

## The Development and Initial Validation of the Very Short Form of the Short Dark Tetrad Scale: Its Links to Alexithymia, and Internet Trolling



Muhammed Akat 

Department of Psychological Counseling and Guidance, Karamanoglu Mehmetbey University

The purpose of this study was to develop a Very Short Form (SD4-VSF) of the Short Dark Tetrad Scale (SD4). In Study I, the 28-item SD4 was reduced to the 16-item SD4-VSF following exploratory factor analysis (EFA). Study I included 440 participants (75.9% female; 24.1% male). Confirmatory factor analysis (CFA) was conducted on the 16-item SD4-VSF in Study II. Furthermore, the scale's reliability was examined using Cronbach's  $\alpha$ , McDonald's  $\omega$ , Guttman's  $\lambda_6$ , and composite reliability. Following the results of the CFA, confirmatory factor analysis for the 16-item SD4-VSF demonstrated an acceptable fit. Study II included 456 participants (63.2% female; 36.8% male). Study III examined the mediating role of alexithymia in the relationship between SD4 and trolling. Study III included 394 participants (56.1% female; 43.9% male). The results of the mediation analysis indicated that alexithymia plays a significant mediating role in the relationship between the Dark Tetrad (excluding narcissism) and trolling.

*Key words:* Dark Tetrad Scale, narcissism, psychopathy, sadism, Machiavellianism

### Introduction

Personality has been a major topic of research in psychology for many years. Personality researchers have examined personality according to various classifications. In the literature, there are classifications such as the Big Five personality traits (Neuroticism, Extraversion, Openness, Agreeableness, and Conscientious-

ness) and Light Triad personality (Faith in Humanity, humanism, and Kantianism) (Costa & McCrae, 1992; Kaufman et al., 2019). Another personality-related classification is the Dark Triad personality. The Dark Triad personality comprises Machiavellianism, narcissism, and psychopathy (Paulhus & Williams, 2002).

The Dark Triad is defined as the malevolent aspects of an individual's character, encompassing socially unacceptable behaviors and

Correspondence concerning this article should be addressed to Muhammed Akat, Karamanoglu Mehmetbey University - Yunus Emre Campus, Faculty of Education, Department of Education Sciences, Floor: 3/312, Karaman – Türkiye. E-mail: [muhammedakatpedr@gmail.com](mailto:muhammedakatpedr@gmail.com)

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attitudes. While Machiavellianism, narcissism, and psychopathy are interrelated, they each possess distinct characteristics (Paulhus & Williams, 2002). For instance, Machiavellianism is characterized by strategic planning, manipulative behavior, and a callous affect (Jones & Paulhus, 2014). The psychopathy personality trait is characterized by impulsivity and harm towards others. One of the main differences between Machiavellian and psychopathic personalities is that Machiavellians strive to protect their reputation, while psychopaths pay little attention to theirs (Jones & Paulhus, 2014). Narcissism is characterized by a sense of entitlement, a desire for prestige, and admiration (Kajonius et al., 2016).

In recent years, researchers have conducted numerous studies on the Dark Triad. Some of these studies have independently measured the personality constructs of the Dark Triad. For instance, the Two-dimensional Machiavellianism Scale (Monaghan et al., 2020) and MACH – IV (Christie & Geis, 1970) were used to measure Machiavellianism. Narcissism was measured using NPI-40 (Raskin & Terry, 1988), NPI-13, and NPI-16 (Gentile et al., 2013). To measure psychopathy, the Levenson Self-Report Psychopathy Scale (Levenson et al., 1995) and the Psychopathy Checklist–Revised (Hare, 1991) were used. Subsequently, measurement tools that can assess each member of the Dark Triad together have been developed, such as the Short Dark Triad (Jones & Paulhus, 2014) and the Dirty Dozen (Jonason & Webster, 2010). In Türkiye, validity and reliability studies of the Dark Triad were carried out with the Brief Dark Triad Scale and the Dirty Dozen (Ozsoy et al., 2017; Satıcı et al., 2018).

Several studies have shown that the negative aspects of human personality are not limited to narcissism, psychopathy, and Machiavellianism (Paulhus et al., 2021). It is believed that sadism plays a unique role in the Dark Triad structure in explaining the negative

aspects of human personality (Međedović & Petrović, 2015). Like the other traits in the Dark Triad, sadism is a personality type characterized by callousness, lack of empathy, and exploitation. Sadism shares similar characteristics with the Dark Triad traits, but it also includes the pleasure of harming other living things, which is not present in the personality types of the Dark Triad (Paulhus & Dutton, 2016). This aspect of sadism covers a different dark side of human nature that is not included in the Dark Triad. The Dark Triad and sadism share similarities and differences, leading to Paulhus and colleagues' proposal for the Dark Tetrad structure (2021).

