEA = .019, $\Delta\chi^2$[102] = 876.41, $p < .001$, ΔTLI = .025, ΔCFI = .039, ΔRMSEA = .002).

The level of invariance across gender was investigated by computing a MGCFA. Across gender, the SD3 did not reached adequate fit indices for configural invariance (χ^2[642] = 14,306.33, $p < .001$, $\chi^2/df = 22.28$, TLI = .697, CFI = .723, RMSEA = .045). Configural invariance being a prerequisite for both metric and scalar invariance, these levels were also not reached even if the ΔTLI, ΔCFI, and ΔRMSEA were acceptable for both metric ($\Delta\chi^2$[24] = 112.48, $p < .001$, ΔTLI < .001, ΔCFI = .002, ΔRMSEA < .001), and scalar invariance ($\Delta\chi^2$[6] = 3.64, $p = .725$, ΔTLI < .001, ΔCFI < .001, ΔRMSEA < .001). A MGCFA using parcels showed on the contrary, that the SD3 reached configural (χ^2[48] = 941.87, $p < .001$, $\chi^2/df = 16.62$, TLI = .928, CFI = .952, RMSEA = .043), metric (χ^2[54] = 963.30, $p < .001$, $\chi^2/df = 17.84$, TLI = .935, CFI = .951, RMSEA = .040, $\Delta\chi^2$[6] = 21.43, $p = .002$, ΔTLI < .001, ΔCFI = .001, ΔRMSEA < .001), and scalar invariance (χ^2[60] = 969.25, $p < .001$, $\chi^2/df = 16.15$, TLI = .941, CFI = .951, RMSEA = .038, $\Delta\chi^2(6) = 5.95$, $p = .429$, ΔTLI < .001, ΔCFI < .001, ΔRMSEA < .001).

Dark Triad Traits (SD3) Position in the HEXACO and ZKA-PQ Personality Space

To observe the position of the three SD3 dimensions in the six-factor space of the HEXACO and the five-factor space of ZKA-PQ, two factor analyses were carried out using the Maximum Likelihood (ML) extraction method with Varimax rotation (Table S-3 and S-4, Supplemental Material). Personality facets from HEXACO and ZKA-PQ with the three SD3 dimensions were analyzed. We obtained similarly robust satisfactory goodness of fit indexes for the two factor matrices, respectively (RMSEA = 0.04/0.05; CFI = 0.98/0.97, and RMSR = 0.03/0.04) (Browne & Cudeck, 1992).

The Machiavellianism, Narcissism and Psychopathy traits obtained high negative loadings on the Honesty-Humility factor (−0.65, −0.58, and −0.55, respectively) in the HEXACO solution. Narcissism also loaded 0.55 on Extraversion, and Psychopathy loaded on Agreeableness and Conscientiousness factors (−0.34 and −0.32, respectively). The facets of each factor of the ZKA-PQ/SF are placed on their respective factor. Psychopathy is located with similar loadings (0.48 and 0.49) on both the Aggressiveness and Sensation Seeking factors, respectively. Narcissism, with a lower loading, is positioned on the Sensation Seeking (0.38) and Activity

factors (0.32), while Machiavellianism, also with a lower loading, is positioned on the Aggressiveness factor (0.33).

Table S-5 (Supplemental Material) shows the factor solutions extracting 3, 4, 5, and 6 factors using the same factor extraction (ML) and rotation method (Varimax), but including only the dimensions of SD3, ZKA-PQ, and HEXACO. In the three-factor solution, Psychopathy and Machiavellianism were located with high Aggressiveness and Sensation Seeking, and low Honesty-Humility, Agreeableness, and Conscientiousness on the first factor. Narcissism loaded on the second factor with Extraversion (ZKA-PQ and HEXACO), Activity and, with a lower loading, Openness. In the following factorial solutions (from 4 to 6 factors), the three dimensions of SD3 are always grouped on the same factor, although Narcissism also loaded on the Extraversion factor with similar weight. In the four-factor solution, the three dimensions of SD3 are grouped with Sensation Seeking (positive), and Honesty-Humility and Conscientiousness (negative). In the five-factor solution, they grouped with Honesty-Humility, and Sensation Seeking forms the fifth factor; in the six-factor solution, the three dimensions of SD3 are grouped into a single factor together with Honesty-Humility. It should be remarked that Honesty-Humility loaded on the factor formed by the three SD3 dimensions on every solution depicted in Table S-5 (Supplemental Material).

Additionally, we tested the hypothesis of Hodston et al. (2018) on the superposition of the three scales of the Dark Triad and the four facets of Honestity-Humility. Exploratory factor analysis, using the oblique rotation principal component extraction method, of the seven variables in all countries confirms this overlap, except for Togo and Senegal. Figure 1 shows the factorial weights and the diagram obtained by means of the structural equation models in the present study and in that of Hodston et al. (2018), with very similar results.

