



Measuring the dark core: A Brazilian adaptation and comparison between the general population and incarcerated men

Bruno Bonfá-Araujo^{a,*}, Leonardo Borges Ferreira^b, Ana Deyvis Santos Araújo Jesuino^c, Nelson Hauck-Filho^d, Fabio Iglesias^b

^a The University of Western Ontario, Canada

^b University of Brasília, Brazil

^c Federal University of Maranhão, Brazil

^d São Francisco University, Brazil

ARTICLE INFO

Keywords:

Antagonism

D factor

Dark traits

Validation studies

ABSTRACT

Aversive or socially undesirable personality traits, characterized by harmful attitudes and behaviors, are gaining more momentum. In the present study, we aimed to describe the cross-cultural adaptation of the versions of the Dark Factor Measure to the Brazilian context and compare results between the general population and incarcerated men to provide insights into socially undesirable traits across different populations. Participated in our study 3229 people aged 18 to 78 years ($M = 31.26$; $SD = 10.01$) and 147 incarcerated men aged 18 to 53 years ($M = 28.91$; $SD = 7.31$). We used an Exploratory Bifactor Structural Equation Modeling (ESEM) to investigate the instrument adequacy. Our findings reveal that the Dark Factor Measure, with its three versions (i.e., D70, D35, D16), demonstrates satisfactory psychometric properties in Brazilian-Portuguese when using a bifactor and unidimensional model, supporting the reliable assessment of the dark core of personality. Additionally, our study highlights sex differences, with men displaying higher levels of dark personality traits when compared to women and incarcerated men showing much higher levels of darker traits when compared with men from the general population. In conclusion, our study sheds light on the unifying construct of the Dark Factor of Personality and its relevance in understanding aversive behaviors.

Usually, group settings require people to interact with each other and respect collective moral values. However, transgressive behavior, trivial indulgences, and even serious crimes are not rare. Some individuals live on the margins of society, purely following their interests, no matter what harm they need to do in order to serve their interests. They are usually referred to as having aversive or socially undesirable personality traits. The so-called “dark personality traits” can be significant predictors of violence and are related to various antisocial behaviors (Jakobwitz & Egan, 2006; Jonason & Webster, 2010; Paulhus & Dutton, 2016; Paulhus & Williams, 2002).

Empirical and theoretical studies have tried to understand socially undesirable personality characteristics and individual differences at a subclinical level, with some traits indicating a disposition to harmful attitudes and behaviors. Studies have focused on isolated characteristics, such as impulsiveness (Dolan & Fullam, 2004) egoism (Weigel, Hessing, & Elffers, 1999), narcissism (Raskin & Hall, 1979), Machiavellianism (Christie & Geis, 1970), psychopathy (Levenson, Kiehl, & Fitzpatrick,

1995; Lilienfeld & Andrews, 1996), sadism (Buckels, Jones, & Paulhus, 2013; Davies & O'Meara, 2007; Min, Pavisic, Howald, Highhouse, & Zickar, 2019), and also a composite of these traits such as the Dark Triad (Jakobwitz & Egan, 2006; Jonason & Webster, 2010; Jones & Paulhus, 2014; Paulhus & Williams, 2002), the Dark Tetrad (Buckels et al., 2013; Mededović & Petrović, 2015; Paulhus, 2014), among many others.

One of the biggest challenges for researchers is to define to what extent these characteristics are, in fact, conceptually and empirically related, referring to two or more traits concurrently, and the extent to which they can be distinguished and analyzed in isolation. The findings of Buckels et al. (2013), for example, indicated a high correlation between traits of sadism, callousness, spitefulness, sadism, and psychopathy, which demonstrates the proximity between the constructs. Moshagen, Hilbig, and Zettler (2018) proposed an argument that sought to unify the theory and measurement of several aversive traits, indicating that a single common core can capture the shared variance across such traits and thus indicators of socially aversive or morally

* Corresponding author at: 1151 Richmond St, London, Ontario N6A 3K7, Canada.

E-mail address: brunobonffa@outlook.com (B. Bonfá-Araujo).

questionable behavior. Specifically, they investigated nine personality traits that have been associated with deviant attitudes and behaviors: egoism, Machiavellianism, moral disengagement, narcissism, psychological entitlement, psychopathy, sadism, self-interest, and spitefulness. According to the conceptualization and supported by the empirical findings (using a bifactor approach), these traits shared a common core, termed the Dark Factor of Personality, or simply *D* (Moshagen et al., 2018), similar to the *g* factor that measures general intelligence. Prior studies, before the conception of *D*, suggested this possibility, indicating that dark features share conceptual similarities and that the measures overlap empirically (Furnham, Richards, & Paulhus, 2013). A common core of the Dark Triad has been suggested to reflect manipulation and callousness, which could better explain narcissism, Machiavellianism, and psychopathy (Jones & Figueredo, 2013). Paulhus (2014), in turn, pointed to callousness as a common core of Dark Tetrad.

D brought the socially undesirable traits together under a single framework to comprehensively reflect an aversive personality. It indicates the dispositional tendency of an individual with a high *D* level to manifest immoral, unethical, and socially transgressive, harmful attitudes and behaviors. In general, individuals with high *D* tend to exalt their usefulness and their personal goals, lowering the value and usefulness of other people, putting their interests first, and harming the interests of others; all of this, supported by a system of self-justifications that allow them to think and act with little feeling of remorse or guilt (Hilbig, Moshagen, Thielmann, & Zettler, 2022; Moshagen et al., 2018).

The Dark Core has a unifying theoretical framework to expand other notions about the similarities of aversive traits and thereby explain the personality characteristics underlying harmful behaviors (e.g., abuse, bullying, cheating, intimidation, insults, exploitation, harassment, humiliation, lying, manipulation, harassment, theft, insults, threats, torture, trolling, among others; Moshagen et al., 2018). Usefulness itself can be translated by conditions of psychological satisfaction, not always clear and observable, such as a sensation of excitement, joy, pleasure, power, status, and, at other times, more apparent as obtaining money, goods, and others, under personal beliefs that normalize, endorse, and justify.

