



# Machiavellianism as a crucial Dark Tetrad trait for the prediction of life-course criminal behavior

Janko Međedović<sup>1</sup>

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## Abstract

The Dark Tetrad (Machiavellianism, psychopathy, narcissism, and sadism) is a taxonomy of personality dispositions toward immoral, antisocial, and antagonistic behavior; still, its predictive power in the domain of criminal behavior is rarely tested. In the present research, we analyzed the associations between the Dark Tetrad and several indicators of criminal behavior (onset of criminal behavior, juvenile correctional measures, problematic use of psychoactive substances [PUPS], penal recidivism, number of convictions, violent offences, and the risk of future recidivism) in a sample of Serbian prisoners ( $N=471$ ). While all dark traits were positively associated with criminal behavior indicators on a zero-order level (except violent offences), regression analyses identified Machiavellianism as the most prominent predictor. Psychopathy positively predicted PUPS, while narcissism had a negative contribution to PUPS and penal recidivism. Interactions with the participants' sex showed that sadism represents a risk factor for females regarding early offences and PUPS, while Machiavellianism elevates the chance of repeated prison sentences for men. Finally, the structural model showed that juvenile offending mediates the association between Machiavellianism and general criminal recidivism. Findings showed the fruitfulness of assessing the Dark Tetrad traits in order to predict various aspects of criminal behavior.

**Keywords** Dark Tetrad · Machiavellianism · Criminal recidivism · Juvenile delinquency · Problematic use of psychoactive substances · Violent offences

## Introduction

### Dark traits and criminal behavior

About two decades ago researchers proposed a model that describes malevolent, socially adverse, immoral, and antagonistic behavioral dispositions; this taxonomy is labeled the Dark Triad (Paulhus & Williams, 2002). It consists of three traits: Machiavellianism (manipulation, deceitfulness, lying), psychopathy (emotional callousness and lack of affective empathy), and narcissism (self-centeredness, entitlement, elevated self-confidence). The model immediately attracted scholars' attention, prompting a large amount of empirical research. Empirical inquiry into the dark side of human personality led to the inclusion of an additional

trait to the taxonomy – sadism, it is defined as enjoyment in the pain of others. This expanded taxonomy of dark traits is called the Dark Tetrad (Chabrol et al., 2009; Međedović & Petrović, 2015; Paulhus, 2014). Indeed, research has shown that the dark traits are related to various aspects of socially adverse behavior and psychological traits like aggression (Paulhus et al., 2021), antagonism, hostility, impulsivity, dominance (Blötner et al., 2021), lying (Forsyth et al., 2021), traditional stalking and cyberstalking (Branković et al., 2023), and criminal attitudes (Međedović & Kovačević, 2021).

However, what about the prototypical behavior associated with breaking moral, social, and legal norms – criminal behavior? There is some research that has examined the potential of dark traits to explain antisocial behavior as well. Some studies have collated the dark traits into a single measure (e.g., calculating a single score of the Dark Triad traits) and found positive associations between this variable, offending (Flexon et al., 2016), and delinquency (Wright et al., 2017). It is true that the dark traits share a substantial portion of variation; indeed, some scholars warn

✉ Janko Međedović  
janko.medjedovic@fmk.edu.rs

<sup>1</sup> Institute of Criminological and Sociological Research,  
Gračanička 18, Belgrade 11000, Serbia

that Machiavellianism is indistinguishable from psychopathy (Miller et al., 2019). Psychopathy and sadism also correlate about  $r=0.24$  in forensic samples (O’Connell & Marcus, 2019) but higher associations have been found as well (Bonfá-Araujo et al., 2022). However, despite positive associations between the dark traits, not analyzing them separately as the predictors of criminal behavior may be disadvantageous as well. All of the tetrad traits have substantial conceptual basis in psychology (Paulhus, 2014) and some of the theoretical grounding suggests that the motivation for antagonistic and antisocial behavior is largely different for narcissism, psychopathy, and sadism (e.g., Međedović, 2017). These traits are not equally “dark” (Rauthmann & Kolar, 2012) and it may be beneficial to explore their specific predictive abilities regarding various criminological criteria. Hence, despite the conceptual overlap between the Tetrad traits, analyzing their separate scores still can provide more detailed picture about personality dispositions for criminal behavior which may prove to be beneficial both to personality researchers and forensic and penological practitioners.

Studies that have analyzed the Dark Triad mostly found that the most powerful predictor of antisocial behavior and delinquency is psychopathy, followed by Machiavellianism; narcissism is shown to have a low or negligible role in explaining the variation in offending (Azizli et al., 2016; Hardyns et al., 2022; Palma et al., 2021; Pechorro et al., 2022). Adding sadism to the predictor set yields somewhat different picture of the traits that explain the most of the variation in delinquent behavior. Studies have shown that psychopathy and sadism are associated with criminal behavior to the highest extent (Međedović & Vujičić, 2022), and that they show the largest independent contributions in prediction models (Chabrol et al., 2009, 2017). Certainly, there is a high number of possible mediators that may explain the link between dark traits and offending. One of them is substance use: research has reliably shown positive associations between the usage of alcohol and other psychoactive substances, and antisocial behavior (Azizli et al., 2016; Chabrol et al., 2017); the statistics on the prisoners’ population in Serbia shows that 20% of all criminal offences are associated with problematic substance use (Statistical Office of the Republic of Serbia, 2024). On the other hand, dark personality traits are characterized by elevated consumption of psychoactive substances (Jauk & Dieterich, 2019). Hence, individuals with pronounced dark personality traits are more prone to substance use, which may consequently facilitate the emergence of criminal behavior.