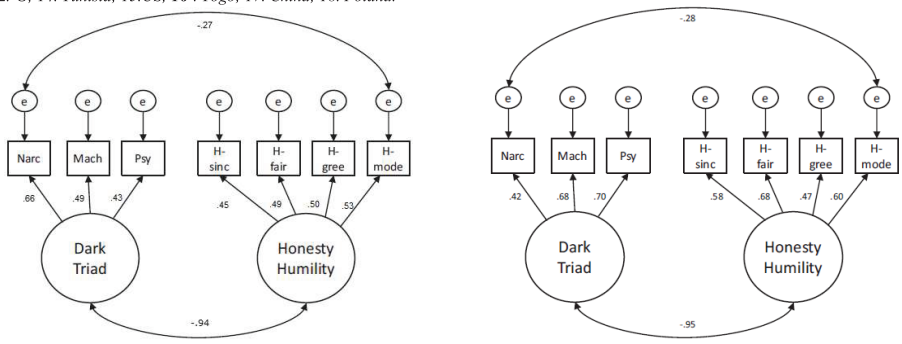
Descriptive Statistics and Gender Differences by Culture and Reliability

Table 1 show the means, standard deviation, Cohen's *d* gender differences, and Cronbach's internal consistency index for each SD3 dimension classified by Europe/US/Israel cultures and other cultures. Men obtained higher scores than women for all three SD3 dimensions, but there are differences by culture. For Machiavellianism, the culture with the highest Cohen's *d* is Poland, although with a medium effect size[2] (0.69), and the average *d* for all cultures was 0.25. For the Narcissism dimension, men scored higher than women in the German-speaking Swiss culture (0.50) and Poland (0.45); the average Cohen's *d* across cultures was 0.18. For Psychopathy, however, gender differences were greater, with a Cohen's *d* average of 0.35. The cultures in which men rated highest in Psychopathy compared to women were Switzerland (German-speaking) (0.75), Germany (0.62), Italy (0.58), China (0.51), and Hungary (0.50). It is also observed that the Gender-Equality-Personality Paradox is supported since gender differences were larger in European countries and the US. In fact, when only European countries and the US were considered, the average of gender differences were 0.31, 0.25, and 0.45 for Machiavellianism, Narcissism, and Psychopathy, respectively, higher values than those observed in Non-Western countries (0.23, 0.11, and 0.28, respectively). This pattern is in agreement with the larger gender differences observed in the DTDD on WEIRD (Western, Educated, Industrialized, Rich, Democratic) compared to non-WEIRD countries (Rogoza et al., 2021).

The low-income cultures obtained a significantly higher mean in Machiavellianism, Narcissism and Psychopathy ($p < .001$). Controlling for age, gender and SPI, the differences are the same, but with a small effect size for Machiavellianism and Psychopathy and medium for Narcissism ($\eta^2 = .008$, .053, .008, respectively). If European/US/Israel and other cultures are compared, the significant differences remain, but with a medium effect size for Narcissism and Psychopathy ($\eta^2 = .017$, 0.10.2, 0.082, respectively) (Figure 2).

	1	2	3	4	5	6	7	8	9	***10****	11	12	13	14	15	***16****	17	18
Machiavellianism	-.73	-.60	-.64	-.64	-.66	-.63	-.64	-.62	-.46	*-.56*	-.68	-.72	-.76	-.71	-.74	*-.40*	-.53	-.68
Narcissism	-.52	-.64	-.60	-.63	-.52	-.52	-.63	-.58	-.47	*-.58*	-.54	-.59	-.46	-.32	-.40	*-.77*	-.44	-.61
Psychopathy	-.53	-.60	-.62	-.69	-.54	-.38	-.51	-.52	-.57	*-.46*	-.63	-.57	-.59	-.40	-.54	*-.27*	-.48	-.56
Sincerity	.41	.34	.47	.33	.51	.49	.53	.62	.42	*.03*	.52	.51	.54	.21	.51	*.22*	.40	.47
Fairness	.50	.45	.57	.43	.46	.48	.54	.54	.50	*.16*	.57	.54	.54	.29	.63	*.12*	.49	.47
Greed-Avoidance	.50	.50	.54	.41	.54	.66	.61	.56	.28	*.20*	.56	.51	.48	.47	.55	*.33*	.50	.50
Modesty	.57	.62	.60	.53	.60	.74	.64	.61	.33	*.44*	.56	.55	.56	.37	.53	*.50*	.50	.64

1. Belgium; 2. Bosnia; 3. Catalonia; 4. Chile; 5. Germany; 6. Hungary; 7. Israel; 8. Italia; 9. Qatar; ***10****. Senegal; 11. Spain; 12. Switz.-F; 13. Switz.-G; 14. Tunisia; 15.US;* ***16****. Togo; 17. China; 18. Poland.*



Current study (N = 10,298) Hodson et al., 2018 (N = 1,402)

Figure 1. Exploratory Factor analysis of the three scales of SD3 and the four facets of Honesty-Humility factor of the HEXACO-60 in a single factor, and meta-analytic test of latent-level relation between Dark Triad and Honesty-Humility. Diagrams show comparison between current and Hodon et al. (2018) study.

