ORIGINAL ARTICLE

Incremental validity of the sense of coherence vis-à-vis depressive tendencies and dispositional aggression

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BACKGROUND
Sense of coherence (SOC) strongly predicts health-related indicators such as depressive tendencies and aggression. However, further investigation of its measurement, related factors, and theoretical positioning is essential. We examined whether SOC is a valid indicator of depressive tendencies, dispositional aggression, and other unique aspects, even when controlling for Dark Triad (DT) and Big Five (BF) traits.

PARTICIPANTS AND PROCEDURE
In this quantitative online cross-sectional study conducted in June 2019, data from 1,626 participants (759 men, 867 women; mean age = 29.90, SD = 13.77) were analyzed using hierarchical multiple regression analysis. The survey comprised the Japanese versions of the 29-item SOC scale, Short DT, BF scale, Center for Epidemiologic Studies Depression Scale, and Buss-Perry Aggression Questionnaire.

RESULTS
Machiavellianism, narcissism, psychopathy, and SOC were correlated with hostility (ps < .01); Machiavellianism, psy-chopathy, and SOC were correlated with anger (ps < .01); Machiavellianism and psychopathy were correlated with verbal aggression (ps < .01); and Machiavellianism, psychopathy, and SOC were correlated with physical aggression (ps < .01). Overall, SOC was correlated with depressive tendencies, hostility, and physical aggression even after accounting for the BF and DT.

CONCLUSIONS
This study reinforces SOC's value as a unique construct that contributes to understanding personality traits and health-related behaviors. Unlike neuroticism and DT traits, SOC promotes adaptive and prosocial behaviors. It fosters effective stress management, self-development, and resilience. In other words, the multidimensional nature of SOC is thought to encompass both self-centered and prosocial elements, reflecting its role in facilitating coping and personal growth.

KEY WORDS
personality trait; cross-sectional study; quantitative web survey

BACKGROUND

Sense of coherence (SOC) is defined as an individual's perception and the sense that their experiences in the world are coherent, comprehensible, consistent, and meaningful; according to the theory of salutogenesis, which has SOC as a core concept, those with high levels of SOC can cope effectively and flexibly with stressors (Antonovsky, 1987). SOC consists of three components: comprehensibility, manageability, and meaningfulness (Antonovsky, 1987). Comprehensibility means that the stimuli encountered in the future will be predictable (Antonovsky, 1987). Manageability refers to the extent to which a person perceives that their resources are adequate to meet demands (Antonovsky, 1987). Meaningfulness refers to the extent that stimuli are considered worth investing energy in, worthy of commitment, and challenges rather than burdens (Antonovsky, 1987). SOC encourages the effective mobilization of psychosocial resources to manage stress (Antonovsky, 1987). Numerous studies have revealed that SOC is a strong predictor of health-related indicators such as depressive tendencies and aggression (Grevenstein & Bluemke, 2015; Kivimäki et al., 2002). However, its measurement, related factors, and theoretical positioning require further investigation; this includes elucidating the uniqueness of SOC by probing its incremental validity in relation to other well-established personality factors, for instance the Big Five (BF) or Dark Triad (DT).

For example, scholars believe that SOC may be conceptually understood by determining its unique effects through the elimination of elements related to the BF personality traits, with which it statistically overlaps (Kase et al., 2018). Grevenstein and Bluemke (2015) and Grevenstein et al. (2016) investigated the incremental validity of SOC based on its associative differences with the BF for depressive tendencies, life satisfaction, and self-efficacy using hierarchical multiple regression analysis and structural equation modeling to attain insights into the unique variance of SOC. These researchers sought to determine whether SOC, as derived from statistical associations, is diametrically opposed to neuroticism. Their results revealed that tendencies toward neuroticism were associated with health-related indicators; further, the unique aspect of SOC was indicated via continued evidence of its correlation with health-related indicators even after controlling for neuroticism (Grevenstein & Bluemke, 2015). Thus, the theoretical organization of SOC attempts to demonstrate its uniqueness by confirming its incremental validity for a certain indicator. In particular, discourse on SOC uniqueness can be rendered specific and detailed through its elucidation apropos a concept such as the BF, which has accumulated extensive scholarly evidence. Piedmont et al. (2014) examined the incremental validity of the SOC in terms of the BF and spirituality; they found that scores for the SOC scale broadly covered the kind of variance already explained by other measures, suggesting that, compared with other measures, the SOC is a factor that explains an aspect of a larger dimension (Piedmont et al., 2014).

