



Brief Reports

The dark side of personality and its somatic expression: Relationship between the Dark Triad, psychosomatic symptoms and somatosensory amplification

Violeta Tadić^{a,*}, Boris Kordić^b

^a Institute of Criminological and Sociological Research, Belgrade, Serbia

^b Faculty of Security Studies, University of Belgrade, Serbia

ARTICLE INFO

Keywords:

Psychosomatics
Students
Dark Triad
SSA
Machiavellianism

ABSTRACT

The Dark Triad is characterized by emotional dysregulation, deficits in self-understanding and interpersonal functioning, as well as maladaptive defense mechanisms. While these traits have been linked to diverse health outcomes, their role in the psychosomatic domain remains limited, and the relationships explored remain unclear. This research examines the associations between the Dark Triad traits, psychosomatic symptoms, and somatosensory amplification in a student population ($N = 296$). While all Dark Triad traits were associated with somatosensory amplification, only psychopathy and Machiavellianism were linked to psychosomatic symptoms. Among the Dark Triad traits, Machiavellianism was the most prominent predictor in both cases. Somatosensory amplification emerged as a significant predictor of psychosomatic symptoms. Finally, the Sobel test indicated that somatosensory amplification mediates the association between Machiavellianism and psychopathy with psychosomatic symptoms. The results showed that the Dark Triad traits may play a significant role in predicting heightened somatic sensitivity and psychosomatic symptoms, with narcissism being excluded from the latter association; therefore, further research in this regard is required.

1. Introduction

Somatic symptoms refer to physical complaints that arise and persist under the direct influence of psychological factors such as trauma, personality traits, and emotions, even in the absence of identifiable organic pathology (Henningsen, 2003). Contemporary research highlights emotional dysregulation, reduced emotional awareness, and maladaptive interpretations of bodily sensations as key mechanisms underlying psychosomatic symptoms (Subic-Wrana et al., 2010). Due to the complex interaction between physical and psychological symptoms and the lack of clear diagnostic criteria, somatic manifestations often blur the boundary between “mental” and “physical” disorders, and are therefore fundamentally considered psychosomatic in nature (Güney et al., 2015):

Somatosensory amplification plays a crucial role in understanding somatization and psychosomatic symptoms (Ciaramella et al., 2020; Nakao & Takeuchi, 2018). It refers to the tendency to perceive normal somatic sensations as unusually intense, distressing, or indicative of pathology (Barsky et al., 1990). Somatosensory amplification may

function as a cognitive process contributing to the development and maintenance of psychosomatic symptoms (Barends et al., 2020).

Personality traits have long been linked to health outcomes, with traits like neuroticism, hostility, and alexithymia showing strong associations with somatization and emotional dysregulation (Ghazanfari et al., 2020). However, the Dark Triad traits have received less attention in psychosomatic research. The Dark Triad encompasses a constellation of personality traits marked by manipulative, egocentric, and antisocial tendencies (Paulhus & Williams, 2002). Machiavellianism involves emotional detachment, low empathy, and manipulateness (Christie & Geis, 1970). Narcissism manifests in two forms: grandiose, characterized by self-confidence and aggression, and vulnerable, marked by emotional fragility and somatic concerns (Wink, 1991). Psychopathy involves impulsivity, low empathy, and antisocial tendencies (Del Gaizo & Falkenbach, 2008). Psychopathy shows the strongest and most consistent association with psychosomatic symptoms, while Machiavellianism exhibits weaker links (Akram et al., 2018; Hudek Knežević et al., 2016). Findings on narcissism are mixed, showing both positive and negative correlations (Hudek Knežević et al., 2016; Kealy et al., 2016). The role of

* Corresponding author at: Institute of Criminological and Sociological Research, Gračanička no. 18, Belgrade, Serbia.

E-mail addresses: tadicv33@gmail.com (V. Tadić), kordic@fb.bg.ac.rs (B. Kordić).

the Dark Triad in somatosensory amplification appears to be limited (Kealy et al., 2018; Marcoux et al., 2013).

This study aimed to examine the relationships between Dark Triad traits, psychosomatic symptoms, and somatosensory amplification. Based on prior research, we hypothesized that psychopathy and Machiavellianism would have a stronger predictive role, while narcissism might show inconsistent effects. Somatosensory amplification was expected to predict psychosomatic symptoms and mediate the relationship between Dark Triad traits and these symptoms (see C1). This study focused on a student population, as prior research in this group highlights the frequent occurrence of sleep problems, chronic fatigue, pain, and depression, with evidence of rising prevalence (Eriksen et al., 1999; Koteles et al., 2011; Panić et al., 2013; Pikó et al., 1997).