Based on rational item selection techniques, Moshagen, Zettler, and Hilbig (2020a) arrived at three item sets with 70, 35, and 16 items, respectively, that allow the psychometrically sound assessment and measurement of *D* values in a self-report questionnaire. Through the item sets, it is possible to reliably measure the dark core of personality common to any set of aversive traits. The findings by Hilbig et al. (2021b) provide validity evidence of *D* by reinforcing its conceptual and empirical bases. Also, the instrument can measure an intersection of relevant constructs of aversive behavior, such as narcissistic, antisocial, paranoid, and borderline dispositions. Hartung, Bader, Moshagen, and Wilhelm (2021) found evidence that *D* is a stable instrument and that its structure allows us to state that *D*, regardless of age and sex variables, supports its theoretical conceptualization. Moreover, men had higher *D* levels than women; in addition, as age increases, there is a decrease in *D* indices. There is a high correlation between socially undesirable personalities from early adulthood to middle age and a steady decline as age increases. These findings corroborate the conceptual bases and point out that *D* coincides with socially aversive personality characteristics (Hartung et al., 2021). A group of people often associated with aversive behaviors are incarcerated individuals; previous studies suggest that childhood maltreatment is highly linked with psychological distress and adult criminal behavior (Boland et al., 2021). However, this group still lacks evidence regarding the Dark Factor Measure.

Moshagen, Zettler, Horsten, and Hilbig (2020b) performed tests with the instrument and found evidence that *D* is not equivalent to the low pole of the Big Five agreeableness. In sum, the authors noted that *D* and agreeableness are functionally distinct (Hilbig, Moshagen, Horsten, & Zettler, 2021a). Despite operating distinctly in aversive behaviors, mainly dishonesty, the common core of *D* is not simply the reflection of low agreeableness, even though it has attitudinal characteristics that

endorse a lack of empathy or guilt. However, it also should be put into perspective that there is no common agreement for the conception of the *D* and its' non-equivalence to the low pole of agreeableness; there is an ongoing debate, with different authors suggesting that *D* can be understood as antagonism (i.e., low pole of agreeableness) and such results were found because of the conceptualization used for agreeableness (cf. Vize & Lynam, 2021; Vize, Miller, & Lynam, 2021). Thus, newer data and information from different countries could contribute to this discussion.

Currently, we are aware of two adaptations of the measure, one to German (Bader et al., 2021) and another to Swedish (Strecker, Kurtz, & Kajonius, 2023). However, both versions resorted only to confirmatory models. Because in those countries, most participants tend to be WEIRD (Henrich, Heine, & Norenzayan, 2010), and they share an individualistic culture, there is a necessity to investigate the measure in non-WEIRD groups from collectivistic cultures. Furthermore, there is a lack of studies regarding the Dark Factor Measure in incarcerated people, which could provide us with a better understanding of how aversive behaviors are displayed in different groups. Thus, in this article, we aimed to describe the cross-cultural adaptation process for Brazil of the instrument proposed by Moshagen, Zettler, and Hilbig (2020a) in search of validity evidence. Also, we further compared the results between a general population and incarcerated men, seeking to provide additional information on how socially undesirable traits work in different populations.

1. Method

1.1. Participants and procedures

This stage of the study comprised 3229 people aged 18 to 78 years ($M = 31.26$; $SD = 10.01$). Among the participants, 51.37% identified themselves as women, 48% as men, and 0.61% as other. For language proficiency, 84.17% spoke Brazilian-Portuguese as their native language, 13.28% were fluent, and 2.53% had a good knowledge of the language. Participants who took part in this study derive from the database collected on the website <https://www.darkfactor.org>, maintained by the authors Morten Moshagen, Benjamin E. Hilbig, and Ingo Zettler, and made available for this research. The website provides self-assessments and automated feedback on *D*. Participants are free to choose which version of the *D* measures to complete. Group A ($n = 2236$) answered the instrument in the 70-item version (52.19% women, aged 18 to 78 years – $M = 30.65$; $SD = 9.75$), group B ($n = 505$) answered the instrument in the 35-item version (51.48% women, aged 18 to 67 years – $M = 32.30$; $SD = 10.12$) and group C ($n = 488$) answered the instrument in the 16-item version (51.63% men, aged 18 to 74 years – $M = 32.91$; $SD = 10.77$).

1.2. Measure

1.2.1. Dark Factor Measure (Moshagen, Zettler, Horsten, & Hilbig, 2020b)

The instrument was developed to assess the Dark Factor of personality based on 12 dark traits, namely, amorality-crudelia, amorality-frustralia, moral disengagement, spitefulness, egoism, self-centeredness, greed, Machiavellianism, narcissism, psychopathy, sadism, and psychological entitlement. The measure has three versions (i.e., D70, D35, and D16) derived using rational item selection techniques and is available in >25 languages. The adaptation of the measure to Brazilian-Portuguese took place in January 2020, with the items being translated and back-translated by three judges proficient in Portuguese and English, considering the recommendations made by the International Testing Commission (International Test Commission, 2017). The items were then sent to the original authors, who identified possible contextual or cultural problems that were resolved in consensus. The final version was approved and considered equivalent between English and Brazilian-Portuguese by the original authors.