Depressive tendencies, used as a dependent variable in several studies on the incremental validity of SOC, are consistently associated with both SOC and the BF (Grevenstein & Bluemke, 2015; Grevenstein et al., 2016). Among the various health-related indicators, depressive tendencies are considered important for understanding the composition of SOC and discriminating it from other factors. In a series of studies, extraversion, conscientiousness, and agreeableness in SOC and the BF were negatively associated with depressive tendencies, and neuroticism in the BF was negatively associated with SOC, having a higher explanatory rate than other factors (Grevenstein & Bluemke, 2015; Yano et al., 2019).

Similar to SOC, another factor uniquely associated with depressive tendencies is the DT. The DT is the collective term for Machiavellianism (characterized by manipulative otherness), narcissism (characterized by exaggerated self-image and self-presentational speech and behavior), and psychopathy (characterized by high impulsivity and low empathy), considered core antisocial personality traits (Kayiş & Akcaoğlu, 2021; Paulhus, 2014). The DT is strongly associated with antisocial traits and behaviors such as aggression (Paulhus & Williams, 2002) and has also been reported to be a risk factor for mental health, with correlations with depression and substance abuse (Vagi et al., 2013). Shih et al. (2021) evinced the relevance of personality traits to depressive tendencies by proving that the DT quantitatively explained the negative aspects that remained undetermined by the BF. This result implies the usefulness of considering the DT along with the BF in examining associations between personal traits and depressive tendencies.

The DT is considered to have inverse personality traits to SOC in various aspects. In light of its relevance to health indicators such as depressive tendencies, SOC is a factor that contributes to the promotion of healthy behaviors and the maintenance and promotion of mental health (Hochwälder & Forsell, 2011; Kuuppelomäki & Utriainen, 2003), while the DT promotes health-damaging behaviors (Paulhus & Williams, 2002; Vagi et al., 2013). Focusing on the relationship with the BF, SOC shows a negative correlation with neuroticism and a positive correlation with other factors of the BF (Barańczuk, 2021; Kase et al., 2018), whereas the DT shows differences across studies but a generally positive correlation with neuroticism and a negative correlation with conscientiousness and agreeableness (Balakrishnan

et al., 2019; Vize et al., 2018). SOC is also known to be associated with aggression. Regarding the DT, it is positively associated with aggression but negatively associated with hostility, a cognitive aspect of aggression (Jones & Neria, 2015; Kivimäki et al., 2002). These indicators suggest that SOC and the DT have opposite components in terms of personality and cognitive traits, in addition to their association with external indicators, although there have been doubts regarding the conceptual understanding of SOC as simply the inverse of neuroticism (Feldt et al., 2007).

Testing the incremental validity of SOC and neuroticism has shown that SOC is a concept independent of neuroticism (Grevenstein et al., 2016). We, therefore, expect that using the DT to clarify the incremental validity of SOC will facilitate the conceptual and measurement understanding of SOC. Furthermore, by including antisocial personality traits – which have not been addressed in previous studies examining the incremental validity of SOC – in the comparison, we expect to provide new insights into the complex structure of SOC, as pointed out by Piedmont et al. (2014).

In sum, the BF and DT are important indicators for the measurement and theoretical positioning of SOC and the investigation of its incremental validity vis-à-vis depressive tendencies and aggression. Therefore, we add the DT of personality traits related to depressive tendencies and dispositional aggression to the BF to investigate SOC's incremental validity. Thus, we attempt to show the additional unique aspects of SOC and prove its significance and legitimacy as a factor related to depressive tendencies and aggression.

PARTICIPANTS AND PROCEDURE

DESIGN

This study is a quantitative analysis of cross-sectional data.

PARTICIPANTS

A web survey was administered to youth and adults across Japan in June 2019 through Cross Marketing Inc. Overall, 2,051 individuals, part of Cross Marketing Inc.'s panel, participated; data from 1,626 (759 men, 867 women; mean age = 29.90, *SD* = 13.77, range = 18-69) who correctly answered the Directed Questions Scale (by selecting "mostly agree" for this item, following the criteria established by Maniaci & Rogge, 2014) were analyzed to detect survey satisficing. Taking into account the expected dropout rate in web surveys conducted by survey companies, the sample size was set to ensure that the number of valid responses would be close to the sample size used by Grevenstein and Bluemke (2015) (*N* = 1842).

