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Dark Tetrad and COVID-19 protective measures: Mediating effects of risk-taking tendencies

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ABSTRACT

Previous research has shown that Dark Triad traits are tied to non-compliance, while there is not enough research regarding sadism. As dark traits are related to risk-taking behaviors, we hypothesized that proneness to risk-taking could be a mediating mechanism explaining the relation between dark traits and non-compliance with protective measures. Sample comprised of 348 participants (77% women) who completed the Hateful Eight (a multifaceted Short Dark Tetrad scale), DOSPERT for measuring different aspects of risk-taking tendencies, and questions regarding frequency of compliance with protection measures and vaccination. Results showed that recklessness (aspect of psychopathy) and violent voyeurism (aspect of sadism) had negative effects on compliance with protective measures. These relations were fully explained by health/safety risk tendency. Deviousness (aspect of Machiavellianism) contributed to unwillingness to vaccinate against COVID-19 independently of risk-taking tendencies. Furthermore, selection of particular vaccine was not associated with dark traits, but those who selected all vaccines (both EU-approved and non-approved) had higher scores on social risks compared to those who selected only non-approved vaccines. Additionally, those who selected only EU-approved vaccines showed lower scores on ethical risks compared to the rest of the participants who were vaccinated or applied for vaccination.

1. Introduction

Due to the major changes coming with the global COVID-19 pandemic, people had to acclimate to extraordinary circumstances. Centers for Disease Control and Prevention (CDC, 2021a) has released a list of protective measures to help slow the spread of the pandemic such as washing hands frequently, wearing a mask, social distancing, etc. One of the most effective protective measures against COVID-19 is vaccination. Vaccines help prevent contracting COVID-19 and even when not fully efficient, vaccinated people tend to develop milder symptoms (CDC, 2021b). However, not all people follow the recommended protective measures and also show hesitancy when it comes to inoculation. One research (Murphy et al., 2021) showed that 35% of people in Ireland and 31% of people in UK were hesitant toward getting vaccinated.

Personality traits can play a role in compliance with COVID-19 protective measures and vaccination hesitancy. For instance, people with higher Conscientiousness, Agreeableness, and Emotional Stability were found to be more accepting toward the idea of getting vaccinated,

or, in case of Conscientiousness, even supporting mandatory vaccination in some circumstances (Lin and Wang, 2020). Among HEXACO personality traits, previous research showed that Honesty-Humility and Openness were positively related to preventive behaviors (Lazarević et al., 2021) or Honesty-Humility and Agreeableness (Zettler et al., 2021).

Besides basic personality traits, the important predictors of non-compliance are traits from the Dark Tetrad constellation (e.g., Hardin et al., 2021) or Dark Factor of Personality (Zettler et al., 2021). Paulhus and Williams (2002) introduced Dark Triad which consists of three socially aversive traits: Machiavellianism, narcissism, and psychopathy. Sadism was added later, making the Dark Tetrad (Chabrol et al., 2017). These traits share low emotional reactivity and manipulation as the central characteristics (Dinić et al., 2020) and they are related to anti-social behaviors, especially psychopathy (Muris et al., 2017) and sadism (Chabrol et al., 2017). Previous research showed that among Dark Triad traits psychopathy and Machiavellianism negatively correlated with current COVID-19 health behaviors, while psychopathy was tied in with intention to expose others to potential danger (Blagov, 2020). The role

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of these two traits was further confirmed, although narcissism also showed a negative effect on protective behavior, but lower compared to other two traits (Nowak et al., 2020; Triberti et al., 2021). When Dark Tetrad was explored, results showed a surprising positive effect of sadism on some forms of protective behaviors, while psychopathy and narcissism had negative effects (Hardin et al., 2021). Authors explained the sadism effect by assuming that sadistic individuals may experience more positive emotions in situations like the pandemic that negatively affect the quality of life. Based on previous research we could conclude that Dark Triad traits are related to non-compliance with protective measures, while for sadism there is not enough research.