1.3. Data analysis

Initially, we used an Exploratory Bifactorial Structural Equation Modeling (Bifactor-ESEM; Asparouhov & Muthén, 2009) to identify the factorial structure of the D70 version as shown in Bader et al. (2021; i.e., with five factors, namely: Callousness, Deceitfulness, Narcissistic Entitlement, Sadism, and Vindictiveness), making use of Bi-Geomin rotation and the Weighted Least Square Mean and Variance Adjusted (WLSMV) estimator, in addition to observing the Root Mean Square Error of Approximation (RMSEA < 0.05), Comparative Fit Index (CFI > 0.90) and Tucker-Lewis Index (TLI > 0.90), considering the criteria proposed by Hu and Bentler (1999). Subsequently, we performed a Bifactor Confirmatory Factor Analysis (Bi-CFA) for the D70 measure and a unidimensional Confirmatory Factor Analysis (CFA) for the two other versions of the instrument (i.e., D35 and D16), using the WLSMV estimator, in addition to the same criteria for the indices of RMSEA, CFI, and TLI adjustment. These analyses were performed using the MPlus 8 software (Muthén & Muthén, 1998-2017).

Next, we tested an invariance for men and women. We assessed invariance in four levels: configural, metric, scalar, and strict. To assess model adequacy, we examined changes in goodness-of-fit, differences bigger than ≤ 0.01 in Comparative Fit Index (Δ CFI), and Root Mean Square Error of Approximation (Δ RMSEA) would indicate invariance violation (Cheung & Rensvold, 2002). It should be noted that for the invariance model, participants who identified as others were excluded from the analysis due to the lack of an expressive number. Finally, the mean differences for the sex variable were analyzed using Student's *t*-test and Cohen's *d*-test to calculate the effect size. The effect size was interpreted from the proposal of Cohen (1988) and Fritz, Morris, and Richler (2012), in which effects < 0.20 are considered small, 0.50 is considered medium, and > 0.80 is considered large. These analyses were performed using the JASP 0.18.1 software (JASP Team, 2023). More information regarding data, coding, and supplementary results can be found at http://osf.io/2hces/?view_only=18ba9c81b40641db807661ce35f45826.

1.4. Results

Aiming to identify whether the factorial structure of the instrument would be better suited to a bifactorial model, as well as the original proposal by Moshagen, Zettler, Horsten, and Hilbig (2020b), exploratory and confirmatory analyses were performed. For the 70-item version, the bifactor exploratory model obtained indexes can be considered adequate $\chi^2(2010) = 7499.770, p = .001$; RMSEA 90% C.I. = 0.035 [0.034–0.036], CFI = 0.96, TLI = 0.95 (factor loadings are shown in the supplementary material). For the bifactor confirmatory model, it obtained adjustment indices also considered adequate $\chi^2(2265) = 13,234.843, p < .001$; RMSEA 90% C.I. = 0.047 [0.046–0.047], CFI = 0.92 and TLI = 0.92, factor loadings and Pearson's correlation between the dimensions can be found in Table 1. More information for competing models (i.e., the 5-factor model) can be found in the supplementary materials.

Next, we tested the unidimensional model for the versions with 35 and 16 items. For the 35-item version, fit indices for the model were excellent $\chi^2(560) = 520.018, p = .886$; RMSEA 90% C.I. = 0.000 [0.000–0.007], CFI = 1.00 and TLI = 1.00. And for the version with 16-items, fit indices were also excellent $\chi^2(104) = 101.910, p = .540$; RMSEA 90% C.I. = 0.000 [0.000–0.022], CFI = 1.00 and TLI = 1.00, factor loadings can be found in Table 2. These results suggest that the Dark Factor Measure, in its three versions (i.e., D16, D35, and D70), presents satisfactory structural validity based on internal structure for the Brazilian population. Furthermore, regarding the reliability of the confirmatory versions, using Cronbach's alpha, McDonald's omega, Guttman's lambda-2 and Average Interitem Correlation (AIC) indicators, the results ranged from adequate to excellent internal consistency, $\alpha = 0.868$; $\omega = 0.869$; $\lambda_2 = 0.870$; AIC = 0.295 for D16, $\alpha = 0.938$; $\omega = 0.940$; $\lambda_2 = 0.940$; AIC = 0.304 for D35. For the D70 version,

considering its bifactor structure, we assessed reliability using omega hierarchical (ω_h), total (ω_t ; Revelle, 2023), and the Explained Common Variance of the general factor (ECV; Rodriguez, Reise, & Haviland, 2015). The results suggested an adequate bifactor model $\omega_h = 0.81$, $\omega_t = 0.97$, and ECV = 0.67.

Finally, we aimed to compare men and women; thus, mean comparisons were performed. Again, people who identified as others were excluded, given the lack of a sufficient number of participants for comparison. In Table 3, we present the invariance model. Our results suggest that Brazilian men and women perceive the items equally and can be directly compared. For the D16 version, men ($M = 35.80$), $t(482) = -5.112, p \leq 0.001, d = -0.465$ obtained a higher mean when compared to women ($M = 31.22$). For the D35 version, men ($M = 85.65$) obtained a higher mean when compared to women ($M = 73.90$), $t(500) = -6.224, p < .001, d = -0.556$. For the D70 version, men showed higher means for all five dimensions, namely, Callousness ($M_{men} = 36.93$; $M_{women} = 32.53, t(2221) = -9.924, p \leq 0.001, d = -0.421$), Deceitfulness ($M_{men} = 20.90$; $M_{women} = 18.22, t(2221) = -9.066, p \leq 0.001, d = -0.385$), Narcissistic Entitlement ($M_{men} = 30.10$; $M_{women} = 28.16, t(2221) = -5.642, p \leq 0.001, d = -0.240$), Sadism ($M_{men} = 41.71$; $M_{women} = 36.26, t(2221) = -9.811, p \leq 0.001, d = -0.417$), and Vindictiveness ($M_{men} = 48.95$; $M_{women} = 43.04, t(2221) = -10.985, p \leq 0.001, d = -0.467$). In general, these tests indicate that men tend to have higher means of socially aversive traits when compared to women.