MEASURES

Independent variables. SOC was assessed using the Japanese version of the 29-item SOC scale (Yamazaki, 1999). Each item was evaluated on a 7-point Likert-type scale, with high total scores indicating elevated SOC. The reliability and validity of this scale were verified by Yamazaki (1999) in a Japanese sample.

The DT properties were assessed using Jones and Paulhus's (2014) Short Dark Triad (SD3), translated into Japanese, and whose reliability and validity were verified by Shimotsukasa and Oshio (2017). The SD3 comprises three subscales: Machiavellianism, narcissism, and psychopathy (each with nine items). Each item was assessed on a 5-point Likert-type scale.

The BF was assessed using the Japanese version of the short-format Big Five Scale (BFS; Namikawa et al., 2012). The BFS has been shown by Namikawa et al. (2012) to have high reliability and validity, in addition to exhibiting a significant correlation and identical factor structure with the Neuroticism-Extraversion-Openness Five-Factor Inventory (Costa & McCrae, 1985). The BFS encompasses five subscales: neuroticism (five items), extraversion (five items), openness (six items), agreeableness (six items), and conscientiousness (seven items). Each item was assessed on a 7-point Likert-type scale.

Dependent variables. Depressive tendencies were evaluated using the Japanese version (Shima et al., 1985) of the Center for Epidemiologic Studies Depression Scale (Radloff, 1977) comprising 20 items. Each item was measured on a 4-point Likert-type scale, with higher total scores indicating greater depressive tendencies.

Dispositional aggression was gauged using Ando et al.'s (1999) Japanese version of the Buss-Perry Aggression Questionnaire (Buss & Perry, 1992), comprising items assessed on a 5-point Likert-type scale and classified into four subscales: hostility (six items), anger (five items), physical aggression (six items), and verbal aggression (five items). Among these four subscales, hostility is considered the cognitive aspect of aggression, anger the emotional aspect, and physical aggression the behavioral aspect (Ando et al., 1999; Buss & Perry, 1992). Martin et al. (2021) stated that anger is the individual's physiological arousal and preparation for aggression, while hostility is cognitive processes and biases of injustice.

Both scales have been confirmed to possess high reliability and validity in studies conducted with Japanese samples (Ando et al., 1999; Shima et al., 1985).

Control variables. Gender (1: woman; 0: man), age, and educational background (1: university graduate; 0: other) were considered as sociodemographic variables.

Table 1

Descriptive statistics and correlation coefficients of each variable (N = 1,626)

	Mean	SD	α	1	2	3	4	5	6	7	8	9	10	11	12	13
1. Sense of coherence	110.88	21.84	.90													
2. Machiavellianism	29.42	5.42	.75	-.17**												
3. Narcissism	20.45	5.83	.79	.38**	.16**											
4. Psychopathy	21.50	5.12	.67	-.16**	.35**	.48**										
5. Neuroticism	23.92	6.06	.85	-.63**	.22**	-.32**	.07**									
6. Extraversion	18.95	6.59	.88	.54**	-.03	.44**	.05	-.40**								
7. Openness	23.75	6.28	.80	.40**	.13**	.50**	.17**	-.26**	.51**							
8. Agreeableness	25.57	6.03	.79	.46**	-.04	.13**	-.27**	-.28**	.29**	.31**						
9. Conscientiousness	27.54	6.94	.80	.38**	-.16**	.16**	-.20**	-.27**	.16**	.15**	.30**					
10. CES-D	17.70	11.39	.90	-.71**	.18**	-.21**	.21**	.61**	-.39**	-.24**	-.34**	-.33**				
11. Hostility	18.76	4.79	.80	-.65**	.29**	-.22**	.26**	.53**	-.37**	-.24**	-.41**	-.29**	.58**			
12. Anger	13.98	4.26	.81	-.37**	.21**	.03	.38**	.32**	-.06**	-.09**	-.63**	-.24**	.33**	.45**		
13. Verbal aggression	14.12	3.47	.70	.26**	.14**	.40**	.28**	-.27**	.36**	.39**	-.04	.12**	-.19**	-.14**	.22**	
14. Physical aggression	15.51	4.91	.79	-.32**	.27**	.12**	.49**	.20**	-.14**	-.05	-.44**	-.25**	.26**	.35**	.51**	.16**

Note. CES-D – Center for Epidemiologic Studies Depression Scale; ** p < .01.