Note. Narc = Narcissism, Mach = Machiavellianism; Psy = Psychopathy; Sin = Sincerity; Fair = fairness; Gree = Greed avoidance; Mode = Modesty.

The averages of alpha internal consistency in all cultures were 0.72, 0.72, and 0.73 for Machiavellianism, Narcissism and Psychopathy, respectively. The alpha coefficients were similar to those reported in the development SD3 two studies: Machiavellianism (0.74/0.76), Narcissism (0.68/0.78), and Psychopathy (0.73/0.73) (Jones & Paulhus, 2014). Nevertheless, some reliability differences between cultures are observed in the three dimensions. African or Arab cultures tended to have lower alpha coefficients. Note that these cultures also obtained low alphas for the ZKA-PQ and HEXACO in the same sample (Aluja et al., 2020; García et al., 2021).

Figure S-10 (Supplemental Material) shows gender differences by age groups in the three dimensions of SD3 for the full sample of all cultures. There are only significant gender differences in Psychopathy for the age range of 18 to 30. The graph also shows that the three SD3 dimensions slightly decline with age, but more markedly in Machiavellianism and Psychopathy. However, for the three dimensions there is a small increase beyond the age of 60.

Dark Triad Traits (SD3) Pearson and Partials Correlations

The correlations in the entire sample were Machiavellianism and Narcissism (.34), Machiavellianism and Psychopathy (.43) and Narcissism and Psychopathy (.38). In the original SD3 validation (three studies), Machiavellianism correlated with Narcissism, Machiavellianism correlated positively with Psychopathy (.50, .30, and .47) and Psychopathy with Narcissism at .34, 31, and .42 (Jones & Paulhus, 2014). Table S-6 shows the Pearson and partial correlations controlling for age and gender for SD3 scales for culture. All correlations were significant ($p < .001$) in all samples, but there were important differences between cultures. The correlation