## Goals of the present research

All the reviewed studies (except one: Međedović & Vujičić, 2022) were conducted on samples of individuals from the general population. Their major limitation is apparent: criminal behavior may have a low frequency in community samples. Therefore, when analyzing the links between the dark traits and criminal behavior, it would be beneficial to explore them in a population characterized by this exact behavior, i.e., prisoners. This was the main goal of the present research: we investigated the links between the Dark Tetrad and various aspects of criminal behavior in a sample of Serbian prisoners. Based on previous research, we proposed several hypotheses. Firstly, we expected positive links between all the dark traits and criminal behavior on a zero-order level (i.e., assessed by bivariate correlations). Secondly, we expected that psychopathy and sadism would have the largest contribution to the prediction of offending in multivariate (i.e., regression) models. Finally, we wanted to explore the mediators of the links between dark traits and criminal recidivism (i.e. by applying structural modelling). Since we explored both early criminal activity (juvenile delinquency and early onset of criminal behavior) and total recidivism rates, we assumed that early offending could mediate the associations between the dark traits and the resulting stability in criminal recidivism. The other assumed mediator is problematic use of psychoactive substances (PUPS) – elevated rates of substance consumption should partially explain the association between the Tetrad traits and criminal recidivism.

## Method

### Sample and procedure

We collected the data from the five largest penitentiary facilities in Serbia: Sremska Mitrovica, Niš, Požarevac, Zabela, and Padinska Skela. Prisoners participated in the research on a voluntary basis; they were informed about the study goals and they gave their informed consent to participate in the study. They filled in the questionnaires mostly in groups of several dozen individuals, with researchers present at all times during data collection. While the whole sample size was larger, we presently report the data obtained from 471 participants ( $M_{age} = 39.85[SD = 9.96]$ ; 84.10% of male participants), who provided information on all analyzed measures. The participants had lower education compared to the average in Serbia, which is expected in this population: the majority had finished high school (63.30%), followed by those with only elementary education (23.40%); the rest had some form of higher education (7.70%), or

hadn't completed primary school (5.60%). The percentage of participants who were convicted for violent offences was relatively high (45.60%). This corresponded to the severity of penalties – this was the distribution of total time spent in prison: less than 1 year – 10.20%, from 1 to 2 years – 18.70%; from 3 to 5 years – 27.00%; from 6 to 10 years – 21.40%, and more than 10 years – 22.70%. The research was approved by the institutional ethical committee and was part of a larger project (the PrisonLIFE project: <https://prisonlife.rs/en/>).

## Measures

Dark personality traits are measured by the Dirty Dozen inventory (Jonason & Webster, 2010) that assesses *psychopathy*, *Machiavellianism*, and *narcissism*; these three traits are operationalized via four items each. *Sadism* is operationalized by five items taken from the scale of Direct Sadism, which represents one of the measures from the VAST inventory (Paulhus & Jones, 2015). Measures of internal reliability are provided in the [Results](#) section.

We measured early or juvenile delinquency via two items: *onset of criminal behavior* (the age of the participant when he/she committed his/her first offence) and *juvenile corrective measures*, which are court appointed sanctions for adolescent offenders. This measure was coded as binary: 1 represented participants who had corrective measures and 0 those without corrective measures.

We measured problematic use of psychoactive substances (PUPS) in the following manner - we asked participants if they: (1) had problems with substances before they started to serve the present prison sentence; (2) needed help with PUPS before the present prison sentence; (3) ever had security measures (appointed by court) regarding mandatory treatment of PUPS; (4) whether they had ever tried psychogenic substances in their life. All these items were binary coded (1- the indicator is present; 0 – the indicator is absent) and the total scores on PUPS was calculated as the mean scores on these indicators. Note that PUPS is not a criminal offence per se; however, we measured it because it is an important facilitator of criminal behavior and hence, it is a plausible mediator in the link between dark traits and criminal recidivism.

We measured three indicators of criminal recidivism: *penal recidivism* (the number of separate prison sentences the participants have served), *number of lawful convictions*, and *risk assessment*. The majority of criminal behavior measures were collected from the participants themselves, except for three indicators: The presence of juvenile corrective measures and number of lawful convictions were taken from the participants' prison dossiers. The third indicator that was not collected using self-report methodology

was *Risk assessment*; this protocol was developed on a base of Offender Assessment System protocol (OASys: Home Office, 2002; for the Serbian version see Ministry of Justice: The Administration for the Enforcement of Penal Sanctions, 2013a, b). This is an assessment procedure based on a comprehensive number of indicators of antisocial behavior, including accommodation to the institution, employment history, training and employability, relationships (including relations with family, friends, and romantic partners), lifestyle and criminal associates, drug and alcohol misuse, thinking and behavior (impulsivity, aggressiveness, problem solving), and attitudes (pro-criminal attitudes and attitudes toward staff). The assessment is conducted by professional staff of the penitentiary facility; we also collected this data from the participants' prison dossiers. We used the total score that represents an estimated risk of future reoffending (the score ranged from 1 to 4 where 1 represents lowest risk and 4 represents the highest risk). Finally, based on the data collected from prison dossiers we divided the participants in two groups: the ones who committed *violent offences* (coded by 1) and the ones with other types of offences (coded by 0).

## The plan of data analysis

Firstly, we showed bivariate associations between all analyzed variables. Secondly, we fitted seven regression models for all indicators of criminal behavior as the criteria measures; The participants' sex, age, education, and the Dark Tetrad traits are analyzed as the predictors. We also analyzed participants' sex as the moderator of the links between dark traits and criminal behavior: since there are sex differences in dark traits themselves (Neumann et al., 2022), dark traits may be differently linked with criminal behavior for males and females. Finally, we estimated a structural model where early delinquency (onset of criminal behavior and juvenile correctional measures) and PUPS were analyzed as mediators of the associations between the dark traits and criminal recidivism. This way, we wanted to explore a potential developmental pathway of criminal behavior: personality traits as dispositions toward juvenile delinquency and PUPS, which further facilitate stable criminal behavior indicated by repeated offending. Regressions and structural modelling were conducted in R studio; the latter via *lavaan* package (Rosseel, 2012).

## Results

### Bivariate associations between the measures

Descriptive statistics, multi-item scale reliabilities (Cronbach's alpha coefficient of internal consistency) and

correlations between the analyzed measures are shown in Table 1. We can see that all measures have high reliabilities. Furthermore, all the Tetrad traits are systematically associated with criminal behavior: all significant coefficients have positive signs except the one with the onset of criminal behavior, which is negative. Hence, dark personalities are more prone to juvenile delinquency, PUPS, and repeated offending. Machiavellianism shows the highest number of associations, followed by psychopathy and sadism, which had only one additional nonsignificant association – with the number of convictions. Narcissism has the fewest correlations with offending: a negative association with the onset of criminal behavior and positive associations with the number of convictions and risk assessment. All correlation coefficients have low effect sizes. Neither of dark traits is significantly associated with violent offences.