1.5. Sample comparisons

1.5.1. Participants and procedures

For the data collection with incarcerated men, authorization was obtained from a penitentiary in the Northeast region of Brazil. All ethical guidelines were followed for approval by the Research Ethics Committee. Participants were previously informed about the research information and responded to a Free and Informed Consent Form. Only those who accepted were part of the data collection. A research assistant accompanied the application process and read along with the participants when necessary. The application took about 20 min per participant. We assessed 147 incarcerated men with the Dark Factor Measure 35-items, aged between 18 and 53 years old ($M = 28.91$; $SD = 7.31$). Regarding education, 44.89% had completed Elementary School II, 23.81% could read and write, 14.96% had completed High School, 6.80% could not read and write, and 9.52% had completed higher education. Among the participants, 56.46% were single, 37.41% were married, and the other 6.12% declared themselves divorced and/or widowed. Finally, regarding monthly income, 57.14% had a family income of less than R\$ 1000.00 (around \$ 210 US dollars) per month, 35.37% from R\$ 1001.00 to R\$ 3000.00 (from \$ 211 to \$ 625 US dollars) per month, 4.76% above BRL 5001.00 (above \$ 1.041 US dollars) per month and 2.72% from BRL 3001.00 to BRL 5000.00 (from \$ 626 to \$ 1.040 US dollars) per month. In addition, the 242 men who answered the D35 version, already described in the first part of this study, were used.

1.6. Instruments

1.6.1. Dark Factor Measure (Moshagen, Zettler, & Hilbig, 2020a)

We used the D35 version described in the first part of this study, which also encompasses the D16 items.

1.6.2. Criminal lifestyle and life history

We developed a measure with six items to assess incarcerated men according to their life history and criminal lifestyle. The first two questions asked participants to rate From 1 (*a little*) to 5 (*a lot*), CH1 = How much do you think prison offers people a chance to overcome the criminal lifestyle? and CH2 = How much do you want to leave the criminal lifestyle? For questions 3 to 6, we used a four-point Likert-type scale (1 = *Nothing to do with my story*, 2 = *Little to do with my story*, 3 = *A*

Table 1
D70 bifactor confirmatory factor analysis and pearson's correlation.

	General factor	Callousness	Deceitfulness	Narcissistic entitlement	Sadism	Vindictiveness
D1	0.65	0.59				
D2	0.73		0.31			
D3	0.64					0.17
D4	0.42	0.07				
D5	0.38			0.36		
D6	0.56					0.06
D7	0.52			0.04		
D8	0.61				0.15	
D9	0.53				0.11	
D10	0.54				0.19	
D11	0.70	0.06				
D12	0.49		0.45			
D13	0.54			0.73		
D14	0.70		0.22			
D15	0.57	0.13				
D16	0.71		0.19			
D17	0.71				0.36	
D18	0.79				0.07	
D19	0.66	0.38				
D20	0.71					-0.05
D21	0.79					-0.29
D22	0.55			0.44		
D23	0.60			0.23		
D24	0.51					0.12
D25	0.61			0.10		
D26	0.61				0.18	
D27	0.60		0.36			
D28	0.46	0.21				
D29	0.69					0.12
D30	0.70	0.17				
D31	0.56		0.41			
D32	0.64					0.01
D33	0.66				0.05	
D34	0.69				0.23	
D35	0.47	0.45				
D36	0.60		0.22			
D37	0.62				-0.01	
D38	0.56	0.30				
D39	0.46			0.41		
D40	0.70				0.30	
D41	0.50			0.13		
D42	0.63				0.66	
D43	0.55		0.26			
D44	0.58	0.05				
D45	0.53					0.03
D46	0.61	0.50				
D47	0.52		0.44			
D48	0.72				0.04	
D49	0.51			0.64		
D50	0.72					0.13
D51	0.63				-0.05	
D52	0.56				0.23	
D53	0.46					0.34
D54	0.62				0.31	
D55	0.54					0.04
D56	0.67				0.12	
D57	0.66					0.07
D58	0.68	0.24				
D59	0.58					-0.24
D60	0.72					0.18
D61	0.45			0.06		
D62	0.60					0.01
D63	0.54			0.38		
D64	0.71					0.03
D65	0.54	0.15				
D66	0.71				0.28	
D67	0.59					0.16
D68	0.65	0.38				
D69	0.50	0.39				
D70	0.59				0.26	
Callousness						
Deceitfulness		0.70				
Narcissistic Entitlement		0.64	0.64			
Sadism		0.82	0.77	0.69		
Vindictiveness		0.80	0.75	0.69	0.84	

Table 2
D35 and D16 unidimensional confirmatory factor analysis.

General Factor – D35		General Factor – D16	
D1	0.68	D1	0.62
D2	0.52	D2	0.50
D3	0.51	D3	0.59
D4	0.66	D4	0.60
D5	0.38	D5	0.57
D6	0.68	D6	0.45
D7	0.72	D7	0.60
D8	0.66	D8	0.56
D9	0.68	D9	0.58
D10	0.66	D10	0.36
D11	0.60	D11	0.62
D12	0.64	D12	0.60
D13	0.74	D13	0.43
D14	0.46	D14	0.54
D15	0.50	D15	0.52
D16	0.57	D16	0.54
D17	0.60		
D18	0.43		
D19	0.37		
D20	0.61		
D21	0.58		
D22	0.51		
D23	0.44		
D24	0.62		
D25	0.52		
D26	0.63		
D27	0.50		
D28	0.58		
D29	0.32		
D30	0.56		
D31	0.28		
D32	0.67		
D33	0.32		
D34	0.56		
D35	0.51		

lot to do with my story, and 4 = Everything to do with my story). Questions were “Thinking about your story and your involvement with a criminal lifestyle”, CH3 = I got involved in a criminal lifestyle because I needed to survive, and there was a lack of opportunities; CH4 = I got involved in crime because it offers what I need to live; CH5 = I got involved in crime because the government and politicians do little for people; CH6 = I got involved in crime out of pure evil and to fulfill my desire to do evil.