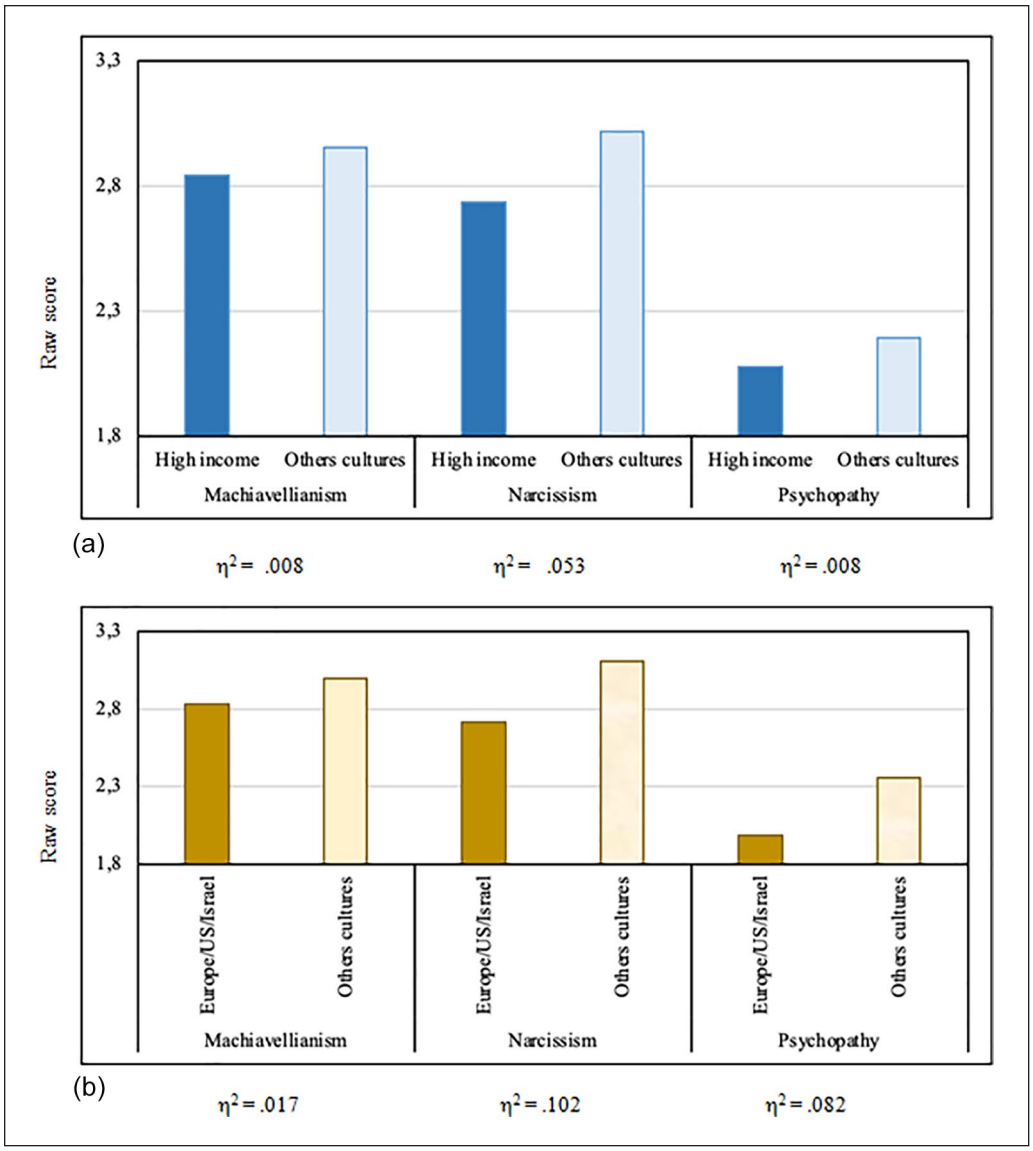


Figure 2. Estimates mean comparison between high income and other cultures (a) and Europe+US+Israel and other cultures (b) cultures controlling for age, gender and SPI. SPI: Social Position Index. Group differences were significant in all cases at $p < .001$.

between Machiavellianism and Narcissism had a range between .18 and .45, between Machiavellianism and Psychopathy a range between .22 and .57, and the range of correlations between Narcissism and Psychopathy was between .22 and .45.

Cultural Differences in Dark Triad Traits (SD3)

We studied the SD3 differences across cultures using a GLM Multivariate procedure. We first controlled for age and gender, (Table S-8, Supplemental Material). The GLM test is based on the linearly independent pairwise comparisons among the estimated marginal means corrected

by the co-variables effect. The culture factor accounts for a significant amount of variance for all three SD3 dimensions (Machiavellianism $\eta^2 = .057$, Narcissism $\eta^2 = .159$ and Psychopathy $\eta^2 = .124$). Significant effects of age and gender were also found for the three SD3 dimensions ($p < .001$), but effect size was smaller than for culture, especially in the case of Narcissism and Psychopathy) (Table 3). The *z*-standardized scores for SD3 dimensions between cultures controlling for gender and age are plotted in Figure 3, graph A. The cultures near to or slightly exceeding ±0.50 were Qatar (PS: 0.59), Senegal (NA: 0.77) and US (NA: −0.54). Cultures with values between 0.35 and 0.50 are as follows: in Machiavellianism, Chile (−0.39); in Narcissism, Belgium (−0.38), Catalonia (−0.36), China (−0.37) and Switzerland (French-speaking) (−0.35), and in Psychopathy, Spain (−.31).

A second GLM Multivariate analysis controlling for age, gender, Social Position Index, Honesty-Humility, Aggressiveness, Sensation Seeking and Extraversion (average ZKA-PQ and HEXACO Extraversion scores) was carried out (Table S-9, Supplemental Material). Honesty-Humility had effects on Machiavellianism ($\eta^2 = .125$), Narcissism[3] ($\eta^2 = .085$) and Psychopathy ($\eta^2 = .124$). Aggressiveness influenced Psychopathy ($\eta^2 = .110$). Sensation Seeking had an effect on Psychopathy ($\eta^2 = .063$), and the Extraversion of ZKA-PQ and HEXACO (average) had an effect of $\eta^2 = .095$ on Narcissism. The results indicated that there were significant differences for all three dimensions of SD3 ($p < .001$) in the two data matrices using a Paired Samples Test according to the two conditions (Figure 3 graphic B). The values of both arrays are shown in the Supplemental Material (S-7, Supplemental Material). The graph values were, in general, somewhat lower than in graph A. The cultures with the greatest differences were China, Hungary, and Tunisia.

Social Position Index and Dark Triad traits (SD3) Dimensions

To study the relationship between the three dimensions of SD3 and the Social Position Index (SPI), the means between the five SPI ranges were compared using an ANOVA. For Machiavellianism, there were no significant mean differences ($F_{(4,\ 7651)} = .440$, $p < .780$), but there were for Narcissism ($F_{(4,\ 7651)} = 20.83$, $p < .001$) and Psychopathy ($F_{(4,\ 7651)} = 6.49$, $p < .001$). SPI ranges of SD3 differences are reported in Figure 4. Subjects with an upper or upper-middle SPI had higher scores on Narcissism, while subjects with a low SPI had low scores. With regard to the Psychopathy dimension, however, the data indicate the opposite; people with upper or upper-middle position have low scores and those with low SPI had high scores in Psychopathy.