### The prediction of criminal behavior

We estimated seven regression models in order to predict criminal behavior using the dark traits as prediction measures. The results of regression analyses are shown in Table 2. All regression models are statistically significant except the binary regression used to predict violent offences ( $R^2=0.03$ ;  $\chi^2(7)=9.86$ ;  $p=.20$ ); therefore, we do not show its results. The analyses single out Machiavellianism as the most prominent predictor of criminal behavior: it has an independent contribution to all criteria measures. Psychopathy positively predicts PUPS and negatively predicts the onset of criminal behavior. Narcissism has negative contributions to the prediction of PUPS and penal recidivism. Sadism has no role in explaining the variation of the analyzed criteria measures.

We tested interactions between participants’ sex and dark traits in the prediction of criteria using the same regression models; we entered the interactions on the second level of regressions thus constructing hierarchical regression models. The results can also be seen in Table 2. Three significant interactions are observed: sadism represents a risk factor for PUPS for females, but not for males; similarly, it is related to earlier onset of criminal behavior for females, while the opposite stands for males. Finally, Machiavellianism elevates penal recidivism in males, but not females. All interactions are graphically depicted on Fig. 1.

### Mediators of the link between dark personalities and criminal recidivism

Our initial model encompassed sociodemographic indicators as the control variables, dark traits as the predictors, PUPS and juvenile delinquency as the mediator variables, and criminal recidivism as the criterion measure. Mediators

**Table 1** Descriptive statistics, reliabilities, and bivariate associations between the examined measures

	M(SD)	$\alpha$	1	2	3	4	5	6	7	8	9	10
1. Machiavellianism	1.71(0.98)	0.87										
2. Psychopathy	1.89(0.92)	0.72	0.57**									
3. Narcissism	1.99(1.07)	0.86	0.47**	0.39**								
4. Sadism	1.24(0.57)	0.81	0.41**	0.49**	0.27**							
5. Onset of criminal behavior	28.60(10.8)		-0.26**	-0.24**	-0.16**	-0.20**						
6. Juvenile correctional measures	18.70%†		0.17**	0.15**	0.08	0.10*	-0.31**					
7. PUPS	0.90(1.15)	0.74	0.23**	0.23**	0.05	0.16**	-0.29**	0.18**				
8. Penal recidivism	1.44(2.19)		0.27**	0.14**	0.05	0.13**	-0.38**	0.25**	0.28**			
9. Number of convictions	3.17(4.54)		0.16**	0.09	0.09*	0.03	-0.29**	0.24**	0.19**	0.55**		
10. Risk assessment	2.46(0.66)		0.25**	0.24**	0.16**	0.20**	-0.39**	0.32**	0.40**	0.33**	0.31**	
11. Violent offences	46.50%†		-0.03	-0.06	-0.03	-0.04	-0.01	0.04	-0.09*	-0.05	-0.11*	0.14**

\* -  $p < .05$ ; \*\* -  $p < .01$ ; † - percentage of individuals with juvenile correctional measures and violent offences in their criminal history. PUPS – problematic use of psychoactive substances

and the criterion variables are modelled as latent, while the rest of the analyzed measures are entered as observed variables. However, the analysis of the initial model resulted in the removal of all dark traits except Machiavellianism, as well as PUPS from the model because they are not associated with the criminal recidivism (removed dark traits are not associated with the remaining mediator as well). Furthermore, the initial model showed that criminal recidivism as the criterion measure has a negative variance (Heywood's case): additional analyses revealed that the reason for this was the inclusion of risk assessment as one of its observed indicators. We removed risk assessment from the analysis and, consequently, the variation of this latent variable was positive. The final model, where all nonsignificant paths are removed, is shown in Fig. 2. Note that the onset of criminal behavior has a higher positive loading on the latent variable of juvenile delinquency (JD) than juvenile correctional measure, which loaded negatively; hence, we can interpret juvenile delinquency as the absence of correctional measures in adolescence and higher age of first criminal offence. Machiavellianism negatively predicts juvenile delinquency and, via this variable, it is positively associated with criminal recidivism (indirect effect is statistically significant:  $\beta=0.25$ ;  $p<.01$ ). The model has high fit indices:  $\chi^2_{(15)}=28.84$ ;  $p=.017$ ; CFI=0.982; TLI=967; RMSEA=0.044; SRMR=0.039 (please see [Supplementary Material](#) for the detailed output information of this model and for the alternative modelling approach where all variables are modelled as observed ones).

## Discussion

The Dark Tetrad traits depict socially aversive, antagonistic, and malevolent personality traits that represent behavioral dispositions toward immoral and antisocial behavior. Therefore, these traits are good candidates for predicting criminal behavior as well. If this is the case, the benefits for the psychology of individual differences and criminological psychology would be twofold: (1) we would gain new knowledge about socially relevant behavioral expressions of the dark traits; (2) forensic and criminological practitioners could gain new insights in personality risk-factors for criminal behavior – this can facilitate prevention and treatment programs for offenders. In the present research, we analyzed the associations between the Dark Tetrad traits and criminal offending in a sample of Serbian offenders. Our first hypothesis was confirmed: we found positive bivariate associations between all dark traits and various aspects of criminal behavior. However, our second hypothesis was rejected – we expected that sadism and psychopathy would be the best predictors from the Dark Tetrad taxonomy; however,

Machiavellianism was pinpointed as the most prominent predictor of criminal behavior with markedly lower contributions from psychopathy and narcissism. Finally, our third hypothesis was partially confirmed – juvenile delinquency mediated the link between Machiavellianism and criminal recidivism, but PUPS did not.