1.7. Data analysis

Seeking to test criterion-related validity, we correlated the D35 scores with the information obtained from our developed Criminal Lifestyle and Life History. Moreover, we tested the measurement invariance of the item parameters by comparing the incarcerated men sample against the community men sample. Because of the reduced sample size and the need to estimate a large number of parameters for the models with 35 items, we restricted this particular analysis to the version with only 16 items, D16. The mean differences between community and incarcerated males were analyzed using both the estimated latent means from the multigroup confirmatory factor analysis and the Student's *t*-test (with Cohen's *d* to calculate the effect size). The analysis was performed using the JASP 0.18.1 software (JASP Team, 2023).

Table 3
Analysis of Sex Invariance in the D70 for the community sample.

Sex invariance models	χ^2	<i>df</i>	CFI	RMSEA[CI]	Model comparison	Δ CFI	Δ RMSEA
Configural	8875.84	4665	0.990	0.029 [0.028/0.029]			
Metric	10,494.68	4735	0.986	0.033 [0.032/0.034]	2 vs. 1	0.004	0.0
Scalar	10,802.60	4800	0.986	0.034 [0.033/0.034]	3 vs. 2	0	0.001
Strict	11,213.72	4870	0.985	0.034 [0.033/0.035]	4 vs. 3	0.001	0

Note. χ^2 = chi-square; *df* = degrees of freedom; CFI = Comparative Fit Index; RMSEA = Root Mean Square Error of Association [CI = Confidence interval].

1.8. Results

Initially, we tested the measurement invariance of the D16 across the community and the incarcerated samples. Results can be found in Table 4. Invariance was reached at the metric (equal factor loadings) but not the scalar level (equal factor loadings and intercepts/thresholds). The latent mean difference obtained in the scalar model, the most restricted model, was 1.02, with incarcerated males exhibiting extremely larger means.

In order to further compare the mean of men from the general population with incarcerated men, a Student's *t*-test was performed. The results by general factor and items are described in Table 5. When the general factor is considered, the group of incarcerated men obtained a higher mean score than men from the general population, with a large effect size. In addition, we decided to analyze the items individually since each one aims to measure a different dark personality trait. In general, incarcerated men had higher means for all items, except for items 2 (Psychopathy – “Payback needs to be quick and nasty”) and 8 (Machiavellianism – “It's wise to keep track of information that you can use against people later”). Effect size ranged from small to large. Next, the correlations between the Dark Factor Measure and the Criminal Lifestyle and Life History of incarcerated men were explored. Our results show that higher scores in socially undesirable behavior are only positively associated with involvement in a criminal lifestyle because of a lack of political and governmental investment and the desire to behave in an aversive way. Criterion-related results are shown in Table 6.

1.9. Discussion

Since the proposal by Paulhus and Williams (2002), the understanding of the association between socially undesirable traits has been changing. It is known that initially, disruptive behaviors, despite being considered equivalent, were modeled separately. However, integrative understandings such as the Dark Factor of personality (Moshagen et al., 2018) and antagonism (Lynam & Miller, 2019) have been gaining more space. Therefore, assuming stability and a pattern of assessment for these behaviors would facilitate evaluative and interventional processes of such undesirable characteristics.

Regarding the Dark Factor measure, Moshagen, Zettler, and Hilbig (2020a) developed three versions of the instrument, with 70, 35, and 16 items. For the present article, adaptations of the three measures were performed. In addition to the original instrument, only two other adaptations are known (German; Bader et al., 2021; and Swedish; Streckert et al., 2023). However, for both versions, exploratory analyses were not performed, resorting only to confirmatory analyses. New evidence was thus needed to demonstrate the efficiency of this measure in Brazilian culture. These investigations are crucial because there are key differences between European and Latin American cultures, especially concerning the relationship between individualist versus collectivist cultural dimensions.

Thus, to explore the measurement of *D* in Brazilian culture, exploratory and confirmatory models were carried out. A bifactorial exploratory proposal was used to characterize the aversive indicators, given the best fit to this model. Similar to previous structures (Bader et al., 2021; Moshagen, Zettler, Horsten, & Hilbig, 2020b), satisfactory psychometric properties were found for the instrument in its three versions.

Table 4
Analysis of Invariance in the D16 for community and incarcerated men.

Models	χ^2	df	CFI	RMSEA[CI]	Model comparison	Δ CFI	Δ RMSEA
Configural	601.22	208	0.890	0.099 [0.090/0.108]			
Metric	626.51	223	0.887	0.097 [0.088/0.106]	2 vs. 1	0.003	0.002
Scalar	1480.98	270	0.661	0.152 [0.145/0.160]	3 vs. 2	0.226	0.056

Note. χ^2 = chi-square; df = degrees of freedom; CFI = Comparative Fit Index; RMSEA = Root Mean Square Error of Association [CI = Confidence interval].

Table 5
Comparison Between Community and Inmates on the D16.