Discussion

The present study explored the Dark Triad personality traits using the SD3 in different cultures across Europe, America, Africa, and Asia. We focused on gender and age differences, their relationship to social status, and the relationship between the Dark Triad and personality, as modeled by HEXACO and AFFM. It is the first time that the three questionnaires have been studied simultaneously in a wide sample of countries. The global factor congruence of SD3 with respect to the original factorial matrix is at the lower limit of the satisfactory range (0.85–0.95), but some countries obtain low factorial congruence indices, particularly in the Psychopathy dimension. While ZKA-PQ and HEXACO-60 have shown good psychometric properties and cross-cultural generalizability in this same sample (Aluja et al., 2020; García et al., 2021), with the exception of some Arab or African cultures, SD3 shows moderate internal consistency values (around 0.70), although similar to the original study (Jones & Paulhus, 2014). The factorial structure of the SD3 of the entire sample replicated the three original factors considering congruence coefficients or the goodness-of-fit indicators using parcels but not the goodness-of-fit indicators

Table 3. Correlations with Age and Gender Differences for each Personality Scales (SD3) and Each Sub-Sample.

		Partial correlations with age controlling for gender			Correlations with SPI controlling for gender			Gender differences controlling for age (partial η^2)					
								MA		NA		PS	
Sub-sample		MA	NA	PS	MA	NA	PS	η^2	$p <$	η^2	$p <$	η^2	$p <$
Europe/US/Israel	Switz. (F)	**−.15*** **	**−.05**	**−.17*** **	**.05**	**−.15***	**.27*** **	**.024**	**<.006**	**.047**	**<.001**	.063	**<.001**
	Switz. (G)	**−.19 *** **	**−.01**	**−.27*** **	**.08**	**−.14***	**.07**	**.047**	**<.001**	.055	**<.001**	.137	**<.001**
	Germany	**−.10 ** **	**−.07**	**−.29**	**.07**	**−.13** **	**.08**	**.036**	**<.001**	**.019**	**<.001**	.095	**<.001**
	US	**−.23 *** **	**−.07**	**−.29*** **	**−.01**	**−.18*** **	**−.04**	**.016**	**<.009**	**.008**	**<.056**	.078	**<.001**
	Belgium	**−.10**	**−.03**	**−.24*** **	**−.11**	**−.13***	**−.03**	**.001**	**<.542**	**.050**	**<.001**	.088	**<.001**
	Italy	**−.20 *** **	**−.12** **	**−.22*** **	**−.04**	**−.18** **	**−.04**	.057	**<.001**	**.037**	**<.001**	.089	**<.001**
	Israel	**−.08**	**−.06**	**−.02**	**.14***	**−.01**	**.13**	.057	**<.001**	**.010**	**<.105**	**.053**	**<.001**
	Catalonia	**.02**	**.14*** **	**−.23*** **	**.08**	**.02**	**.17*** **	**.030**	**<.001**	**.013**	**<.003**	.055	**<.001**
	Spain	**.05**	**−.18*** **	**−.23*** **	**.13** **	**−.07**	**.11***	**.031**	**<.001**	**.015**	**<.001**	**.040**	**<.001**
	Poland	**−.21 *** **	**−.13** **	**−.09***	**.04**	**−.06**	**.10***	**.116**	**<.001**	**.053**	**<.001**	**.038**	**<.001**
	Hungary	**−.21 *** **	**−.08**	**−.26*** **	**.01**	**−.15** **	**.11***	**.038**	**<.001**	**.026**	**<.001**	.061	**<.001**
	Bosnia H.	**−.17 *** **	**.04**	**.08**	**.06**	**−.07**	**.03**	**.005**	**<.141**	**.000**	**<.910**	**.015**	**<.009**
	Average	−.13	−.05	−.19	.04	−.10	.08	.038	<.059	.028	<.090	.068	<.002
Other cultures	Qatar	**−.16 *** **	**−.08***	**−.13*** **	**.09**	**−.12***	**.09***	**.000**	**<.752**	**.003**	**<.109**	**.007**	**<.021**
	Chile	**−.01**	**.11** **	**−.03**	**−.11**	**−.03**	**.10**	**.004**	<.183	**.002**	<.430	**.011**	<.037
	China	**−.04**	**−.00**	**−.15*** **	**−.16***	**−.06**	**.04**	**.009**	<.023	**.005**	<.081	.063	**<.001**
	Tunisia	**−.12 ***	**−.13***	**−.15** **	**.02**	**−.10**	**−.02**	**.008**	<.211	**.002**	<.615	**.015**	**<.054**
	Senegal	**−.01**	**−.04**	**−.03**	**.04**	**−.02**	**−.01**	**.000**	<.756	**.006**	<.002	**.001**	<.237
	Togo	**−.16*** **	**−.15*** **	**−.23*** **	**.05**	**−.06**	**.06**	**.008**	<.100	**.003**	<.326	**.023**	<.004
	Average	−.08	−.05	−.12	−.01	−.07	.04	.005	<.338	.004	<.261	.020	<.059

Note. MA = Machiavellianism; NA = Narcissism; PS = Psychopathy; SPI = Social Position Index; (F): French; (G) German. *$p < .05$; **$p < .01$; ***$p < .001$. η^2 equal to or above .055 are given in boldface type. $\eta^2 < .0099$ = negligible; $\eta^2 > .01$: small; $\eta^2 \geq .0588$ medium; $\eta^2 \geq .1379$: large effect size (Cohen, 1988, pp. 274–288). The cultures are arranged according to the Gross Domestic Product Purchasing Power. https://www.gfmag.com/global-data/economic-data/richest-countries-in-the-world. (S-1 Supplemental Material).