STATISTICAL ANALYSIS

For analysis, we employed hierarchical multiple regression with reference to Grevenstein and Bluemke (2015). In this study, gender, age, educational background, and the BF were entered as independent variables in step 1, the DT in step 2, and SOC in step 3. The significance level was set at 5%; data were analyzed using HAD version 18 (Shimizu, 2016).

ETHICAL CONSIDERATIONS

The ethics committee of the authors' previous research institute approved the survey (No. 19-06). At the beginning of the web survey, informed consent was obtained by presenting participants with a statement explaining the purpose of the study and the handling of personal information, which they read and then pressed "consent." The study conforms to the principles of the Declaration of Helsinki.

RESULTS

BASIC ANALYSIS

The descriptive statistics and correlation coefficients for each variable are shown in Table 1. Cronbach's α and McDonald's ω coefficients for each scale exceeded .70 except for psychopathy (α = .67, ω = .68) in the SD3. In addition, correlations were found among each of the scales, similar to the results of previous studies (Kase et al., 2018; Shih et al., 2021; Vagi et al., 2013). Correlation analysis revealed that SOC was positively correlated with narcissism, extraversion, openness, agreeableness, conscientiousness, and verbal aggression (rs = .26 to .54, ps < .01) and negatively correlated with Machiavellianism, psychopathy, neuroticism, depressive tendencies, hostility, anger, and physical aggression (rs = −.17 to −.71, ps < .01).

INCREMENTAL VALIDITY OF SOC OVER THE DT

Hierarchical multiple regression analyses were performed to determine the incremental validity of SOC (Table 2). First, R^2 (.45 to .57, ps < .01) and ΔR^2 (.02 to .11, ps < .01) were significant from step 1 to 3 in the analysis with the Center for Epidemiologic Studies Depression Scale score as the dependent variable. Narcissism (β = .06, p < .01) and psychopathy (β = .07, p < .01) were positively correlated with depressive tendencies in step 3, and SOC (β = −.52, p < .01) was negatively correlated with depressive tendencies. Second, an analysis was performed considering Buss-Perry Aggression Questionnaire scores as dependent variables. The ΔR^2 of step 3 was significant in the models for hostility, anger, and physical aggression (ΔR^2 = .01 to .07, ps < .01). Hostility was correlated with Machiavellianism (β = .15, p < .01), narcissism (β = −.09, p < .01), psychopathy (β = .14, p < .01), and SOC (β = −.41, p < .01). Anger was correlated with Machiavellianism (β = .09, p < .01), psychopathy (β = .16, p < .01), and SOC (β = −.09, p < .01). Physi-

Table 2

Hierarchical multiple regression analysis of the associations of sense of coherence, the Dark Triad, and the Big Five with depressive tendencies and dispositional aggression (N = 1,626)

	CES-D	Aggression			
		Hostility	Anger	Verbal	Physical
		β			
Step 1					
Gender	.01	−.03	−.04*	−.13**	−.23**
Age	−.08**	−.08**	−.02	−.04	−.06*
Education	−.03	−.02	−.01	.03	−.03
Neuroticism	.47**	.37**	.22**	−.16**	.08**
Extraversion	−.16**	−.14**	.17**	.23**	.01
Openness	.03	.02	.08**	.30**	.11**
Agreeableness	−.14**	−.26**	−.63**	−.29**	−.45**
Conscientiousness	−.12**	−.08**	−.03	.10**	−.10**
R^2	.45**	.38**	.45**	.28**	.28**