Items	Groups	N	Mean	SD	t	df	p	Cohen's d
D1	1	147	3.231	1.562	-7.283	387	< 0.001	-0.762
	2	242	2.252	1.085				
D2	1	147	2.211	1.366	2.908	387	0.004	0.304
	2	242	2.607	1.256				
D3	1	147	4.122	1.146	-20.111	387	< 0.001	-2.103
	2	242	1.855	1.035				
D4	1	147	2.483	1.426	-1.17	387	0.243	-0.122
	2	242	2.326	1.183				
D5	1	147	3.252	1.466	-7.02	387	< 0.001	-0.734
	2	242	2.285	1.218				
D6	1	147	3.054	1.498	-6.203	387	< 0.001	-0.649
	2	242	2.223	1.13				
D7	1	147	3.245	1.599	-7.751	387	< 0.001	-0.81
	2	242	2.157	1.16				
D8	1	147	2.483	1.326	6.913	387	< 0.001	0.723
	2	242	3.409	1.253				
D9	1	147	3.531	1.346	-11.366	387	< 0.001	-1.189
	2	242	2.153	1.029				
D10	1	147	3.143	1.385	-2.781	387	0.006	-0.291
	2	242	2.781	1.151				
D11	1	147	2.884	1.392	-1.119	387	0.264	-0.117
	2	242	2.727	1.311				
D12	1	147	2.469	1.346	-1.829	387	0.068	-0.191
	2	242	2.149	1.293				
D13	1	147	3.803	1.338	-13.334	387	< 0.001	-1.394
	2	242	2.091	1.156				
D14	1	147	3.565	1.453	-14.414	387	< 0.001	-1.507
	2	242	1.831	0.92				
D15	1	147	2.197	1.412	-0.389	387	0.697	-0.041
	2	242	2.145	1.215				
D16	1	147	3.469	1.477	-14.171	387	< 0.001	-1.482
	2	242	1.756	0.908				
Dark Core	1	147	49.1	9.96	-10.9	387	< 0.001	-1.14
	2	242	36.7	11.4				

Notes. SD = Standard Deviation; df = degrees of freedom; Group 1 = Incarcerated men; Group 2 = Community men.

Table 6
Correlation between the dark core measure (D35) and criminal lifestyle and life history.

	D35	CH1	CH2	CH3	CH4	CH5
CH1	-0.04					
CH2	-0.14	0.40**				
CH3	-0.01	0.03	0.20*			
CH4	0.10	0.01	0.13	0.22*		
CH5	0.19*	0.06	-0.05	0.30**	0.26**	
CH6	0.27**	0.16	-0.02	0.03	0.39**	0.28**

Notes. * $p < .01$, ** $p < .001$. CH1 = How much do you think prison offers people a chance to overcome the criminal lifestyle?; CH2 = How much do you want to leave the criminal lifestyle?; CH3 = I got involved in a criminal lifestyle because I needed to survive, and there was a lack of opportunities; CH4 = I got involved in crime because it offers what I need to live; CH5 = I got involved in crime because the government and politicians do little for people; CH6 = I got involved in crime out of pure evil and to fulfill my desire to do evil.

Another suitable and more parsimonious option, previously suggested (Bader et al., 2021; Moshagen, Zettler, Horsten, & Hilbig, 2020b), was to rely on single factors for the D35 and D16 versions, with excellent results also being found here. Therefore, it can be assumed that the Dark Factor,

as measured by the item sets proposed by Moshagen, Zettler, and Hilbig (2020a), represents the latent tendency toward undesirable behaviors in Brazilian culture. In addition, as already exhaustively described in the dark personality literature (see Furnham et al., 2013; Moshagen et al., 2018), men had higher averages when compared to women, reinforcing the association between disruptive behaviors and the role usually performed by men in different cultures (i.e., dominance).

A second and indeed entirely novel result related to the Dark Factor measure was the higher levels of aversive personality for incarcerated men when compared to men from the general population. It is known that socially undesirable behaviors are usually associated with adverse outcomes, such as crimes and different types of violence, especially in their media representations. The estimated latent means revealed an extremely sized difference, with incarcerated males exhibiting far more levels on the Dark Factor. Studies with incarcerated populations are scarce, especially in the evaluation of subclinical behaviors such as aversive personality. However, previous results—for the dimensions of moral disengagement, spitefulness, Machiavellianism, narcissism, and psychopathy—reinforce the findings evidenced here, signaling the presence of higher means in incarcerated individuals in Italian and Spanish populations. In addition, they suggest that men are more likely to behave violently (Navas, Maneiro, Cutrín, Gómez-Fraguela, & Sobral,

2021; Rogier, Roberti, Garofalo, & Velotti, 2021). Obviously, such results must be considered carefully because one cannot assume causal relationships between the presence of socially undesirable personality traits and crimes, especially if we take into account how social desirability can affect the measurement of aversive traits. Previous studies suggest that a more significant presence of abuse during childhood is connected with higher levels of aggression and socially undesirable traits (Boland et al., 2021; Zhang et al., 2022). Therefore, the presence of violent and threatening experiences may consequently culminate in aversive personality traits, making use of rationalizations to justify such behaviors (Brugués & Caparrós, 2021; Navas et al., 2021). On the other hand, the presence of socially undesirable traits was not associated with recidivist offenses (Brugués & Caparrós, 2021). In sum, new investigations with this population are suggested so that new answers can be obtained, particularly for the association between aversive personality and crimes.

One additional noteworthy discovery pertains to the D16 assessment, which exhibited metric, but not scalar, invariance when comparing responses from community and incarcerated men. However, it is our hypothesis that this specific outcome does not necessarily reflect a deficiency in the scale itself. Rather, it suggests the presence of notable response biases within the incarcerated sample. Individuals with limited reading skills or low motivation to engage in the study often provide less consistent responses and are more inclined to general agreement with questionnaire items. As extensively documented, response biases are contingent on the sample's characteristics, and they can distort the psychometric properties of assessment inventories (Primi, Hauck-Filho, & Valentini, 2022). Unmotivated responders within the incarcerated sample might introduce systematic nuisance variance, resulting in variations in item thresholds between the two samples. Importantly, it should be noted that the psychometric properties remained robust in the community sample, emphasizing the need for careful consideration of these invariance results. To explore this issue further, studies with larger samples and questionnaires designed to control for acquiescence and other response styles are essential in this field.

Our study has two main limitations. First, because people from the general population were assessed through a website, self-selection bias could have happened. Individuals more interested in "dark traits" may have been more likely to participate. But we also consider our sample large enough to reduce the impact caused by a self-selection bias because not only people interested in aversive behavior would have responded to the research call. Second, sociodemographic characteristics of the general population were not assessed (e.g., socioeconomic status and educational background). Because we aimed to adapt all three Dark Factor measures, we have not focused on comparisons beyond the participant's sex. Thus, future studies should compare the socially undesirable traits within and among cultural settings, mainly because Brazil is one of the largest countries and shows cultural differences between its states. Furthermore, future studies should seek to analyze if the Dark Factor measure can be directly compared between different countries using invariance models and should investigate, through longitudinal methods, how time and environment affect the display of aversive behavior.