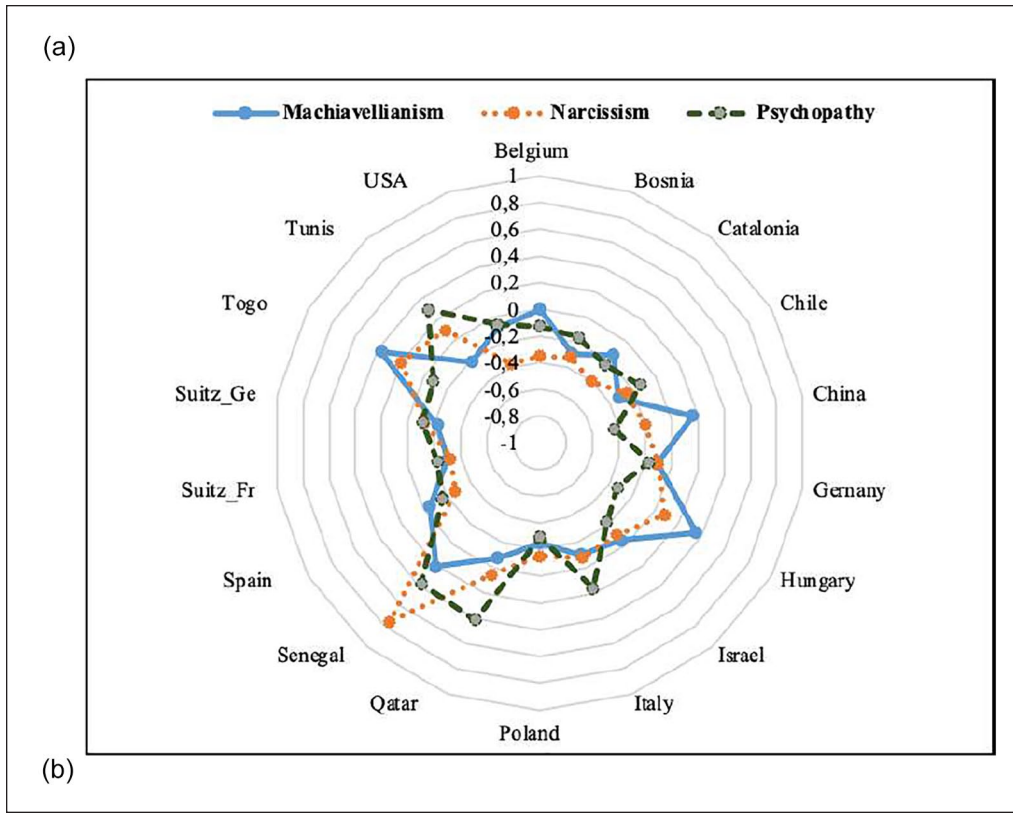


Figure 3. (a) Standardized z-scores of SD3 personality scales by culture controlling for age and gender, (b) standardized z-scores of SD3 personality scales by culture controlling for age, gender, Social Position Index, Honesty-Humility, Aggressiveness, Sensation Seeking, and Extraversion.