Table 2 continues

Table 2

Table 2 continued

	CES-D	Aggression			
		Hostility	Anger	Verbal	Physical
		β			
Step 2					
Gender	.03	.01	.01	−.09**	−.16**
Age	−.07**	−.05*	.01	−.01	−.02
Education	−.03	−.01	−.01	.02	−.04
Neuroticism	.46**	.30**	.20**	−.17**	.05*
Extraversion	−.17**	−.12**	.16**	.21**	−.01
Openness	.00	−.01	.02	.23**	.00
Agreeableness	−.09**	−.20**	−.57**	−.24**	−.33**
Conscientiousness	−.10**	−.03	.00	.11**	−.06**
Machiavellianism	.01	.16**	.09**	.09**	.10**
Narcissism	−.03	−.16**	−.01	.06*	.01
Psychopathy	.15**	.21**	.18**	.12**	.32**
R^2	.46**	.44**	.49**	.32**	.39**
ΔR^2	.02**	.06**	.04**	.03**	.11**
Step 3					
Gender	.02	.00	.00	−.09**	−.16**
Age	−.06**	−.04*	.01	−.01	−.01
Education	−.02	.00	−.01	.02	−.03
Neuroticism	.27**	.15**	.16**	−.16**	.01
Extraversion	−.04	−.02	.18**	.19**	.02
Openness	.04	.01	.03	.23**	.01
Agreeableness	−.01	−.14**	−.55**	−.25**	−.31**
Conscientiousness	−.04*	.02	.01	.11**	−.04
Machiavellianism	−.01	.15**	.09**	.09**	.10**
Narcissism	.06*	−.09**	.01	.05	.03
Psychopathy	.07**	.14**	.16**	.13**	.30**
Sense of coherence	−.52**	−.41**	−.09**	.05	−.13**
R^2	.57**	.51**	.50**	.32**	.40**
ΔR^2	.11**	.07**	.03**	.01	.01**

Note. Gender was coded 1 = woman, 0 = man. Educational background was coded 1 = university graduate, 0 = other. Variance inflation factor = 1.14-2.53. CES-D – Center for Epidemiologic Studies Depression Scale. *p < .05, **p < .01.

cal aggression was correlated with Machiavellianism (β = .10, p < .01), psychopathy (β = .30, p < .01), and SOC (β = −.13, p < .01). The ΔR^2 in step 3 was not significant for verbal aggression; in step 2, all three SD3 subscales were correlated with verbal aggression (β = .06 to .12, ps < .01). There was no multicollinearity in step 3 (variance inflation factors = 1.14-2.53).

DISCUSSION AND CONCLUSIONS

Our aim in this study was to investigate the incremental validity of SOC in relation to depressive tendencies and dispositional aggression, after controlling for the DT and BF. As a result, SOC showed correlations with depressive tendencies, hostility,

and physical aggression, even after accounting for the BF and DT. These findings support the results of previous studies on the incremental validity of SOC using BF and depressive tendencies as indicators (e.g., Grevenstein & Bluemke, 2015; Piedmont et al., 2014), while also providing new insights into the relationship between the DT and SOC.

SOC overlapped with the BF and DT. Grevenstein and Bluemke (2015) reported a high negative association between SOC and the BF, especially for neuroticism. Additionally, SOC was positively associated with narcissism and negatively associated with psychopathy in the DT. The DT attributes were positively correlated with each other, as in a previous study (Jones & Paulhus, 2014). However, the positive aspects of the DT could be reflected by the polar opposite association of narcissism and psychopathy with SOC and the finding that narcissism is associated with mental toughness (Papageorgiou et al., 2019). Mental toughness has been suggested to be a psychological factor that may subsume grit (Lin et al., 2017), buoyancy (Martin & Marsh, 2008), motivation (Lepper et al., 2005), resilience (McGeown et al., 2016), and hardiness (Kobasa, 1979); it reflects an effective coping mechanism in response to stressors and enables individuals to proactively seek opportunities for personal growth (Lin et al., 2017; Papageorgiou et al., 2019). Among the DT traits, narcissism has been suggested to produce favorable results, such as reducing psychopathy by enhancing mental toughness and alleviating perceived stress and depressive symptoms (e.g., Gerber et al., 2013; Papageorgiou et al., 2017, 2019). In this study, SOC was positively correlated with narcissism and negatively correlated with psychopathy. This suggests a commonality between SOC and the DT, particularly narcissism, in their potential to alleviate stress and depressive tendencies. In fact, among these factors encompassed by mental toughness, hardiness is also considered to be included in the concept of SOC (Antonovsky, 1987).