One of the reasons why people with high dark traits do not comply with protective measures could be their tendency toward risk behaviors. Previous research showed that people more prone to risky behaviors were less likely to wear a mask properly and to comply with social distance measures (Byrne et al., 2021). Past risk-taking behavior was negatively related to adherence to protective measures (Pollak et al., 2020). Similarly, Camargo et al. (2021) found that people who showed greater adherence to preventive measures were also more risk averse. Thus, non-compliance with various COVID-19 prevention measures is related to personal tendencies for different kinds of risk taking (Keinan et al., 2021).

All Dark Tetrad traits showed significant correlations with various risky behaviors (Stanwix and Walker, 2021). In investigation of Dark Triad, Maneiro et al. (2020) found that Machiavellianism and psychopathy are positively related to risk-engagement and negatively related to risk-perception. Furthermore, Crysel et al. (2013) found that Dark Triad composite is related to various risk-taking tasks, and among Dark Triad traits, narcissism showed the most consistent relationships. Furthermore, Grover and Furnham (2021) found that secondary psychopathy, aspects of psychopathy which contains excessive Neuroticism, impulsivity, and sensation seeking, is the most consistent predictor of risk-taking (both self-reported and experimentally induced) and narcissism is related to self-reported tendency toward risk-taking. Additionally, Dark Triad traits were related to the riskier driving attitudes (speeding, drunk driving, joyriding, and violating rules for keeping up with traffic flow, see Endriulaitienė et al., 2018), indicating that they are related to safety risks.

The aim of this study was to examine the relationship between Dark Tetrad traits and compliance with COVID-19 protective measures, with inclusion of proneness to risk-taking as potential mechanism which could explain this relationship. Previous research consistently showed that Dark Triad traits had a negative effect on protective behaviors (e.g., Blagov, 2020; Nowak et al., 2020), while sadism was explored only in one study in which it showed a surprisingly positive effect on cleanliness during pandemic (Hardin et al., 2021). Since people with higher Dark Tetrad traits showed tendency toward various risk behaviors (e.g., Stanwix and Walker, 2021), we assumed that risk-taking proneness could be an explanation mechanism by which Dark Tetrad traits are related to non-compliance with protective measures, which represent one of the health and safety risks. Among protective behaviors, besides those proclaimed by the CDC, we also explored willingness to be vaccinated as the most prominent protective measure.

Additionally, because it was possible to choose several vaccines through application form in Serbia, both EU-approved (Pfizer, Moderna, AstraZeneca) and non-approved (Sputnik V, Sinopharm) at the moment of investigation, we explored the difference in Dark Tetrad traits and risk-taking tendencies between those who selected only EU-approved, non-approved, and all vaccines. Since this is an exploratory part of the study, we do not have expectations regarding these differences. Thus, we could assume that those who selected non-approved vaccines would show a higher tendency toward health risk compared to those who selected EU-approved vaccines, but also there is a possibility that those who selected non-approved vaccines show lower health risk since they choose “traditional” vaccine. Additionally, we assumed that dark traits would have an effect only on the decision to be vaccinated or not, and

not on the decision about selection of specific vaccines.

2. Method

2.1. Participants and procedure

Sample included 348 participants (77% women) from the general population (age range 18–74, $M = 34.24$, $SD = 13.54$). Majority of the participants had higher education (30.15% university students and 42% university degree or higher). Most of the participants have never been infected with novel coronavirus (68.4%), some have recovered from it (27.3%) and some were in isolation (1.2%) or infected (2%) at the time of data collection (February and March 2021). It should be noted that data were collected before the news about stopping the use of the AstraZeneca vaccine in some countries. Instruments were administered via Facebook, thus the sample was convenient. The study was a part of a larger research project which was approved by the Ethical Committee of the Department of Psychology, Faculty of Philosophy, University of Novi Sad, Serbia, which is the Second Instance Commission of the Ethical Committee of the Serbian Psychological Society (code 202102091724_y05W).