## Dark Tetrad and crime: congruence and discrepancies between the present and previous research

Firstly, we analyzed bivariate associations between dark personalities and criminal behavior indicators. Analyzing zero-order correlations between the dark traits and criminal behavior may be particularly important because scholars have noticed that regression models tend to become unstable due to high correlations between the Tetrad traits (Lynam et al., 2006; Miller et al., 2019; Sleep et al., 2017; Vize et al., 2018). Correlation analysis showed that all dark traits are positively related to criminal behavior, but to different extents. Machiavellianism showed a slightly higher number of associations with somewhat higher effect sizes than other traits, but psychopathy and sadism were closely behind, showing systematic relations with criminality as well. Only narcissism showed a markedly lower number of associations, but in an expected direction. These findings are in line with all previous data on the links between the Dark Triad (Azizli et al., 2016; Hardyns et al., 2022; Palma et al., 2021; Pechorro et al., 2022), Tetrad (Chabrol et al., 2009, 2017; Međedović & Vujičić, 2022), and antisocial behavior. Therefore, the Dark Tetrad traits are indeed important for understanding personality dispositions for criminal behavior. Individuals showing elevated manipulativeness, emotional callousness, and aggression motivated by enjoyment in the pain of others exhibit criminal behavior more early during development, are more prone to PUPS, and show stable and persistent offending behavior.

However, regression models suggested a slightly different picture regarding the most important personality dispositions for offending – Machiavellianism turned to be the most prominent predictor. The existing Dark Tetrad literature has singled out sadism as one of the most prominent predictors (Chabrol et al., 2009, 2017). However, we obtained almost the opposite result – sadism did not have an independent contribution to the prediction of any of our criteria measures. Interestingly, its role emerged only in interactions with participants' sex: although more pronounced in males than females (Neumann et al., 2022), sadism turned out to be a higher risk factor for female participants in our analyses. It elevated the chance for earlier onset of criminal behavior together with PUPS for our female participants. The finding that sadism did not have more substantial role in



**Table 2** Dark Tetrad traits as predictors of criminal behavior

	OCB	JCM	PUPS	PR	NOC	RA
Machiavellianism	-0.15(0.04)**	-82.23(247.03)	0.18(0.06)**	0.32(0.06)**	0.16(0.06)**	0.17(0.06)**
Psychopathy	-0.07(0.04)	103.37(317.08)	0.12(0.06)**	0.06(0.06)	0.04(0.06)	0.08(0.06)
Narcissism	0.02(0.04)	-19.72(50.72)	-0.11(0.05)*	-0.11(0.05)*	0.01(0.06)	-0.01(0.05)
Sadism	0.01(0.04)	48.18(137.40)	0.03(0.05)	0.01(0.06)	-0.03(0.05)	0.07(0.05)
Sex	-0.54(0.09)**	280.24(870.18)	0.06(0.34)	0.13(0.33)	0.39(0.12)**	-0.38(0.33)
Age	0.58(0.04)**	-0.05(0.02)**	-0.13(0.05)**	0.14(0.05)**	0.11(0.05)*	-0.08(0.05)
Education	0.10(0.03)**	-0.34(0.19)	0.03(0.05)	-0.14(0.04)**	-0.14(0.05)**	-0.23(0.04)
F ( $\chi^2$ for JCM)	59.19**	61.97**	7.22**	10.97**	5.25**	11.41**
R <sup>2</sup>	0.47	0.10	0.10	0.14	0.07	0.15
Sex *						
Machiavellianism	-0.00(0.12)	82.63(247.03)	-0.25(0.16)	-0.33(0.16)*	-0.13(0.16)	-0.16(0.16)
Sex * Psychopathy						
Sex * Narcissism	0.16(0.12)	-103.06(317.08)	-0.20(0.15)	-0.12(0.15)	-0.29(0.15)	-0.27(0.15)
Sex * Sadism	0.03(0.10)	19.63(50.72)	0.10(0.13)	0.02(0.13)	-0.01(0.14)	0.02(0.13)
F ( $\chi^2$ for JCM)	38.38**	48.38(137.40)	0.60(0.25)*	0.35(0.24)	0.17(0.25)	0.37(0.24)
R <sup>2</sup>	0.48	72.36**	5.49**	8.03**	4.23**	8.18**
		0.14	0.11	0.16	0.09	0.16

Standardized coefficients are shown in the table with standard errors in parentheses (the only exception is JCM—unstandardized predictors are shown in this regression model together with  $\chi^2$  instead F coefficient); OCB Onset of criminal behavior, JCM Juvenile correctional measures, PUPS problematic use of psychoactive substances, PR penal recidivism, NOC Number of convictions, RA Risk assessment

the predictions of criminal behavior was unexpected, especially in the sample where almost a half of participants were violent offenders. Furthermore, neither of the dark traits were able to predict violent offences; this result was unanticipated as well, having in mind that there are empirical data showing that some features of psychopathy and narcissism are related to violent offences (Långström & Grann, 2002; Piros et al., 2023); the data on sadism are lacking but the content of this dark trait and its specific motivation for offending make it a plausible candidate to explain violent crime. On the other hand, the obtained result is partially in line with the previous research showing that dark personality traits are not necessarily elevated in homicide offenders (as a type of violent offences) suggesting that the association between dark personalities and offence type is a complex one (Međedović & Vujičić, 2022). Another way we can explain why sadism did not have a more prominent role in the regression models is that previous research on the links between the Tetrad and crime was conducted on high schoolers and college students (Chabrol et al., 2009, 2017), markedly different samples compared to the present one.

Besides the difference in sample structure, there is another potential source of discrepancy in results between the current and past research: the measurement method. In the Dirty Dozen inventory that we used, psychopathy is operationalized mostly via emotional callousness (Jonason & Webster, 2010). However, previous research showed that affective psychopathy traits are not related to criminal recidivism, in contrast to impulsive and disinhibited psychopathic behavior (Međedović & Vujičić, 2022). And indeed, the Dark Tetrad research that highlighted psychopathy’s role in the prediction of delinquency included impulsiveness and disinhibition in the measurement of psychopathy (Chabrol et al., 2009). On the other hand, Machiavellianism can be seen as a more malevolent trait than psychopathy in the Dirty Dozen operationalization because it has explicit markers of immoral behavior (e.g. “I tend to exploit others for my own ends” or “I have used deceit or lied to get my way”). Congruently with this view, a study that assessed the Dirty Dozen Dark Triad traits on a representative sample of Belgian citizens found that Machiavellianism was the best predictor of offending, which is in line with the present findings (Hardyns et al., 2022). Hence, when predicting criminal behavior, we should pay attention to how the dark traits are measured – it is probably best to apply multidimensional measures for every trait in order to capture more detailed information about the links between the Tetrad and crime (Miller et al., 2019).