Further, SOC was correlated with depressive tendencies, hostility, and physical aggression, even after accounting for the BF and DT, the central factors of personality traits that exhibit an elevated explanatory power vis-à-vis SOC. The associations for each variable were consistent with those identified in previous studies (Grevenstein & Bluemke, 2015; Jones & Neria, 2015; Kivimäki et al., 2002). SOC is an indicator of factors related to not only mental health and cognitive functions, such as hostility, but also behavioral attributes, such as physical aggression. This outcome reflects the uniqueness of SOC as a factor that transcends positive or negative personality traits. Moreover, the relationship between SOC and the DT suggests that the former not only relates to a prosocial personality but also represents a trait with a self-centered aspect. These results support Grevenstein and Bluemke's (2015) and Grevenstein et al.'s (2016) asser-

tions that SOC is not a concept that disguises other personality traits or indicates health. Kaufman et al. (2019, p. 2) noted that "a positive, growth-oriented side of human beings" denotes an element of personality traits not captured by the BF and DT. SOC includes a self-developmental facet because it promotes the effective management of stress; a successful coping experience strengthens SOC (Antonovsky, 1987). SOC could conceptually elucidate wide-ranging individual characteristics, including positive and negative aspects and elements pinpointed by Kaufman et al. (2019). Simultaneously, such a conceptual expansion could render it difficult to definitively apprehend SOC. These results can also be considered supportive of the opinion of Piedmont et al. (2014): SOC is a high-dimensional and complex concept.

We examined the incremental validity of SOC in relation to psychological measures based on the DT, which facilitated an understanding of the SOC concept. However, SOC has been reported to have similarities with psychological factors other than the BF and DT (e.g., resilience; Kase et al., 2024), and the understanding gained in this study pertains to a limited aspect of SOC. Prospective studies can develop this research theme by introducing individual differences between factors comprising the BF and DT as well as diverse factors strongly predicting each dependent variable (e.g., the behavioral inhibition system and behavioral activation system, cognitive reactivity, and self-esteem) as an independent variable, thereby examining the incremental validity of SOC through fresh perspectives. Changing the dependent variable to a different factor unrelated or inversely related to SOC could also represent an important exploratory attempt in understanding its discriminatory nature through other concepts. For example, among health-related factors, dental anxiety and infection prevention behaviors have been reported to have only a very weak or no association with SOC (Carlsson et al., 2015; Kase et al., 2024). Exploring such indicators and examining their association with SOC are expected to further deepen the theoretical understanding of SOC.

References

Ando, A., Soga, S., Yamasaki, K., Shimai, S., Shimada, H., Utsuki, N., Oashi, O., & Sakai, A. (1999).

Development of the Japanese version of the Buss-Perry Aggression Questionnaire (BAQ). *Shinrigaku Kenkyu: The Japanese Journal of Psychology, 70*, 384–392. https://doi.org/10.4992/jjpsy.70.384

Antonovsky, A. (1987). *Unraveling the mystery of health: How people manage stress and stay well.* Jossey-Bass.

Balakrishnan, V., Khan, S., Fernandez, T., & Arabnia, H. R. (2019). Cyberbullying detection on Twitter using Big Five and Dark Triad features. *Personality and Individual Differences, 141*, 252–257. https://doi.org/10.1016/j.paid.2019.01.024

Barańczuk, U. (2021). The five-factor model of personality and sense of coherence: a meta-analysis. *Journal of Health Psychology, 26*, 12–25. https://doi.org/10.1177/1359105319884597

Buss, A. H., & Perry, M. (1992). The aggression questionnaire. *Journal of Personality and Social Psychology, 63*, 452–459. https://doi.org/10.1037/0022-3514.63.3.452

Carlsson, V., Hakeberg, M., & Wide Boman, U. (2015). Associations between dental anxiety, sense of coherence, oral health-related quality of life and health behavior – a national Swedish cross-sectional survey. *BMC Oral Health, 15*, 100. https://doi.org/10.1186/s12903-015-0088-5

Costa, P. T., Jr., & McCrae, R. R. (1985). *The NEO Personality Inventory manual.* Psychological Assessment Resources.