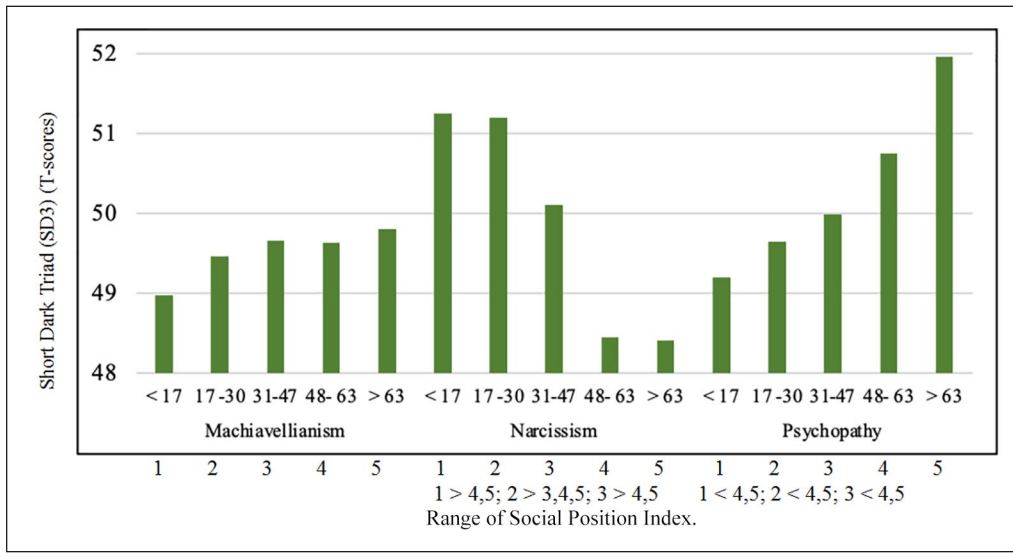


Figure 4. Social Position Index range differences in SD3 adding all countries. $p < 0.01$. Upper: < 17; upper-middle: 18–31; middle: 32–47; low-middle: 48–63; and low: >63.

resulting from a regular CFA. It is worthy to note that the parcel approach that been criticized by many psychometricians and methodologists (e.g., Marsh et al., 2013). These results illustrate the difficulties of assessing the structure underlying a personality inventory using a large set of lowly correlated items using a CFA approach (e.g., McCrae et al., 1996). Using a regular MGCFA approach, the SD3 did not reach configural, metric or scalar invariance. Considering parcels did allow to reach configural and somehow metric invariance, but clearly not scalar invariance, as did the ZKA-PQ/SF and HEXACO-60 in the same samples (Aluja et al., 2020; García et al., 2021). Several methodologists would claim that in this case means cannot be compared across cultures (Rossier & Duarte, 2019). However, this type of mismatch between the psychometric approach (large sample of uncorrelated items) and the statistical approach (parsimonious highly correlated observed variables), and the over emphasis given to the question of the measurement invariance did lead several methodologists to suggest that the criteria to assess invariance across cultures were too strict, considering differences not directly related with the latent constructs (Millsap, 2011). A recent contribution highlights the limitation of measurement invariance construct and shows that when cross-group differences are important measurement invariance is very difficult to reach, because it is closely linked with the arithmetic of the closed-ended scaled that are used (Welzel et al., 2021). For personality measurements, invariance is indeed usually observed when differences are very small (e.g., Rossier et al., 2012). Moreover, Welzel et al. (2021) suggested that the cross-cultural validity of multi-item index should not be assessed considering single items. This could be an argument in favor of the parcel approach, even if this approach does not solve the arithmetical limitation mentioned.

Considering the gender and cultural differences on the Dark Triad traits observed in the present paper, the idea that processes of enculturation and socialization play a role in the prevalence of Dark Triad is supported. However, it should be noted that effect sizes of the differences between gender and cultures on the three Dark Triad traits were usually below $d = 0.40$, suggesting a not very large effect size. This is congruent with behavioral genetic studies about the Dark Triad. Psychopathy and Narcissism have strong genetic (about 60%) and non-shared environment (about 35%) percentages of variance, which is typical in the field of personality (Vernon et al., 2008). Machiavellianism, however, is a notable exception, as shared environment seems the most relevant factor accounting for phenotypic differences (39%), with a heritability of only 30% (Vernon et al., 2008). In the present study, culture accounts for fewer differences in Machiavellianism than in Psychopathy and Narcissism. It should be noted that the profiles observed in this study are like the profiles observed in other samples from the same countries. Hence, the profile we observed in the US, with higher scores for men and higher scores on Machiavellianism and Narcissism, is similar to the profile observed by Jones and Paulhus (2014) or Persson et al. (2019). Curiously, scores that were expected to be higher in individualistic cultures were in fact lower in most Western cultures compared to African and Asian cultures. While the important social control feature of collectivistic cultures might lead to a reduction in the prevalence of antisocial or narcissistic personality disorders symptoms (Rossier et al., 2017), this control could also tend to increase the expression of maladaptive personality and sub-clinical traits, being perceived as socially more acceptable than clinical traits. We could speculate that the level of social stigma of mental illness that is known to be higher in Eastern cultures (Krendl & Pescosolido, 2020) (and that could be generally higher in non-Western collectivistic cultures) might explain lower prevalence rates for personality disorders but higher levels on socially more accepted sub-clinical traits that could be perceived as more acceptable, as in our African, Middle-Eastern, and Asian samples.

These results support the idea that cultural context shapes how people express their personality in reference to others. Nevertheless, exactly how culture influences this expression remains largely unknown and should be further studied.

The three Dark Triad traits present relationships with HEXACO and AFFM in agreement with our predictions. All three scales correlate negatively with Agreeableness (Vize et al., 2020; Watts

et al., 2017), but most strongly with Honesty-Humility (Lee & Ashton, 2014). Psychopathy is negatively related to Conscientiousness, and positively to Aggressiveness and Sensation Seeking. Narcissism correlates positively with Extraversion. Machiavellianism and Psychopathy are related to Aggressiveness. It is also worth remarking that, in a three-factor space, Psychopathy and Machiavellianism load on the same factor as Aggressiveness, Honesty-Humility, Sensation Seeking and Conscientiousness. This factor appears highly similar to the Eysenck Psychoticism trait (Eysenck & Eysenck, 1977; Eysenck et al., 1985). In this solution, Narcissism loads on the Extroversion factor, along with Activity and Openness.