2. Method

2.1. Sample and procedure

A sample of 296 Serbian university students (29 % male and 71 % female) participated in an online questionnaire-based research aimed at examining the relationship between Dark Triad traits, psychosomatic symptoms, and somatosensory amplification. Participants ranged in age from 19 to 29 years ($M_{\text{age}} = 22.53$, $SD = 2.49$). The research was administered via an online survey platform - Google Forms. The questionnaire, accompanied by detailed instructions regarding the research and its main objectives, was distributed through official student groups on social media. Participation in the research was voluntary and anonymous. Prior to data collection, all procedures were conducted in accordance with institutional ethical guidelines for research.

2.2. Measures

2.2.1. Psychosomatic symptoms

Individual psychosomatic symptoms were assessed using a shortened version of the Subjective Health Complaints Inventory (SHC) (Eriksen et al., 1999), originally validated. From the original list of 29 psychosomatic symptoms, 12 most relevant to students were selected, focusing on symptoms previously identified as prominent in this population (e.g., Eriksen et al., 1999; Pikó et al., 1997). Participants rated symptom frequency over the past 12 months on a five-point Likert scale, explicitly excluding symptoms with known or suspected organic causes (see C2). The shortened scale demonstrated good internal consistency in this sample (Cronbach's $\alpha = 0.84$).

2.2.2. Somatosensory Amplification Scale

Somatosensory amplification was assessed using the Somatosensory Amplification Scale (SSAS; Barsky et al., 1990). The SSAS consists of 10 items rated on a five-point Likert scale, measuring the tendency to perceive normal somatic sensations as unusually intense or disturbing. The reliability and validity of the Turkish version of the scale have been previously established with Cronbach's alpha values ranging from 0.62 to 0.76 (Güleç & Sayar, 2007). In the current research, the internal consistency of the SSAS was 0.65.

2.2.3. Short Dark Triad

The 27-item Short Dark Triad questionnaire (SD3; Jones & Paulhus, 2014) was used to assess Machiavellianism, psychopathy, and narcissism. Items are rated on a five-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). In the current research, the internal consistency of the full SD3 scale yielded a Cronbach's alpha of 0.78, with subscale alphas of 0.56 for Narcissism, 0.75 for Machiavellianism, and 0.74 for Psychopathy.

2.3. Data analysis

Multicollinearity among Dark Triad traits, psychosomatic symptoms,

and somatosensory amplification was examined using Pearson's correlation coefficient (r_p). Multiple linear regression analysis was conducted to assess the predictive power of the Dark Triad traits in relation to psychosomatic symptoms and somatosensory amplification. Additionally, the significance of the mediation effect of somatosensory amplification on the relationship between Dark Triad traits (Machiavellianism and psychopathy) and psychosomatic symptoms was tested using the Sobel test (Sobel, 1982). Bivariate correlations and regression analyses were performed using SPSS Statistics 20.0, while the Sobel mediation test was conducted using an interactive calculation tool for mediation testing (Preacher & Leonardelli, 2003).

3. Results

3.1. Descriptive statistics and bivariate associations between the measures

Table 1 details descriptive statistics, internal consistency reliabilities (Cronbach's alpha), and Pearson's bivariate correlations for all measures used in the current research. The results indicate that all measures, except for narcissism and somatosensory amplification, demonstrated high reliability. All Dark Triad traits were positively associated with somatosensory amplification. However, only Machiavellianism and psychopathy were associated with higher levels of psychosomatic symptoms. Furthermore, a strong positive association was observed between somatosensory amplification and psychosomatic symptoms.

3.2. The prediction of psychosomatic symptoms and somatosensory amplification

Two sets of multiple linear regression analyses were conducted. In predicting psychosomatic symptoms, Machiavellianism and psychopathy emerged as significant positive predictors, while narcissism was nonsignificant. Adding somatosensory amplification significantly improved prediction beyond the Dark Triad traits. In predicting somatosensory amplification, Machiavellianism was the strongest predictor, followed by psychopathy and narcissism, all reaching significance (Table 2).

3.3. Mediator of the link between Dark Triad traits and psychosomatic symptoms

Our model specified Machiavellianism and psychopathy as predictor variables, somatosensory amplification as the mediator, and psychosomatic symptoms as the criterion variable. Mediation was tested using the Sobel test, with unstandardized coefficients (a and b), their standard errors (SE_a and SE_b), test statistics (Z), and p -values reported in Table 3. Results indicated that the indirect effects of both predictors on psychosomatic symptoms via somatosensory amplification were statistically significant.