2.2. Measures

2.2.1. The Hateful Eight (H8: Webster and Wongsomboon, 2020, for Serbian adaptation see Dinić, 2020)

This is a 16-item short form of the Short Dark Tetrad Scale (SD4; Paulhus et al., 2021, for Serbian adaptation see Dinić, 2020) measuring Machiavellianism (deviousness and scheming), narcissism (leadership and exceptionalism), psychopathy (defiance and recklessness), and sadism (violent voyeurism and verbal abuse). Items were presented in a 5-point Likert format (1 = strongly disagree; 5 = strongly agree). Since this is the first use of Serbian adaptation of the H8, we tested the model fit of three selected models in Webster and Wongsomboon (2020): 1) 4-factor model (MLR $\chi^2(98) = 261.01$, $p < .001$, CFI = 0.81; TLI = 0.76; RMSEA = 0.07, 90% CI 0.06–0.08; SRMR = 0.09), 2) 8-factor model (MLR $\chi^2(76) = 146.74$, $p < .001$, CFI = 0.92; TLI = 0.87; RMSEA = 0.05, 90% CI 0.04–0.06; SRMR = 0.06), and 3) hierarchical model with global Dark Tetrad composite which did not converge. Results of model fit comparison showed that an 8-factor model had a better fit ($\Delta\chi^2(22) = 111.94$, $p < .001$), so it will be used in further analysis (see Table A in Supplement for details about the model parameters). Cronbach's alphas

Table 1

Descriptives, reliabilities, and correlates of COVID-19 protective behaviors and willingness to be vaccinated.

	Protective behaviors	Vaccination	<i>M</i>	<i>SD</i>	α
Dark Tetrad traits					
Deviousness	−0.02	−0.11*	2.57	1.02	0.60
Scheming	0.02	−0.09	3.13	1.06	0.41
Leadership	0.04	0.02	2.79	1.15	0.75
Exceptionalism	0.01	−0.08	2.78	0.97	0.59
Defiance	−0.06	0.05	2.46	0.91	0.32
Recklessness	−0.14***	0.03	1.50	0.77	0.65
Violent voyeurism	−0.12**	−0.09	1.45	0.88	0.73
Verbal abuse	−0.05	−0.06	2.02	0.86	0.21
Risk-taking					
Social risks	0.001	0.03	5.05	1.01	0.67
Ethical risks	−0.16***	−0.03	1.93	0.84	0.59
Health/safety risks	−0.27***	−0.15***	2.52	1.11	0.66
Financial risks	−0.05	−0.15***	2.05	0.80	0.58
Recreational risks	−0.12**	−0.08	2.90	1.65	0.87

Note: r_{pb} coefficient of correlation was used for the willingness to be vaccinated (0 = no or unsure, 1 = yes, applied or already vaccinated).

*** $p < .001$.

** $p < .01$.

* $p < .05$.

for all scales are acceptable considering a small number of items, except for defiance and verbal abuse (Table 1).

2.2.2. A Domain-Specific Risk-Taking scale for adult populations (DOSPERT: Blais and Weber, 2006, for Serbian adaptation see Oljača et al., 2018)

The scale consists of 30 items, with 6 items per subscales: social, ethical, health/safety, financial, and recreational risk-taking. Participants rated how likely they are to engage in certain activities. Items were presented in 7-point Likert format (1 = *highly unlikely*; 7 = *almost certainly*). Since Serbian adaptation of DOSPERT was not validated previously, we calculated model fit: DWLS $\chi^2(395) = 631.61, p < .001$, CFI = 0.95; TLI = 0.94; RMSEA = 0.04, 90% CI 0.04–0.05; SRMR = 0.08 (see Table B in Supplement for model parameters). Cronbach's alphas for all scales are acceptable (Table 1).