Data availability

The data that support the findings of this study are available from the corresponding author, upon reasonable request.

Acknowledgments

The authors greatly appreciate Morten Moshagen, Benjamin E. Hilbig, and Ingo Zettler for data sharing and initial comments on our manuscript.

References

- Asparouhov, T., & Muthén, B. (2009). Exploratory structural equation modeling. *Structural Equation Modeling: A Multidisciplinary Journal*, 16(3), 397–438. <https://doi.org/10.1080/10705510903008204>
- Bader, M., Hartung, J., Hilbig, B. E., Zettler, I., Moshagen, M., & Wilhelm, O. (2021). Themes of the dark core of personality. *Psychological Assessment*. <https://doi.org/10.1037/pas0001006>
- Boland, J., Rock, R., Johnson, A. K., Jones, M. A., Salekin, R. T., & Anderson, J. L. (2021). Pathways to incarceration: An examination of childhood maltreatment and personality psychopathology in incarcerated adults. *Psychology, Crime & Law*, 27(3), 253–264. <https://doi.org/10.1080/1068316X.2020.1798426>
- Brugués, G., & Caparrós, B. (2021). Dysfunctional personality, dark triad and moral disengagement in incarcerated offenders: Implications for recidivism and violence. *Psychiatry, Psychology and Law*, 29, 431–455. <https://doi.org/10.1080/13218719.2021.1917011>
- Buckels, E., Jones, D., & Paulhus, D. (2013). Behavioural confirmation of everyday sadism. *Psychological Science*, 24(11), 2201–2209. <https://doi.org/10.1177/0956797613490749>
- Cheung, G. W., & Rensvold, R. B. (2002). Evaluating goodness-of-fit indexes for testing measurement invariance. *Structural Equation Modeling*, 9(2), 233–255. https://doi.org/10.1207/S15328007SEM0902_5
- Christie, R., & Geis, F. L. (1970). *Studies in machiavellianism*. Academic Press.
- Cohen, J. (1988). *Statistical power analysis for the behavioral sciences*. Routledge Academic.
- Davies, J., & O'Meara, A. (2007). "I consider myself sadistic": A qualitative analysis of sadistic endorsement in a group of Irish undergraduates. *The British Journal of Forensic Practice*, 9, 24–30. <https://doi.org/10.1108/14636646200700005>
- Dolan, M., & Fullam, R. (2004). Behavioural and psychometric measures of impulsivity in a personality disordered population. *Journal of Forensic Psychiatry & Psychology*, 15(3), 426–450. <https://doi.org/10.1080/14789940410001721048>
- Fritz, C. O., Morris, P. E., & Richler, J. J. (2012). Effect size estimates: Current use, calculations, and interpretation. *Journal of Experimental Psychology: General*, 141(1), 2–18. <https://doi.org/10.1037/a0024338>
- Furnham, A., Richards, S. C., & Paulhus, D. L. (2013). The dark triad of personality: A 10 year review. *Social and Personality Psychology Compass*, 7(3), 199–216. <https://doi.org/10.1111/spc3.12018>
- Hartung, J., Bader, M., Moshagen, M., & Wilhelm, O. (2021). Age and gender differences in socially aversive ("dark") personality traits. *European Journal of Personality*. <https://doi.org/10.1177/0890207020988435>, 0890207020988435.
- Henrich, J., Heine, S. J., & Norenzayan, A. (2010). The weirdest people in the world? *Behavioral and Brain Sciences*, 33(2–3), 61–83. <https://doi.org/10.1017/S0140525X0999152X>
- Hilbig, B. E., Moshagen, M., Horsten, L. K., & Zettler, I. (2021a). Agreeableness is dead. Long live agreeableness? Reply to Vize and Lynam. *Journal of Research in Personality*, 91, Article 104074. <https://doi.org/10.1016/j.jrp.2021.104074>
- Hilbig, B. E., Thielmann, I., Klein, S. A., Moshagen, M., & Zettler, I. (2021b). The dark core of personality and socially aversive psychopathology. *Journal of Personality*, 89(2), 216–227. <https://doi.org/10.1111/jopy.12577>
- Hilbig, B. E., Moshagen, M., Thielmann, I., & Zettler, I. (2022). Making rights from wrongs: The crucial role of beliefs and justifications for the expression of aversive personality. *Journal of Experimental Psychology: General*, 151(11), 2730–2755. <https://doi.org/10.1037/xge0001232>
- 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), 1–55. <https://doi.org/10.1080/10705519909540118>
- International Test Commission. (2017). The ITC Guidelines for Translating and Adapting Tests (Second edition). www.InTestCom.org.
- Jakobwitz, S., & Egan, V. (2006). The dark triad and normal personality traits. *Personality and Individual Differences*, 40(2), 331–339. <https://doi.org/10.1016/j.paid.2005.07.006>
- JASP Team. (2023). *JASP (Version 0.18.1) [Computer software]*.
- Jonason, P. K., & Webster, G. D. (2010). The dirty dozen: A concise measure of the dark triad. *Psychological Assessment*, 22(2), 420–432. <https://doi.org/10.1037/a0019265>
- 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. <https://doi.org/10.1002/per.1893>
- Jones, D. N., & Paulhus, D. L. (2014). Introducing the short dark triad (SD3): A brief measure of dark personality traits. *Assessment*, 21, 28–41. <https://doi.org/10.1177/1073191113514105>
- Levenson, M. R., Kiehl, K. A., & Fitzpatrick, C. M. (1995). Assessing psychopathic attributes in a noninstitutionalized population. *Journal of Personality and Social Psychology*, 68(1), 151–158. <https://doi.org/10.1037/0022-3514.68.1.151>
- Lilienfeld, S. O., & Andrews, B. P. (1996). Development and preliminary validation of a self-report measure of psychopathic personality traits in noncriminal population. *Journal of Personality Assessment*, 66(3), 488–524. https://doi.org/10.1207/s15327752jpa6603_3
- Lynam, D. R., & Miller, J. D. (2019). On the ubiquity and importance of antagonism. In J. D. Miller, & D. R. Lynam (Eds.), *The Handbook of Antagonism: Conceptualizations, Assessment, Consequences, and Treatment of the Low End of Agreeableness*. Academic Press.
- Mededović, J., & Petrović, B. (2015). The dark tetrad: Structural properties and location in the personality space. *Journal of Individual Differences*, 36(4), 228–236. <https://doi.org/10.1027/1614-0001/a000179>
- Min, H., Pavisic, I., Howald, N., Highhouse, S., & Zickar, M. J. (2019). A systematic comparison of three sadism measures and their ability to explain workplace