Finally, narcissism showed the weakest associations with criminal behavior. Interestingly, regression models even showed negative links between PUPS, penal recidivism, and narcissism. This finding echoes previous data

of narcissism's small but negative contribution to juvenile delinquency when other Dark Triad traits are controlled in the analysis (Palma et al., 2021). We can interpret this result through views that narcissism is the least "dark" trait compared to other Tetrad characteristics (Rauthmann & Kolar, 2012) and that it probably has a maladaptive and adaptive side—only the former is related to criminal behavior, while the opposite stands for the latter (Barry et al., 2007). Similarly, narcissism is frequently divided into its grandiose and vulnerable components: there is empirical data showing that only the former but not the latter is positively associated with criminal behavior in prisoners (Krusemark et al., 2018).

Once again, we would like to note that we should be careful in interpreting the results of multivariate analyses that encompass dark traits as the predictors: partialing common variation between these traits may produce residual variables that are largely different in content than the original ones (Lynam et al., 2006; Miller et al., 2019; Sleep et al., 2017; Vize et al., 2018; on the other hand, note that this does not mean that we should base our findings only on bivariate correlations: Paulhus, 2023). For example, when controlled for the common variation between the dark traits, narcissism is mostly characterized by its adaptive features (Vize et al., 2018): this is in line with the current findings of the regression models showing that narcissism is mostly unrelated to criminal behavior. Interestingly, residual scores of Machiavellianism also shows features that may buffer criminal behavior (lower disinhibition, antagonism, and externalizing behavior: Sleep et al., 2017) and yet, our analyses showed that Machiavellianism is still the best predictor of criminal offending; therefore, our current results cannot be fully explained by using residuals scores of the tetrad variables in regression models. Nevertheless, problems of partialing emphasize zero-order correlations as the estimates of the associations between the constructs: we highlight once more that *all dark traits* showed expected positive relations with various indicators of criminal behavior. Machiavellianism did produce highest number of zero-order associations as well: future research will address the generalizability of this finding in regard to the sample structure and measurement methods.

### **Machiavellianism and life-course criminal behavior**

We estimated the model intended to explain the links between dark personality traits and criminal recidivism (as the most important marker of criminal behavior according to forensic practice) via early-life delinquency and PUPS. Congruently with the previous analysis we conducted, only Machiavellianism was retained in the model. While PUPS was associated with dark traits, which is in line with

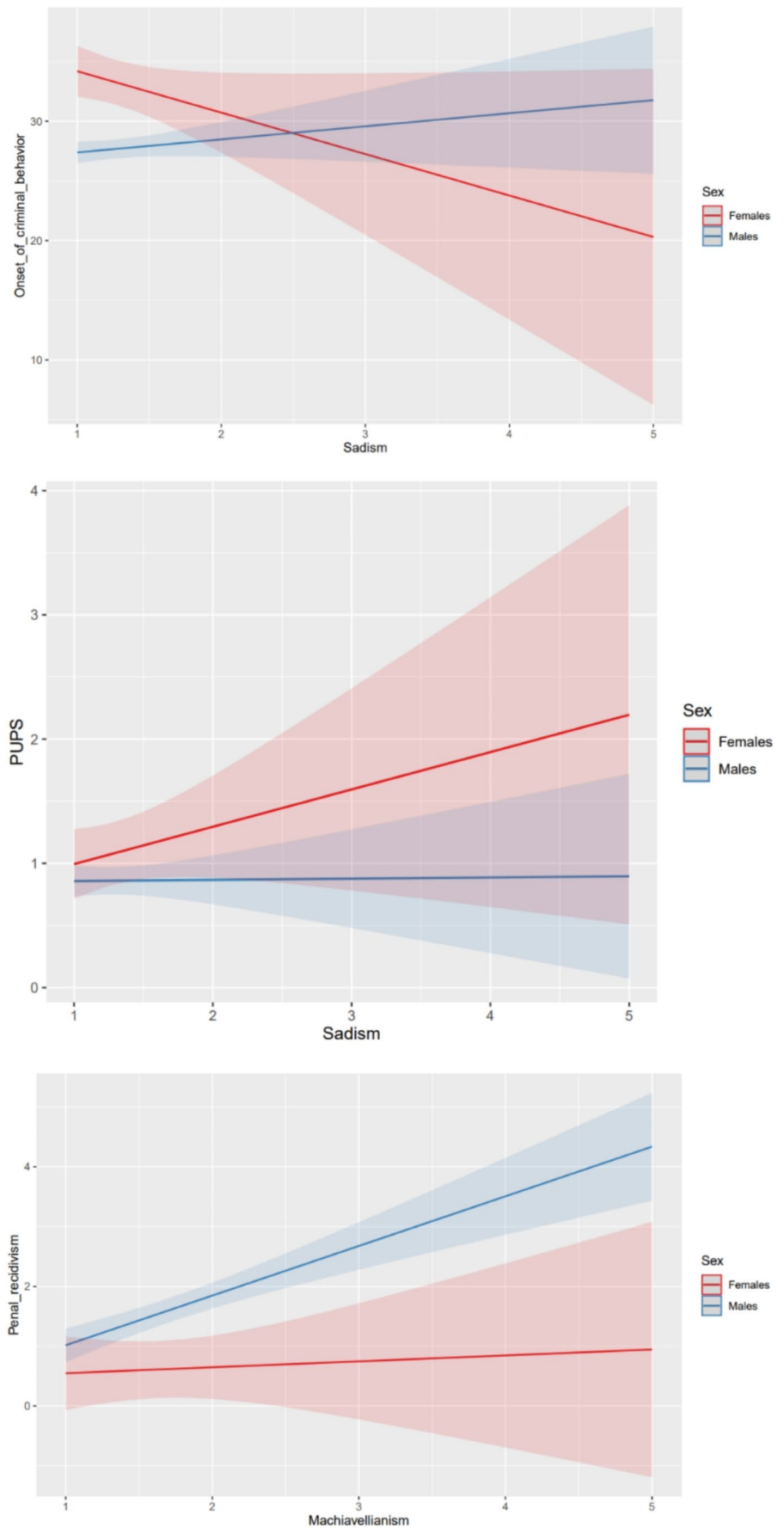
existing literature (Azizli et al., 2016; Chabrol et al., 2017; Jauk & Dieterich, 2019), it was not related to recidivism in our model; hence it was removed as well. Zero-order correlations showed systemic correlations between PUPS and criminal recidivism, but latent variables of PUPS and criminal recidivism were unrelated (however, see [Supplementary Material](#) for arguments that PUPS may still be useful in explaining the links between Machiavellianism and criminal recidivism when the paths between observed measures are analyzed). This may suggest that the link between PUPS and criminal behavior is not robust and that it may depend on the specific offence types.