4. Discussion

Consistent with the first hypothesis, Machiavellianism emerged as the strongest predictor of both psychosomatic symptoms and somatosensory amplification, followed closely by psychopathy. Narcissism predicted somatosensory amplification, but not psychosomatic symptoms. The observed relationships may be explained by maladaptive cognitive-emotional patterns characteristic of Machiavellianism and psychopathy, including emotional detachment and affective dysregulation, which can impair emotional processing and result in somatic symptom manifestation (Lane & Schwartz, 1987). Alternatively, somatic symptoms might serve instrumental purposes, such as manipulation or avoidance of responsibility (Garofalo et al., 2019). Somatosensory amplification likely reflects deficits in emotional processing as well as broader dysfunctional emotional and social functioning, acting as a regulatory or interpersonal mechanism (Barsky et al., 1990). These

Table 1

Descriptive statistics, reliabilities, and bivariate associations.

Variables	<i>M</i> (SD)	α	1	2	3	4
1. PS (Overall)	3.07 (0.37)	0.84				
Back pain	2.84 (1.17)					
Headache	3.53 (1.30)					
Sleep disturbances	3.21 (1.00)					
Chronic fatigue	3.43 (1.11)					
Stomach pain	3.14 (1.18)					
Dyspepsia	3.35 (1.12)					
Diarrhoea	3.37 (1.13)					
Obstipation	2.95 (1.26)					
Eczema	3.11 (1.11)					
Allergies	2.75 (1.42)					
Anxiety	3.15 (1.50)					
Depression	2.02 (1.28)					
SD3 (Overall)	3.25 (0.32)	0.78				
2. Narcissism	3.08 (0.50)	0.56	0.10			
3. Machiavellianism	3.65 (0.44)	0.75	0.25**	0.09		
4. Psychopathy	3.03 (0.41)	0.74	0.16**	0.40**	0.16**	
5. SSAS	3.37(0.41)	0.65	0.46**	0.29**	0.56**	0.47**

Note: ** $p < .01$; PS, psychosomatic symptoms; SD3, Short Dark Triad; SSAS, somatosensory amplification scale.**Table 2**

Regression model predicting PS and SSA.

Variables		PS			SSA		
		β	<i>t</i>	<i>p</i>	β	<i>t</i>	<i>p</i>
Step 1	Machiavellianism	0.23	3.97	0.000	0.49	11.37	0.000
	Psychopathy	0.12	2.14	0.033	0.34	7.3	0.000
	Narcissism				0.11	2.34	0.020
	R^2	0.08***			0.47***		
	SSA	0.51	7.30	0.000			
Step 2	R^2	0.22***					

Note: *** $p < .001$; PS, psychosomatic symptoms; SSA, somatosensory amplification.**Table 3**

The Sobel test of the mediating effect of SSA on Machiavellianism and psychopathy.

Indirect effect	<i>a</i>	<i>SE_a</i>	<i>b</i>	<i>SE_b</i>	<i>Z</i>	<i>SE</i>	<i>p</i>
$M \rightarrow SSA \rightarrow PS$	0.520	0.052	0.413	0.046	7.09	0.031	<0.001
$P \rightarrow SSA \rightarrow PS$	0.472	0.052	0.413	0.046	6.38	0.030	<0.001

Note: M, Machiavellianism; P, psychopathy.

findings align with prior research linking Machiavellianism and psychopathy to psychosomatic symptoms and partially to somatosensory amplification (Akram et al., 2018; Marcoux et al., 2013).

In this study, narcissism was primarily operationalized as grandiose (Jones & Paulhus, 2014), which may relate to heightened somatic awareness driven by needs for control, validation, and impression management. Somatosensory amplification appears to reflect somatic hypersensitivity oriented toward perceived threats to the self, while simultaneously serving as a protective mechanism for self-esteem and a defense against negative emotions (Rhodewalt & Morf, 1998). This is consistent with previous findings linking pathological narcissism to somatosensory amplification, though not directly to psychosomatic symptoms (Kealy et al., 2018).

The second hypothesis was supported, with somatosensory amplification emerging as a significant predictor of psychosomatic symptoms. As a psychological process altering the perception and interpretation of bodily sensations, somatosensory amplification contributes to symptom development by heightening attention to somatic cues and misattributing them to pathology. This is consistent with earlier research identifying somatosensory amplification as an independent predictor of psychosomatic symptoms (Nakao & Takeuchi, 2018).