Feldt, T., Metsäpelto, R. L., Kinnunen, U., & Pulkkinen, L. (2007). Sense of coherence and five-factor approach to personality. *European Psychologist, 12*, 165–172. https://doi.org/10.1027/1016-9040.12.3.165

Gerber, M., Brand, S., Feldmeth, A. K., Lang, C., Elliot, C., Holsboer-Trachsler, E., & Pühse, U. (2013). Adolescents with high mental toughness adapt better to perceived stress: a longitudinal study with Swiss vocational students. *Personality and Individual Differences, 54*, 808–814. https://doi.org/10.1016/j.paid.2012.12.003

Grevenstein, D., & Bluemke, M. (2015). Can the Big Five explain the criterion validity of sense of coherence for mental health, life satisfaction, and personal distress? *Personality and Individual Differences, 77*, 106–111. https://doi.org/10.1016/j.paid.2014.12.053

Grevenstein, D., Bluemke, M., & Kroeninger-Jungaberle, H. (2016). Incremental validity of sense of coherence, neuroticism, extraversion, and general self-efficacy: Longitudinal prediction of substance use frequency and mental health. *Health and Quality of Life Outcomes, 14*, 9. https://doi.org/10.1186/s12955-016-0412-z

Hochwälder, J., & Forsell, Y. (2011). Is sense of coherence lowered by negative life events? *Journal of Happiness Studies, 12*, 475–492. https://doi.org/10.1007/s10902-010-9211-0

Jones, D. N., & Neria, A. L. (2015). The Dark Triad and dispositional aggression. *Personality and Individual Differences, 86*, 360–364. https://doi.org/10.1016/j.paid.2015.06.021

Jones, D. N., & Paulhus, D. L. (2014). Introducing the Short Dark Triad (SD3): a brief measure of dark personality traits. *Assessment, 21*, 28–41. https://doi.org/10.1177/1073191113514105

Kase, T., Ueno, Y., & Endo, S. (2024). Association of sense of coherence and resilience with distress and infection prevention behaviors during the coronavirus disease pandemic. *Current Psychology, 43*, 707–716. https://doi.org/10.1007/s12144-023-04359-w

Kase, T., Ueno, Y., & Oishi, K. (2018). The overlap of sense of coherence and the Big Five personality traits: a confirmatory study. *Health Psychology Open, 5*, 2055102918810654. https://doi.org/10.1177/2055102918810654

Kaufman, S. B., Yaden, D. B., Hyde, E., & Tsukayama, E. (2019). The light vs. dark triad of personality: Contrasting two very different profiles of human nature. *Frontiers in Psychology, 10*, 467. https://doi.org/10.3389/fpsyg.2019.00467

Kayiş, A., & Akcaoğlu, M. (2021). Big Five and Dark Triad personality traits as predictors of multicultural attitude and efficacy. *Current Issues in Personality Psychology, 9*, 215–228. https://doi.org/10.5114/cipp.2021.104687

Kivimäki, M., Elovainio, M., Vahtera, J., Nurmi, J. E., Feldt, T., Keltikangas-Järvinen, L., & Pentti, J. (2002). Sense of coherence as a mediator between hostility and health: Seven-year prospective study on female employees. *Journal of Psychosomatic Research, 52*, 239–247. https://doi.org/10.1016/S0022-3999(01)00305-1

Kobasa, S. C. (1979). Stressful life events, personality, and health: an inquiry into hardiness. *Journal of Personality and Social Psychology, 37*, 1–11. https://doi.org/10.1037/0022-3514.37.1.1

Kuuppelomäki, M., & Utriainen, P. (2003). A 3-year follow-up study of health care students' sense of coherence and related smoking, drinking and physical exercise factors. *International Journal of Nursing Studies, 40*, 383–388. https://doi.org/10.1016/S0020-7489(02)00103-7

Lepper, M. R., Corpus, J. H., & Iyengar, S. S. (2005). Intrinsic and extrinsic motivational orientations in the classroom: Age differences and academic correlates. *Journal of Educational Psychology, 97*, 184–196. https://doi.org/10.1037/0022-0663.97.2.184

Lin, Y., Clough, P. J., Welch, J., & Papageorgiou, K. A. (2017). Individual differences in mental toughness associate with academic performance and income. *Personality and Individual Differences, 113*, 178–183. https://doi.org/10.1016/j.paid.2017.03.039

Maniaci, M. R., & Rogge, R. D. (2014). Caring about carelessness: Participant inattention and its effects

on research. *Journal of Research in Personality, 48,* 61–83. https://doi.org/10.1016/j.jrp.2013.09.008

Martin, A. J., & Marsh, H. W. (2008). Academic buoyancy: Towards an understanding of students' everyday academic resilience. *Journal of School Psychology, 46,* 53–83. https://doi.org/10.1016/j.jsp.2007.01.002