When examining scales related to sadism in the literature, it is evident that there are scales that measure sadism as a distinct construct (Dinić et al., 2020). However, there are areas where the scope of the scales aimed at measuring sadism overlaps with psychopathy, Machiavellianism, and narcissism. Therefore, it is recommended to measure sadism in conjunction with other personality types in the Dark Triad (Paulhus et al., 2021). Paulhus and colleagues (2021) developed a short Dark Tetrad Scale consisting of four subscales, each with seven items. The study provided evidence of the scale's validity and reliability. However, the scale's relatively large number of items may reduce its usefulness.

When examining the literature on the Dark Tetrad in Türkiye, it is evident that the Short Dark Tetrad Scale (Paulhus et al., 2021) has been adapted to Turkish. However, the adaptation study resulted in a final version of the scale comprising 21 items and six subscales, namely narcissism, psychopathy, Machiavellianism-mask, Machiavellianism-strategy, behavioral sadism, and sadistic attitude (Aytac, 2022). It seems that the scale has undergone some modifications from its original structure. Given the limited research on the Dark Tetrad in Türkiye, there is a need for addition-

al measurement tools to accurately assess this phenomenon. The Short Dark Tetrad Scale, developed by Paulhus et al. (2021), consists of 28 items. The large number of items reduces usability and makes it difficult to encourage participation in the scale. Various scales measure each of the Dark Tetrad traits with fewer items (Jonason & Webster, 2010; Ozsoy et al., 2017). For these reasons, the SD4-VSF (4 dimensions and 16 items) was developed in this study. Thus, a brief scale to measure the Dark Tetrad would be a practical benefit to mental health professionals and researchers. In this context, exploratory factor analysis (EFA) was carried out in Study I to reveal the latent structure of the scale. Confirmatory factor analysis (CFA) was performed to determine whether the structure that emerged in Study II was confirmed.

Empathy deficits are a common characteristic of individuals with Dark Tetrad personalities, as evidenced by numerous independent studies (Akat et al., 2022; Hamarta et al., 2023; Mullins-Nelson et al., 2006; Pajevic et al., 2018; Simard et al., 2023; Yuan et al., 2020). Pajevic and colleagues (2018) found negative correlations between emotional empathy and cognitive empathy with all personality types in the Dark Tetrad. Thus, it can be inferred that individuals with Dark Tetrad personalities may experience difficulty in identifying emotions (Dinić et al., 2021), potentially leading to alexithymia. Alexithymia is characterized by difficulty recognizing, distinguishing, experiencing, expressing emotions, and having an externally oriented thinking style (Bagby et al., 1994; Parker et al., 2008). Individuals with high levels of alexithymia have difficulty noticing other people's emotions (Lyvers et al., 2020). Studies have linked alexithymia to impulsivity (Lyvers et al., 2021), moral disengagement (Lu et al., 2024), hostile attribution bias (Li et al., 2020), and emotional dysregulation (Velotti et al., 2016). All these have shown

that alexithymia is associated with factors that can lead to antisocial behavior. Alexithymia is associated with various dark personality traits. Previous studies have found that the Dark Triad is associated with alexithymia (Cairncross et al., 2013; Jonason & Krause, 2013). However, there are uncertainties regarding the relationship between the Dark Tetrad and alexithymia. Therefore, this study examined the relationship between the Dark Tetrad and alexithymia. Examining the role of alexithymia in the relationship between the Dark Tetrad and trolling will reveal its role in the emergence of antisocial behaviors (e.g., trolling). Therefore, this study examined the mediating role of alexithymia in the relationship between the Dark Tetrad and trolling.