2.2.3. The COVID-19 Protective Behaviors Scale

For the purposes of this research, a short, 5-items scale was created, based on the item difficulty and loadings in Dinić and Bodroža (2021), to assess people's compliance with protective measures against infection of COVID-19. On a 5-point Likert scale, participants rate how often they engage in avoiding crowds and gatherings, keeping 1.5–2 meter distance, meeting people in person, hand-sanitizing outside, wearing a mask in public ($M = 3.65, SD = 0.88, \alpha = 0.79$).

2.2.4. Vaccination against COVID-19

This was a one-item measure in which participants were divided in two groups: 1) against getting vaccinated (42.4%) or unsure (25.6%), and 2) have already applied for vaccination (16.5%) or have already been vaccinated (15.6%). Additionally, we asked about the preference for the certain vaccine and added three additional groups: 1. those who selected only EU-approved vaccines (Pfizer, AstraZeneca, and/or Moderna, $n = 31$ or 29.2% among those who have already applied for or have been vaccinated), 2) those who selected only EU not-approved (Sputnik V and/or Sinopharm, $n = 25$ or 23.6%), and 3) those who selected all or both EU-approved and non-approved vaccines ($n = 50$ or 47.2%).

2.3. Data analysis

Initial sample consisted of 348 participants. Those with missing data on one of the instruments were deleted (8 participants). The amount of missing data was 0.33% and they were replaced using the multiple imputation method (with 5 imputation). Among all scales, recklessness and violent voyeurism had kurtosis over recommended for normal distribution (± 2 , see Tabachnick and Fidell, 2019) and they were normalized using rankit transformation. First, correlations were calculated between protective measures (Pearson coefficients) and vaccination (point-biserial coefficients) on the one side and the Dark Tetrad and risk-taking behaviors on the other side. Second, hierarchical regression analysis was conducted with gender, age, and previous/present infection with the novel coronavirus in the 1st step as control, Dark Tetrad traits in the 2nd step, and risk-taking tendencies in the 3rd step, while compliance with protective measures was criterion in the first analysis (hierarchical linear regression) and category regarding getting vaccinated or unsure contrasted to those who have applied for vaccination or have been vaccinated in the second analysis (hierarchical logistic regression). In this way we could analyse the potential mediation role of all risk-taking forms simultaneously in relations between the dark traits and protective measures as change in contribution of dark traits when risk-taking scales were introduced into the model. Third, ANOVA and Bonferroni post hoc tests were used for testing the differences between the three groups of participants based on vaccination selection. In the case of violation of homogeneity of variance, robust ANOVA was used (Welch) with Games-Howell post hoc tests.

3. Results

Adherence to protective behaviors is significantly negatively correlated with two of the dark traits (recklessness and violent voyeurism), as well as with three of the risk-taking scales (ethical risks, health/safety risks, and recreational risks, see Table 1). Willingness to get vaccinated is significantly negatively correlated with deviousness, health/safety, and financial scale of risk-taking (Table 1). Correlations between all variables are shown in Table C in Supplement.

Results of hierarchical regression analysis showed that protective behaviors could be explained by age, with older people more likely to comply with protective measures (Table 2). Gender was a significant predictor in the 1st step (women showed higher compliance), but when dark traits were introduced, it became non-significant. Among dark traits in the 2nd step only recklessness and violent voyeurism showed small negative effects. However, in the 3rd step when risk-tendencies were introduced, dark traits did not show significant contribution anymore, but health/safety risks, in a negative direction. Therefore, health/safety risk fully mediated the effect of recklessness and violent voyeurism on protective behaviors.

In the case of vaccination, results showed that age is again a significant predictor and, among dark traits, deviousness showed significant negative effect although the 2nd step didn't add significant change in explained variance of the vaccination. When risk-tendencies were introduced, health/safety risk showed significant negative contribution, but without change in contribution of deviousness. Thus, deviousness showed a significant effect on vaccination independent of tendency toward health risks. Overall accuracy of classification was 73.7%.