The main message of the final model's results is that Machiavellianism is positively associated with reoffending via early involvement of Machiavellian individuals in criminal activity. This data may provide suggestions for a developmental model of the links between Machiavellianism and life-course criminal behavior, by highlighting the role of Machiavellian traits as dispositions towards persistent crime. However, we should be cautious about the potential causal role of Machiavellianism in this process. We analyzed Machiavellianism as the predictor of both juvenile and subsequent criminal behavior based on data that some forms of dark personality traits may develop early in ontogeny and predict later delinquency (e.g., Callous-Unemotional traits: Frick et al., 2005). However, our data is cross-sectional and does not allow us to make direct conclusions about the causal links between our variables because other causal links are probable as well: there are data showing that antisocial behavior elevates the level of Machiavellian traits, but not vice versa (Sijtsema et al., 2019). Indeed, it is plausible also to assume that young individuals may start exhibiting criminal behavior for various reasons, and afterwards develop Machiavellianism as a way to adapt to the criminal environment, social interactions, and milieu.

### **Limitations, future directions, and conclusions**

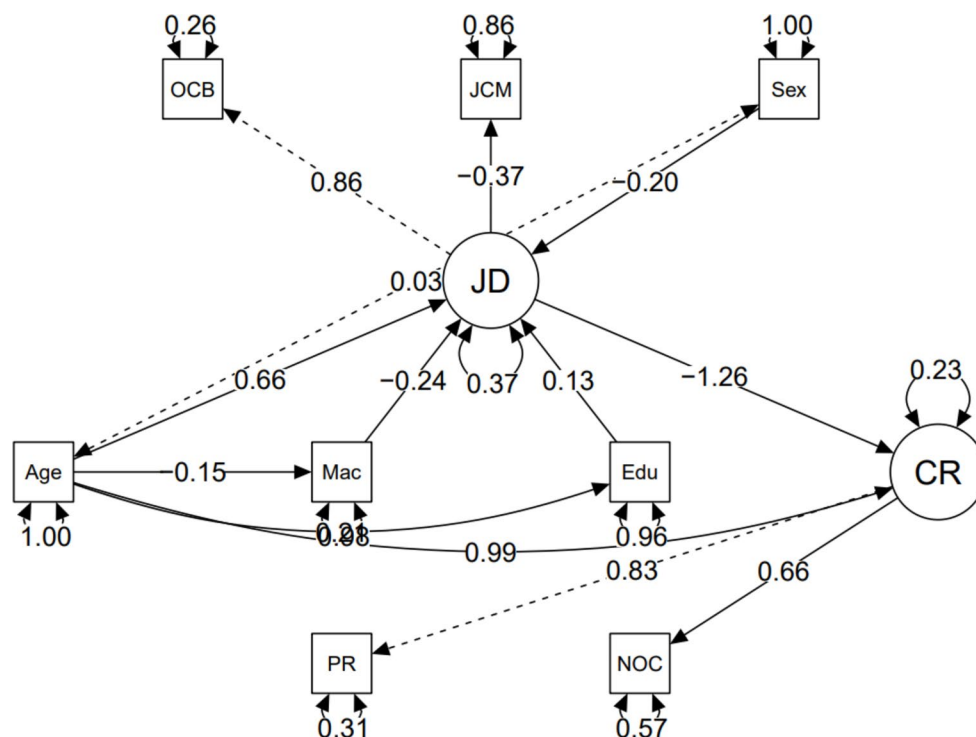
We already mentioned several limitations of the present research and we will briefly summarize them here. We used short measures of dark traits, mostly because we were limited by survey length in the project that was not primarily aimed to the dark traits' exploration; however, short measures may increase the probability of a Type 2 error and prevent us from detecting some effects that exist in the population. Furthermore, dark traits are multifaceted traits and inclusion of the multidimensional inventories may reveal important differences between the narrower facets of the Dark Tetrad in the prediction of criminal behavior, e.g., grandiose and vulnerable narcissism or callous-manipulative and impulsive psychopathic characteristics. Future studies may apply not only multidimensional self-report measures of the dark

**Fig. 1** Interactions between the dark traits and participants' sex in the prediction of criminal behavior. Notes: upper – interaction between sex and sadism in the prediction of onset of criminal behavior; middle - interaction between sex and sadism in the prediction of problematic use of psychoactive substances (PUPS); lower - interaction between sex and Machiavellianism in the prediction of penal recidivism