Supporting the third hypothesis, somatosensory amplification significantly mediated the relationship between Machiavellianism,

psychopathy, and psychosomatic symptoms. This suggests that these Dark Triad traits contribute indirectly to psychosomatic symptoms through somatosensory amplification, which represents a misinterpretation of bodily states influenced by low emotional awareness and difficulty differentiating between somatic and emotional experiences (Ciaramella et al., 2020; Lane & Schwartz, 1987). The mediating role of somatosensory amplification in this context remains underexplored, with limited research focusing on narcissism (Kealy et al., 2018).

Examining the predictive role of the Dark Triad requires caution, as the Dark Triad traits share overlapping characteristics with alexithymia (Cairncross et al., 2013; Del Gaizo & Falkenbach, 2008). Given that alexithymia also correlates with somatosensory amplification in psychosomatic patients, its mediating role should be considered in future research (Nakao & Takeuchi, 2018).

5. Limitation and conclusion

The brief measure of the Dark Triad limited differentiation between vulnerable and grandiose narcissism. The application of the Somatosensory Amplification Scale, developed for clinical populations, to a student sample may influence findings. Moreover, the young, healthy sample may constrain generalizability, though psychosomatic issues are increasingly reported among students (e.g., Köteles et al., 2011; Píró et al., 1997). This study raises key questions about the Dark Triad and psychosomatic symptoms as under-integrated research areas, encouraging future inquiry.

CRedit authorship contribution statement

Violeta Tadić: Writing – original draft, Methodology, Investigation, Conceptualization. **Boris Kordić:** Methodology, Discussion.

Ethics approval

All procedures in research performed in studies were performed in compliance with the ethical standards of the institutional and national research committee and with the 1964 Helsinki Declaration and its later amendments or comparable ethical standards.

Funding

No funding.

Declaration of competing interest

The authors declare no competing interests.

Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.paid.2025.113480>.

Data availability

The datasets generated during this research are available from the corresponding author upon reasonable request.