Furthermore, ANOVA showed significant differences in social ($F(2,103) = 4.12, p = .019, \eta^2 = 0.07$) and ethical risks (Welch $F(2,59.69) = 6.29, p = .003, \eta^2 = 0.08$) between the three groups of participants regarding the vaccine selection. Post hoc tests showed that those who selected all vaccines (both EU-approved and non-approved) had higher scores on social risks ($p = .019$) compared to those who selected only non-approved vaccines. Additionally, those who selected only EU-approved vaccines showed lower scores on ethical risks compared to the rest of the participants who were vaccinated or applied for vaccination (non-approved: $p = .032$, all vaccines: $p = .007$). There are no significant differences in dark traits among these three groups of participants.

4. Discussion

The aim of this research was to explore effects of Dark Tetrad traits on non-compliance with protective measures considering potential mediation role of tendency toward various risk behaviors. This is the first study that explored risk tendencies as an explanation mechanism in relations between the Dark Tetrad traits and non-compliance with protective measures as well as willingness to be vaccinated along with other recommended protective behaviors.

Results showed that among dark traits measured by short H8, only recklessness (psychopathy) and violent voyeurism (sadism) showed small negative effects on compliance with protective measures, and deviousness (Machiavellianism) showed small negative effect on vaccination. Results are generally in line with previous studies in which dark traits, except narcissism, showed negative effects on COVID-19 protective behaviors (e.g., Blagov, 2020). Although narcissism showed effect on protective behaviors in some studies (e.g., Nowak et al., 2020), it clearly showed smaller effects compared to other dark traits.

Regarding obtained effects, we should note that recklessness refers to rule-breaking and exposure to dangerous situations (Webster and Wongsomboon, 2020). Thus, we could conclude that those who scored higher on this trait also would not follow the proclaimed protective measures and would expose themselves to health risks (note that correlation recklessness had the highest correlation with health/risk among all risk tendencies, $r = 0.39$, see Table C in Supplement). In the case of

Table 2

Hierarchical regression analysis: prediction of COVID-19 protective behaviors and willingness to be vaccinated based on Dark Tetrad traits and risk tendencies.

	Protective behavior (β)			Vaccination [Exp(B)]		
	1st step	2nd step	3rd step	1st step	2nd step	3rd step
Gender	0.14**	0.08	0.04	0.71	0.82	0.95
Age	0.18***	0.20***	0.15**	1.06***	1.06***	1.06***
COVID-19 infection	0.01	0.02	0.02	1–11	1.04	1.05
R^2	0.04**			0.12–0.17***		
Deviousness		–0.04	–0.05		0.76*	0.75*
Scheming		0.08	0.05		0.99	0.97
Leadership		0.08	0.10		1.20	1.23
Exceptionalism		0.02	0.01		0.80	0.79
Defiance		–0.06	–0.01		0.94	0.98
Recklessness		–0.15*	–0.04		1.21	1.39
Violent voyeurism		–0.12*	–0.07		0.79	0.86
Verbal abuse		0.03	0.06		1.09	1.13
ΔR^2		0.06**			0.02–0.03	
Social risks			0.08			1.27
Ethical risks			0.07			1.14
Health/safety risks			–0.33***			0.61**
Financial risks			0.04			0.76
Recreational risks			–0.06			0.98
ΔR^2			0.10***			0.04–0.06***
Total R^2			0.20***			0.18–0.26***

Note: Gender was coded 0 = man, 1 = woman; COVID-19 infection was coded 0 = no, 1 = yes; vaccination was coded 0 = no or unsure, 1 = yes, applied or already vaccinated. Range of R^2 coefficients in logistic regression represents Cox & Snell and Nagelkerke R^2 .

*** $p < .001$.

** $p < .01$.

* $p < .05$.

sadism there is only one previous study which showed the positive effect of sadism on hygiene during pandemic (Hardin et al., 2021). However, our results showed that sadism had a negative effect on protective measures, which is in line with the theoretical determination of sadism as an antagonistic trait which refers to enjoyment in others suffering and carelessness for others (e.g., Chabrol et al., 2017). Previous research showed that sadism, as well as other dark traits, is related to various risk-taking forms (Stanwix and Walker, 2021). Furthermore, Krcmar and Greene (2000) showed that attraction to violence, which could be understood as violent voyeurism, is related to various forms of risk-taking (drinking problem, drinking and driving, risky sex, delinquency, etc.). Thus, we could conclude that the effect of sadism is in the same direction as the effect of other dark traits, especially psychopathy with which it showed the highest correlation (e.g., Dinić et al., 2020).