It is also striking that, in the four, five and six factor solutions, the three Dark Triad traits scales tend to load on the same factor with Honesty-Humility from the HEXACO. Our results demonstrate an almost perfect overlap between the three Dark Triad scales and the four Honesty-Humility facets, corroborating the results of Hodston et al. (2018) In fact, the present study replicates what has been found previously, in that this sixth factor of the HEXACO model could be the best personality correlate of the Dark Triad traits (Lee & Ashton, 2014), although other personality traits such as Sensation Seeking clearly add explanatory power. It is interesting to note that if the Dark Triad has been consistently and strongly associated with the Honesty-Humility personality trait, a recent study showed that this Triad is even more strongly associated with the pathological trait of Antagonism from the Personality Inventory for the DSM-5 (Dinić et al., 2021). This might be seen as consistent with the fact that this triad is a set of sub-clinical personality traits, so somewhere in between common and subclinical personality. Overall, the present study supports the notion that the Dark Triad consists of a homogeneous cluster of maladaptive personality and sub-clinical traits (Jakobwitz & Egan, 2006; Paulhus & Williams, 2002), and is, therefore, not in agreement with studies suggesting a non-significant correlation between Narcissism and Machiavellianism (Lee & Ashton, 2005; Rogoza & Cieciuch, 2020).

The literature reports that low Social Position or socioeconomic status is linked to Psychopathy, and that groups of subjects with higher social standing present higher rates of Narcissism. The results of the present study replicate this pattern of relationships across 18 different cultures. Therefore, the present paper also reinforces the idea that these sub-clinical traits, as well as the personality traits associated, could have a real impact on social phenomena. Hence, the present paper highlights the need to consider these psychological variables in actions to prevent and tackle things like poverty and social deprivation. What is also relevant is that this pattern of results is observed across a variety of cultures that clearly differ in political and economic systems, welfare and other political, economic and social indexes. Finally, our results are in agreement with previous studies that point out that Machiavellianism plays no role in the observed differences on SES.

The Dark Triad has shown practical utility in the prediction and explanation of many behavioral outcomes such as counterproductive behaviors in organizational settings (DeShong et al., 2015), addiction (Jauk & Dieterich, 2019), clinical symptoms (Gómez-Leal et al., 2019), educational preferences (Krick et al., 2016), and mate choice (Jonason, Baughman et al., 2015). The results of the present study suggest this practical utility, indicating that the Dark Triad is a potentially useful tool for research and psychological practitioners all over the world.

This research has strengths and limitations. Among the strengths is a particularly large sample ($>$10,000) that comes from community subjects, not only students. The proportion of man and woman participants is similar, and the average age is over 40 years, and was somewhat stratified to avoid excessive sampling biases. In regard to limitations, sampling procedures in every culture were not entirely representative of the culture of reference, although a concerted effort was made to achieve appropriate representation across age and gender. African or Arab cultures tended to have lower alpha coefficients and low factor congruence coefficients in SD3 but also in ZKA-PQ

and HEXACO in the same sample (Aluja et al., 2020; García et al., 2021). This could be due to difficulties in comprehension or motivation, biased response styles within countries, or low education levels (Laajaj et al., 2019). Hence, replication of the present studies is recommended with larger and more representative samples, even including sub-samples with different educational levels to control for this variable. Finally, SD3 presents some high secondary loadings on a different factor, as recognized by the authors in the limitations section of the original study. As some of the psychometric properties of SD3 are not entirely satisfactory, more suitable instruments should be used in future studies on Dark Triad traits.

Authors' Note

Anton Aluja designed and coordinated this research. He also performed the statistical calculations and wrote the article with the collaboration of Luis F. García and Jérome Rossier. Fritz Ostendorf and Joseph Gliksohn made contributions and suggestions that were incorporated in the manuscript. All co-authors collected and provided data on their culture and approved the final version.

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Supplemental Material

Supplemental material for this article is available online.

Notes

1. Some of the data have already been used for other studies. The French-speaking Swiss, Belgium, and Togolese data have been partly used in a study aimed at predicting perceived employability (Atitsogbe et al., 2020). Moreover, this data collection has been included in a larger research project aimed at assessing the cross-cultural validity of several inventories assessing personality traits, such as the ZKA-PQ or the HEXACO-60 (Aluja et al., 2020; García et al., 2021).
2. Cohen's *d*: 0.01: very small, .20: small, 0.50: medium, 0.80: large, 1.20: very large.
3. $\eta^2 < .0099$ = negligible; $\eta^2 > .01$: small; $\eta^2 \geq .0588$ medium; $\eta^2 \geq .1379$: large effect size (Cohen, 1988, pp. 274–288).

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