**Fig. 2** Juvenile delinquency as the mediator of the association between Machiavellianism and criminal recidivism. Notes: Double arrows represent correlations; One-sided arrows represent regressions; all coefficients are significant at least on the level of  $p < .05$ ; OCB – Onset of criminal behavior; JCM – Juvenile correctional measures; PR – penal recidivism; NOC – Number of convictions; Edu – education; Mac – Machiavellianism; JD – juvenile delinquency; CR – Criminal recidivism



traits, but observer-based assessments of dark personalities, for example the newly developed rating measure of the Dark Triad (Walker et al., 2023) or a novel observer-based inventory for measuring psychopathy (Međedović, 2024). The usage of observer-based instruments can address potential confounding of socially-desirable responding which may be present in prison settings, and especially in the measurement of morally-relevant personality dispositions. The cross-sectional design of our study prevents us from making unequivocal conclusions about the causal links between the variables— future studies may apply longitudinal designs to explore the developmental roles of the dark traits in life-course criminal behavior. Early delinquency and substance abuse are certainly not the only plausible mediators for explaining the link between the dark traits and criminal behavior; therefore, future research should test other processes that may mediate this link. While heterogeneous, our sample was still not representative for the population of offenders in Serbia; on the other hand, it is quite probable that specific sample characteristics (e.g., sex ratio, type of criminal offending, recidivism rates, social background) may affect the examined associations. Nevertheless, this research is one of the first to confirm that the measurement of dark personality traits is quite beneficial in a forensic and criminological context. The present data further validate the Dark Tetrad taxonomy and suggest its practical significance as well: paying more attention to dark personalities in individuals at risk of criminal offending, together with acknowledging them in the offenders' resocialization process may

help in reducing crime rates, and especially reoffending behavior. Both the conceptual and practical significance of this topic provide incentives for future research of criminal behavior as a behavioral expression of dark personalities.

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**Data availability** All data from the PrisonLIFE project will be made publicly available until the end of this calendar year.

## Declarations

**Conflict of interest** Author states that there is no conflict of interest.

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## References

- Azizli, N., Atkinson, B. E., Baughman, H. M., Chin, K., Vernon, P. A., Harris, E., & Veselka, L. (2016). Lies and crimes: Dark Triad, misconduct, and high-stakes deception. *Personality and Individual Differences, 89*, 34–39. <https://doi.org/10.1016/j.paid.2015.09.034>
- Barry, C. T., Frick, P. J., Adler, K. K., & Grafeman, S. J. (2007). The predictive utility of narcissism among children and adolescents: Evidence for a distinction between adaptive and maladaptive narcissism. *Journal of Child and Family Studies, 16*, 508–521. <https://doi.org/10.1007/s10826-006-9102-5>
- Blötner, C., Ziegler, M., Wehner, C., Back, M. D., & Grosz, M. P. (2021). The nomological network of the short Dark Tetrad scale (SD4). *European Journal of Psychological Assessment, 38*, 187–197. <https://doi.org/10.1027/1015-5759/a000655>
- Bonfá-Araujo, B., Lima-Costa, A. R., Hauck-Filho, N., & Jonason, P. K. (2022). Considering sadism in the shadow of the Dark Triad traits: A meta-analytic review of the Dark Tetrad. *Personality and Individual Differences, 197*, 111767. <https://doi.org/10.1016/j.paid.2022.111767>
- Branković, I., Dinić, B. M., & Jonason, P. K. (2023). How traditional stalking and cyberstalking correlate with the Dark Tetrad traits? *Current Psychology, 42*(30), 26238–26242. <https://doi.org/10.1007/s12144-022-03681-z>
- Chabrol, H., Van Leeuwen, N., Rodgers, R., & Séjourné, N. (2009). Contributions of psychopathic, narcissistic, machiavellian, and sadistic personality traits to juvenile delinquency. *Personality and Individual Differences, 47*(7), 734–739. <https://doi.org/10.1016/j.paid.2009.06.020>
- Chabrol, H., Bouvet, R., & Goutaudier, N. (2017). The Dark Tetrad and antisocial behavior in a community sample of college students. *Journal of Forensic Psychology Research and Practice, 17*(5), 295–304. <https://doi.org/10.1080/24732850.2017.1361310>
- Flexon, J. L., Meldrum, R. C., Young, J. T., & Lehmann, P. S. (2016). Low self-control and the Dark Triad: Disentangling the predictive power of personality traits on young adult substance use, offending and victimization. *Journal of Criminal Justice, 46*, 159–169. <https://doi.org/10.1016/j.jcrimjus.2016.05.006>
- Forsyth, L., Anglim, J., March, E., & Bilobrk, B. (2021). Dark Tetrad personality traits and the propensity to lie across multiple contexts. *Personality and Individual Differences, 177*, 110792. <https://doi.org/10.1016/j.paid.2021.110792>
- Frick, P. J., Stickle, T. R., Dandreaux, D. M., Farrell, J. M., & Kimonis, E. R. (2005). Callous–unemotional traits in predicting the severity and stability of conduct problems and delinquency. *Journal of Abnormal Child Psychology, 33*, 471–487. <https://doi.org/10.1007/s10648-005-5728-9>
- Hardyns, W., Ponnet, K., Hauspie, T., & Pauwels, L. J. (2022). How well do the Dark Triad characteristics explain individual differences in offending in a representative non-clinical adult sample? *Current Research in Behavioral Sciences, 3*, 100084. <https://doi.org/10.1016/j.crbeha.2022.100084>
- Home Office (2002). *OASys user Manual, volume 2*. National Probation Directorate.
- Jauk, E., & Dieterich, R. (2019). Addiction and the Dark Triad of personality. *Frontiers in Psychiatry, 10*, 476188. <https://doi.org/10.3389/fpsy.2019.00662>
- 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>
- Krusemark, E. A., Campbell, W. K., Crowe, M. L., & Miller, J. D. (2018). Comparing self-report measures of grandiose narcissism, vulnerable narcissism, and narcissistic personality disorder in a male offender sample. *Psychological Assessment, 30*(7), 984–990. <https://doi.org/10.1037/pas0000579>
- Långström, N., & Grann, M. (2002). Psychopathy and violent recidivism among young criminal offenders. *Acta Psychiatrica Scandinavica, 106*, 86–92. <https://doi.org/10.1034/j.1600-0447.106.s412.19.x>
- Lynam, D. R., Hoyle, R. H., & Newman, J. P. (2006). The perils of partialing: Cautionary tales from aggression and psychopathy. *Assessment, 13*, 328–341. <https://doi.org/10.1177/1073191106290562>
- Mededović, J. (2017). Aberrations in emotional processing of violence-dependent stimuli are the core features of sadism. *Motivation and Emotion, 41*(2), 273–283. <https://doi.org/10.1007/s11031-016-9596-0>
- Mededović, J. (2024). Observing psychopathy promptly, reliably, and validly: Development and validation of the Short Psychopathy Rating Scale (SPRS). *Personality and Individual Differences, 219*, 112520. <https://doi.org/10.1016/j.paid.2023.112520>
- Mededović, J., & Kovačević, U. (2021). Sadism as a key dark trait in the link between football fandom and criminal attitudes. *Journal of Individual Differences, 42*(1), 9–18. <https://doi.org/10.1027/1614-0001/a000325>
- 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>
- Mededović, J., & Vujičić, N. (2022). How dark is the personality of murderers? Psychopathy, Machiavellianism, and sadism in homicide offenders. *Personality and Individual Differences, 197*, 111772. <https://doi.org/10.1016/j.paid.2022.111772>
- Miller, J. D., Vize, C., Crowe, M. L., & Lynam, D. R. (2019). A critical appraisal of the dark-triad literature and suggestions for moving forward. *Current Directions in Psychological Science, 28*(4), 353–360. <https://doi.org/10.1177/0963721419838233>
- Ministry of Justice: The Administration for the Enforcement of Penal Sanctions. (2013a). *Priručnik Za primenu instrumenta za procenu rizika preko tri godine [Manual for the application of the instrument for risk assessment over three years of sentence]*. Ministry of Justice, Republic of Serbia.
- Ministry of Justice: The Administration for the Enforcement of Penal Sanctions. (2013b). *Priručnik Za Primenu Instrumenta Za Procenu Rizika do i tri godine [Manual for the application of the instrument for risk assessment up to three years of sentence]*. Ministry of Justice, Republic of Serbia.
- Neumann, C. S., Jones, D. N., & Paulhus, D. L. (2022). Examining the short Dark Tetrad (SD4) across models, correlates, and gender. *Assessment, 29*(4), 651–667. <https://doi.org/10.1177/1073191120986624>
- O’Connell, D., & Marcus, D. K. (2019). A meta-analysis of the association between psychopathy and sadism in forensic samples. *Aggression and Violent Behavior, 46*, 109–115. <https://doi.org/10.1016/j.avb.2019.02.013>
- Palma, V. H. G., Pechorro, P., Prather, J., Matavelli, R., Correia, A., & Jesus, S. N. (2021). Dark Triad: Associations with juvenile delinquency, conduct disorder and trauma. *Análise Psicológica, 39*(2), 247–261. <https://doi.org/10.14417/ap.1814>
- 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. (2023). Controversies in dark trait research: A call for reason. In P. K. Jonason (Ed.), *Shining light on the dark side of*