Martin, R. L., Smith, N. S., McGrew, S. J., & Capron, D. W. (2021). Aggressive worriers: How aggression moderates the association between intolerance of uncertainty and suicidal desire constructs. *Archives of Suicide Research, 25,* 353–372. https://doi.org/10.1080/13811118.2019.1689877

McGeown, S. P., St Clair-Thompson, H., & Clough, P. (2016). The study of non-cognitive attributes in education: Proposing the mental toughness framework. *Educational Review, 68,* 96–113. https://doi.org/10.1080/00131911.2015.1008408

Namikawa, T., Tani, I., Wakita, T., Kumagai, R., Nakane, A., & Noguchi, H. (2012). Development of a short form of the Japanese Big Five Scale, and a test of its reliability and validity. *Shinrigaku Kenkyu: The Japanese Journal of Psychology, 83,* 91–99. https://doi.org/10.4992/jjpsy.83.91

Papageorgiou, K. A., Denovan, A., & Dagnall, N. (2019). The positive effect of narcissism on depressive symptoms through mental toughness: Narcissism may be a dark trait but it does help with seeing the world less grey. *European Psychiatry, 55,* 74–79. https://doi.org/10.1016/j.eurpsy.2018.10.002

Papageorgiou, K. A., Gianniou, F. M., Wilson, P., Moneta, G. B., Bilello, D., & Clough, P. J. (2019). The bright side of dark: Exploring the positive effect of narcissism on perceived stress through mental toughness. *Personality and Individual Differences, 139,* 116–124. https://doi.org/10.1016/j.paid.2018.11.004

Paulhus, D. L. (2014). Toward a taxonomy of dark personalities. *Current Directions in Psychological Science, 23,* 421–426. https://doi.org/10.1177/0963721414547737

Paulhus, D. L., & Williams, K. M. (2002). The Dark Triad of personality: Narcissism, Machiavellianism, and psychopathy. *Journal of Research in Personality, 36,* 556–563. https://doi.org/10.1016/S0092-6566(02)00505-6

Piedmont, R. L., Magyar-Russell, G., DiLella, N., & Matter, S. (2014). Sense of coherence: Big Five correlates, spirituality, and incremental validity. *Current Issues in Personality Psychology, 2,* 1–9. https://doi.org/10.5114/cipp.2014.43096

Radloff, L. S. (1977). The CES-D scale: a self-report depression scale for research in the general population. *Applied Psychological Measurement, 1,* 385–401. https://doi.org/10.1177/014662167700100306

Shih, S. I., Chi, N. W., Wu, C. C., & Wang, S. Y. (2021) When dark meets blue: The relations between Dark Triad personality and depression symptoms.

Current Psychology, 40, 6110–6117. https://doi.org/10.1007/s12144-019-00549-7

Shima, S., Shikano, T., Kitamura, T., & Asai, M. (1985). New self-rating scales for depression. *Clinical Psychiatry, 27,* 717–723.

Shimotsukasa, T., & Oshio, S. (2017). Creation of the Japanese version of the Short Dark Triad (SD3-J). *Personality Research, 26,* 12–22. https://doi.org/10.2132/personality.26.1.2

Shimizu, Y. (2016). An introduction to the statistical free software HAD: Suggestions to improve teaching, learning and practice data analysis. *Journal of Media, Information and Communication, 1,* 59–73.

Vagi, K. J., Rothman, E. F., Latzman, N. E., Tharp, A. T., Hall, D. M., & Breiding, M. J. (2013). Beyond correlates: a review of risk and protective factors for adolescent dating violence perpetration. *Journal of Youth and Adolescence, 42,* 633–649. https://doi.org/10.1007/s10964-013-9907-7

Vize, C. E., Lynam, D. R., Collison, K. L., & Miller, J. D. (2018). Differences among Dark Triad components: a meta-analytic investigation. *Personality Disorders: Theory, Research, and Treatment, 9,* 101–111. https://doi.org/10.1037/per0000222

Yamazaki, Y. (1999). SOC, a theory on salutogenesis and health promoting ability from newly developed view points for health. *Quality Nursing, 5,* 824–832.

Yano, K., Kase, T., & Oishi, K. (2019). The effects of sensory-processing sensitivity and sense of coherence on depressive symptoms in university students. *Health Psychology Open, 6,* 2055102919871638. https://doi.org/10.1177/2055102919871638