References

- Akram, U., Allen, S., McCarty, K., Gardani, M., Tan, A., Villarreal, D., ... Akram, A. (2018). The relationship between insomnia symptoms and the Dark Triad personality traits. *Personality and Individual Differences*, 131, 212–215. <https://doi.org/10.1016/j.paid.2018.05.001>
- Barends, H., Claassen van Dessel, N., van der Wouden, J. C., Twisk, J. W. R., Terluin, B., van der Horst, H. E., & Dekker, J. (2020). Impact of symptom focusing and somatosensory amplification on persistent physical symptoms: A three year follow up study. *Journal of Psychosomatic Research*, 135, Article 110131. <https://doi.org/10.1016/j.jpsychores.2020.110131>
- Barsky, A. J., Wyshak, G., & Klerman, G. L. (1990). The somatosensory amplification scale and its relationship to hypochondriasis. *Journal of Psychiatric Research*, 24(4), 323–334. [https://doi.org/10.1016/0022-3956\(90\)90004-a](https://doi.org/10.1016/0022-3956(90)90004-a)
- Cairncross, M., Veselka, L., Schermer, J. A., & Vernon, P. A. (2013). A behavioral genetic analysis of alexithymia and the Dark Triad traits of personality. *Twin Research and Human Genetics*, 16(3), 690–697. <https://doi.org/10.1017/thg.2013.19>
- Christie, R., & Geis, F. L. (1970). *Studies in Machiavellianism*. Academic Press.
- Ciamarella, A., Silvestri, S., Pozzolini, V., Federici, M., & Carli, G. (2020). A retrospective observational study comparing somatosensory amplification in fibromyalgia, chronic pain, psychiatric disorders and healthy subjects. *Scandinavian Journal of Pain*, 21(2), 317–329. <https://doi.org/10.1515/sjpain-2020-0103>
- Del Gaizo, A. L., & Falkenbach, D. M. (2008). Primary and secondary psychopathic-traits and their relationship to perception and experience of emotion. *Personality and Individual Differences*, 45(3), 206–212.
- Eriksen, H. R., Ihlebaek, C., & Ursin, H. (1999). A scoring system for subjective health complaints (SHC). *Scandinavian Journal of Public Health*, 27(1), 63–72.
- Garofalo, C., Virgilio, C., Bogaerts, S., & Schimmenti, A. (2019). Dark ladies: Maladaptive personality domains, alexithymia, and the Dark Triad in women. *Clinical Neuropsychiatry*, 16(5–6), 221–228.
- Ghazanfari, E., Kazemnejad, A., Feizi, A., Fesharaki, M. G., Dinu, I., Keshteli, A. H., & Adibi, P. (2020). The relationship between personality traits and psychosomatic complaints in a sample of Iranian adults. *Journal of Affective Disorders*, 261, 253–258. <https://doi.org/10.1016/j.jad.2019.10.020>
- Güleç, H., & Sayar, K. (2007). Reliability and validity of the Turkish form of the Somatosensory Amplification Scale. *Psychiatry and Clinical Neurosciences*, 61(1), 25–30. <https://doi.org/10.1111/j.1440-1819.2007.01606.x>
- Güney, Z. O., Sattel, H., Cardone, D., & Merla, A. (2015). Assessing embodied interpersonal emotion regulation in somatic symptom disorders: A case study. *Frontiers in Psychology*, 6, Article 68. <https://doi.org/10.3389/fpsyg.2015.00068>
- Henningsen, P. (2003). The body in the brain: Towards a representational neurobiology of somatoform disorders. *Acta Neuropsychiatrica*, 15(4), 157–160. <https://doi.org/10.1034/j.1601-5215.2003.00032.x>
- Hudek Knežević, J., Kardum, I., & Mehić, N. (2016). Dark triad traits and health outcomes: An exploratory study. *Psihologijske Teme*, 25(1), 129–156.
- Jones, D. N., & Paulhus, D. L. (2014). Introducing the Short Dark Triad (SD3): A brief measure of dark personality traits. *Assessment*, 21(1), 28–41. <https://doi.org/10.1177/1073191113514105>
- Kealy, D., Rice, S. M., Ogrodniczuk, J. S., & Cox, D. W. (2018). Investigating the link between pathological narcissism and somatization. *The Journal of Nervous and Mental Disease*, 206(12), 964–967. <https://doi.org/10.1097/NMD.0000000000000903>
- Kealy, D., Tsai, M., & Ogrodniczuk, J. S. (2016). Pathological narcissism and somatic symptoms among men and women attending an outpatient mental health clinic. *International Journal of Psychiatry in Clinical Practice*, 20(3), 175–178. <https://doi.org/10.1080/13651501.2016.1199811>
- Köteles, F., Szemerszky, R., Freyler, A., & Bárdos, G. (2011). Somatosensory amplification as a possible source of subjective symptoms behind modern health worries. *Scandinavian Journal of Psychology*, 52(2), 174–178. <https://doi.org/10.1111/j.1467-9450.2010.00846.x>
- Lane, R. D., & Schwartz, G. E. (1987). Levels of emotional awareness: A cognitive-developmental theory and its application to psychopathology. *The American Journal of Psychiatry*, 144(2), 133–143. <https://doi.org/10.1176/ajp.144.2.133>
- Marcoux, L.-A., Michon, P.-E., Voisin, J. I. A., Lemelin, S., Vachon Presseau, E., & Jackson, P. L. (2013). The modulation of somatosensory resonance by psychopathic traits and empathy. *Frontiers in Human Neuroscience*, 7, 274. <https://doi.org/10.3389/fnhum.2013.00274>
- Nakao, M., & Takeuchi, T. (2018). Alexithymia and somatosensory amplification link perceived psychosocial stress and somatic symptoms in outpatients with psychosomatic illness. *Journal of Clinical Medicine*, 7(5), 112. <https://doi.org/10.3390/jcm7050112>
- Panić, D., Radojković, D., & Hadži Pešić, M. (2013). Osobine ličnosti, strategije prevladavanja stresa i sklonost psihosomatičnosti kod studenata. *TEME: Časopis za Društvene Nauke*, 37(2), 735–751.
- 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)
- Pikó, B., Barbás, K., & Boda, K. (1997). Frequency of common psychosomatic symptoms and its influence on self-perceived health in a Hungarian student population. *European Journal of Public Health*, 7(3), 243–247. <https://doi.org/10.1093/eurpub/7.3.243>
- Preacher, K., & Leonardelli, G. (2003). Calculation for the Sobel test: An interactive calculation tool for mediation tests. Retrieved November 10, 2003, from <http://www.unc.edu/preacher/sobel/sobel.htm>
- Rhodewalt, F., & Morf, C. C. (1998). On self-aggrandizement and danger: A temporal analysis of narcissism and affective reactions to success and failure. *Journal of Personality and Social Psychology*, 74(3), 672–685.
- Sobel, M. E. (1982). Asymptotic confidence intervals for indirect effects in structural equation models. In S. Leinhardt (Ed.), *Sociological methodology 1982* (pp. 290–312). Washington, DC: American Sociological Association.
- Subic-Wrana, C., Beutel, M. E., Knebel, A., & Lane, R. D. (2010). Theory of mind and emotional awareness deficits in patients with somatoform disorders. *Psychosomatic Medicine*, 72(4), 404–411. <https://doi.org/10.1097/PSY.0b013e3181d35e83>
- Wink, P. (1991). Two faces of narcissism. *Journal of Personality and Social Psychology*, 61, 590–597.