- personality: Measurement properties and theoretical advances* (pp. 294–305). Hogrefe.
- Paulhus, D. L., & Jones, D. N. (2015). Measures of dark personalities. In G. J. Boyle, D. H. Saklofske, & G. Matthews (Eds.), *Measures of personality and social psychological constructs* (pp. 562–594). Academic. <https://doi.org/10.1016/B978-0-12-386915-9.00020-6>
- 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)
- Paulhus, D. L., Gupta, R., & Jones, D. N. (2021). Dark or disturbed? Predicting aggression from the Dark Tetrad and schizotypy. *Aggressive Behavior*, 47(6), 635–645. <https://doi.org/10.1002/ab.21990>
- Pechorro, P., DeLisi, M., Gonçalves, R. A., Braga, T., & Maroco, J. (2022). Dark triad personalities, self-control, and antisocial/criminal outcomes in youth. *Journal of Forensic Psychology Research and Practice*, 22(5), 427–443. <https://doi.org/10.1080/24732850.2021.2013356>
- Piros, H. I., Bauman, A., & Clark, C. B. (2023). An exploration of the link between narcissism, masochism, and crime in a post-incarcerated sample. *Journal of the National Medical Association*, 115(5), 488–495. <https://doi.org/10.1016/j.jnma.2023.07.008>
- Rauthmann, J. F., & Kolar, G. P. (2012). How dark are the Dark Triad traits? Examining the perceived darkness of narcissism, machiavellianism, and psychopathy. *Personality and Individual Differences*, 53(7), 884–889. <https://doi.org/10.1016/j.paid.2012.06.020>
- Rosseel, Y. (2012). Lavaan: An R package for structural equation modeling. *Journal of Statistical Software*, 48(2), 1–36. <https://doi.org/10.18637/jss.v048.i02>
- Sijtsema, J. J., Garofalo, C., Jansen, K., & Klimstra, T. A. (2019). Disengaging from evil: Longitudinal associations between the Dark Triad, moral disengagement, and antisocial behavior in adolescence. *Journal of Abnormal Child Psychology*, 47, 1351–1365. <https://doi.org/10.1007/s10802-019-00519-4>
- Sleep, C. E., Lynam, D. R., Hyatt, C. S., & Miller, J. D. (2017). Perils of partialing redux: The case of the Dark Triad. *Journal of Abnormal Psychology*, 126(7), 939–950. <https://doi.org/10.1037/abn0000278>
- Statistical Office of the Republic of Serbia (2024). Judiciary. <https://www.stat.gov.rs/en-us/oblasti/pravosudje/>. Accessed 17 Jun 2024.
- Vize, C. E., Collison, K. L., Miller, J. D., & Lynam, D. R. (2018). Examining the effects of controlling for shared variance among the Dark Triad using meta-analytic structural equation modeling. *European Journal of Personality*, 32(1), 46–61. <https://doi.org/10.1002/per.2137>
- Walker, S. A., MacCann, C., & Jonason, P. K. (2023). The Dark Informant-Rated Triad (DIRT): A concise informant-rated measure of the Dark Triad. *European Journal of Psychological Assessment*. Advance online publication. <https://doi.org/10.1027/1015-5759/a000796>
- Wright, J. P., Morgan, M. A., Almeida, P. R., Almosaed, N. F., Moghrabi, S. S., & Bashatah, F. S. (2017). Malevolent forces: Self-control, the Dark Triad, and crime. *Youth Violence and Juvenile Justice*, 15(2), 191–215. <https://doi.org/10.1177/1541204016667995>

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