- mistreatment over and above the dark triad. *Journal of Research in Personality*. <https://doi.org/10.1016/j.jrp.2019.103862>
- Moshagen, M., Hilbig, B. E., & Zettler, I. (2018). The dark core of personality. *Psychological Review*, 125(5), 656–688. <https://doi.org/10.1037/rev0000111>
- Moshagen, M., Zettler, I., & Hilbig, B. E. (2020a). Measuring the dark core of personality. *Psychological Assessment*, 32(2), 182–196. <https://doi.org/10.1037/pas0000778>
- Moshagen, M., Zettler, I., Horsten, L. K., & Hilbig, B. E. (2020b). Agreeableness and the common core of dark traits are functionally different constructs. *Journal of Research in Personality*, 87, Article 103986. <https://doi.org/10.1016/j.jrp.2020.103986>
- Muthén, L. K., & Muthén, B. O. (1998-2017). *Mplus User's Guide* (8th ed.). Muthén & Muthén.
- Navas, M. P., Maneiro, L., Cutrín, O., Gómez-Fraguela, J. A., & Sobral, J. (2021). Contributions of the dark triad to moral disengagement among incarcerated and community adults. *Legal and Criminological Psychology*, 26(2), 196–214. <https://doi.org/10.1111/lcrp.12190>
- Paulhus, D. L. (2014). Toward a taxonomy of dark personalities. *Current Directions in Psychological Science*, 23(6), 421–426. <https://doi.org/10.1177/0963721414547737>
- Paulhus, D. L., & Dutton, D. G. (2016). Everyday sadism. In V. Zeigler-Hill, & D. K. Marcus (Eds.), *The dark side of personality: Science and practice in social, personality, and clinical psychology* (pp. 109–120). American Psychological Association. <https://doi.org/10.1037/14854-006>.
- Paulhus, D. L., & Williams, K. M. (2002). The dark triad of personality: Narcissism, Machiavellianism, and psychopathy. *Journal of Research in Personality*, 36(6), 556–563. [https://doi.org/10.1016/S0092-6566\(02\)00505-6](https://doi.org/10.1016/S0092-6566(02)00505-6)
- Primi, R., Hauck-Filho, N., & Valentini, F. (2022). Self-report and observer ratings: Item types, measurement challenges, and techniques of scoring. In J. Burrus, S. Rikoon, & M. Brennenman (Eds.), *Assessing competencies for social and emotional learning* (1st ed., pp. 99–116). Routledge.
- Raskin, R. N., & Hall, C. S. (1979). A narcissistic personality inventory. *Psychological Reports*, 45(2), 590. <https://doi.org/10.2466/pr0.1979.45.2.590>
- Revelle, W. (2023). Using R and the Psych Package to Find ω . Retrieved from: <http://personality-project.org/r/psych/HowTo/omega.pdf>.
- Rodriguez, A., Reise, S. P., & Haviland, M. G. (2015). Applying bifactor statistical indices in the evaluation of psychological measures. *Journal of Personality Assessment*, 98(3), 223–237. <https://doi.org/10.1080/00223891.2015.1089249>
- Rogier, G., Roberti, A., Garofalo, C., & Velotti, P. (2021). An investigation of spitefulness in violent offenders: Associations with the dark triad and emotion dysregulation. *Personality and Mental Health*, 15(2), 89–99. <https://doi.org/10.1002/pmh.1495>
- Streckert, N., Kurtz, L., & Kajonius, P. J. (2023). Can your darkness be measured? Analyzing the full and brief version of the dark factor of personality in Swedish. *International Journal of Testing*, 1-45. <https://doi.org/10.1080/15305058.2023.2195659>
- Vize, C. E., & Lynam, D. R. (2021). On the importance of the assessment and conceptualization of agreeableness: A commentary on “agreeableness and the common core of dark traits are functionally different constructs”. *Journal of Research in Personality*, 90. <https://doi.org/10.1016/j.jrp.2020.104059>
- Vize, C. E., Miller, J. D., & Lynam, D. R. (2021). Examining the conceptual and empirical distinctiveness of agreeableness and “dark” personality items. *Journal of Personality*, 89(3), 594–612. <https://doi.org/10.1111/jopy.12601>
- Weigel, R. H., Hessing, D. J., & Elffers, H. (1999). Egoism: Concept, measurement and implications for deviance. *Psychology, Crime & Law*, 5(4), 349–378. <https://doi.org/10.1080/10683169908401777>
- Zhang, J., Leng, J., Yang, C., Cooke, E. M., Gong, P., & Liu, J. (2022). Dark triad traits mediate the interaction between childhood abuse and COMT Val158Met polymorphism on aggression among incarcerated Chinese males. *Current Psychology*, 1-11. <https://doi.org/10.1007/s12144-022-03092-0>