The effects of recklessness and violent voyeurism could be fully explained by tendency toward health/safety risks. It could be assumed that people who are more reckless and impulsive are more likely to get into dangerous situations and expose themselves and others to safety risks, which in turn reflects in violation of the health-protective measures. Also, we could assume that people who spend more time indulging in violent media become desensitized to consequences of health-damaging actions, which can in turn make them more prone to take health/safety risks and therefore more likely to disregard COVID-19 safety measures.

However, the effect of deviousness holds independently of introducing the risk tendencies, meaning that it is solely a negative predictor of willingness to be vaccinated. This is in accordance with previous findings, as Machiavellianism has been associated with non-compliance with protective measures (e.g., Blagov, 2020; Nowak et al., 2020) and vaccination could be considered one of the most important protective measures. Since deviousness refers to getting your way through conflict-avoidance, we could assume that those scored high on this subscale are generally more hesitant and passive, which could also make them more hesitant to vaccinate.

We should note that effects are rather small. One of the explanations could be “strong situation hypothesis” according to which personality traits have less room to play an important role in predicting behaviors in a strong situational context such as pandemic (e.g., Zajenkowski et al.,

2020). The other possibility is the cost of using the short measure of dark traits that captures only a narrow range of indicators.

Finally, results showed that those who selected all vaccines showed higher social risk and that those who selected only EU-approved vaccines showed the lowest ethical risks among participants who are already vaccinated or who applied for vaccination. It seems that those who are more prone to take social risk, i.e., who are bold and do not hesitate to make changes in their lives and disagree with authorities, are more willing to take any vaccine. On the one hand, we could assume that those who are more prone to social risks are more active and are willing to take any vaccine in order to get their life back as soon as possible and to proceed with their activities. On the other hand, those who score lower on the ethical risk could prefer EU-approved vaccines since they obey rules and norms, therefore they would accept something that is already validated and approved. However, further research is needed to explore the reasons for selecting specific vaccine. Additionally, dark traits showed no significant effects on selection of vaccines, only risk-taking tendencies.

There are several limitations of the study. First, the sample was convenient and consisted of more women, thus generalization of the results is limited. Second, although model fit for used measures was adequate, the cost of short measures could be seen in lower alpha reliability for some scales. Since this study was a part of a larger project, we used short measure of Dark Tetrad traits in order to keep the instruments' set as brief as possible. Future studies should consider the use of the longer multidimensional measures of dark traits.

Taken together, results confirmed the significant role of specific aspects of psychopathy, sadism, and Machiavellianism in some aspects of non-compliance with COVID-19 protective measures. Although previous research has shown that people who are non-compliant also score higher on dark traits (e.g., Blagov, 2020; Nowak et al., 2020), we demonstrated that the mechanism by which malevolent traits had an effect on non-compliance could be a general tendency to disregard safety rules. Moreover, this is the first study explored the preferences for a specific vaccine (e.g., EU-approved or non-approved) and our results showed that tendency toward certain risks is connected to these preferences. Our findings could be useful for public health policies, e.g., in formulation of a public message to raise awareness about the vaccination safety and to

reduce perception of risk regarding the application of specific vaccine.

CRediT authorship contribution statement

Iva Konc: Conceptualization, Methodology, Formal analysis, Writing – original draft, Investigation. **Kristina Petrović:** Conceptualization, Methodology, Formal analysis, Writing – original draft, Investigation. **Bojana M. Dinić:** Conceptualization, Methodology, Formal analysis, Writing – original draft, Writing – review & editing, Supervision.

Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.paid.2021.111341>.

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