Dark Tetrad personality traits are personal factors that are effective in the emergence of antisocial behaviors (Fan et al., 2019; Sest & March, 2017; Yuan et al., 2020). The Dark Tetrad consists of four interrelated but different traits. Common traits of the Dark Tetrad personality include low empathy, high moral disengagement, manipulation, and hostility. These common traits increase the risk of trolling in individuals with a Dark Tetrad personality. The unique traits of each personality structure in the Dark Tetrad also carry risks in terms of trolling. For instance, the dominant traits of psychopathy include recklessness, impulse control problems, boldness, excitement seeking, tolerance for danger, and immediate gratification (Patrick et al., 2009). Therefore, individuals with high levels of psychopathy may take pleasure in engaging in behaviors that harm others. In narcissism, traits such as self-importance, superiority, and exploitativeness dominate (Foster et al., 2015). These characteristics make it easier for narcissists to harm others by reducing their empathy levels. In Machiavellianism, the individual tends to manipulate others according to their interests (Jones & Paulhus 2014). Therefore, Machia-

vellian individuals may prefer harming others to achieve their goals. Finally, in sadism, seeing them suffer is at the forefront (Lui et al., 2020). People with a sadistic personality often have a preference for harming others, which puts them at risk for trolling. The distinctive features of each of the Dark Tetrad traits show that these personality traits can affect trolling at different levels. Indeed, previous research has shown that each structure of the Dark Tetrad predicts trolling at different levels. For example, Buckels and colleagues (2014) found that sadism had the strongest relationship with trolling among the personality traits in the Dark Tetrad. In a study that investigated the relationship between the Dark Tetrad and Facebook trolling, it was discovered that all dark traits, except narcissism, were positively associated with Facebook trolling (Gylfason et al., 2021). Buckels and colleagues (2014) found a positive correlation between Machiavellianism, psychopathy, and sadism, and the enjoyment derived from trolling. However, they concluded that narcissism was not related to the pleasure derived from trolling. Craker and March (2016) also found positive relationships between Dark Tetrad personality traits and Facebook trolling. In conclusion, studies have found positive correlations between having the Dark Tetrad personality trait and engaging in trolling behaviors. However, further research is necessary to understand the impact of each Dark Tetrad personality trait on trolling. In Türkiye, as far as is known, there is no research examining the relationship between the Dark Tetrad and trolling. Therefore, Study III examines the relationships between the Dark Tetrad, trolling, and alexithymia.

### **The Current Study**

When the scales developed to measure the dark side of personality are considered, it is

seen that each dark personality trait was initially measured independently. Although the validity and reliability of these scales have been proven, they have practical limitations due to their length. For example, the Levenson Psychopathy Scale (Levenson et al., 1995) consists of 26 items, the Machiavellianism Scale (Mach-IV) consists of 20 items (Christie & Geis, 1970), and the Narcissistic Personality Inventory (Raskin & Terry, 1988) consists of 40 items. Short forms of these scales have been developed to support their practical use. In addition, the Dirty Dozen was developed to measure the dark triad structure together. The Dirty Dozen is a short, valid, and reliable scale in which each sub-dimension (narcissism, psychopathy, and Machiavellianism) is measured with four items. The increasing interest in the dark side of personality has motivated researchers to develop short forms of the scales used. The super-short form of SD4 was developed to increase its efficiency and encourage participation (Meng et al., 2022). For all these reasons, this study aimed to develop a valid and reliable very short form of SD4 to support the practical use of the scale, increase its efficiency, and encourage participation.

Scales measuring Dark Tetrad traits have been used in samples in different countries (Paulhus et al., 2021; Dinić et al., 2024). However, there is a need for a scale that can measure the Dark Tetrad traits of adults in Türkiye. The development of a very short form of a Dark Tetrad scale with proven validity and reliability in adults is important in terms of presenting a reliable tool for investigating this psychological structure. In addition, the development of the Very Short Form Dark Tetrad Scale is also important in terms of determining the psychological factors associated with the Dark Tetrad. Therefore, one of the aims of the present study is to develop a 16-item Very Short Form of the 28-item Short Dark Tetrad Scale. In this context, exploratory factor anal-

ysis was conducted in Study I. Study II conducted confirmatory factor analysis to confirm the scale structure that emerged from the exploratory factor analysis. In addition, the reliability of the scale in Study II was determined with Cronbach's alpha, McDonald's omega, and composite reliability coefficients. In Study III, the mediating role of alexithymia in the relationship between the Dark Tetrad traits and trolling was examined.

Studies have shown that Dark Tetrad traits are linked to several harmful behaviors, including aggression (Jain et al., 2022), catfishing (Lauder & March, 2023), antisocial social media use (Duncan & March, 2019), and cyberstalking an intimate partner (Smoker & March, 2017). Researchers have also proven that Dark Tetrad traits are a risk for trolling behaviors (Masui, 2019; Volkmer et al., 2023). The prevalence of online antisocial behaviors such as trolling is increasing in Türkiye. Although personality traits are among the factors that are effective in the emergence of online antisocial behaviors, the relationship between Dark Tetrad and trolling has not been examined. Study III examined the mediating role of alexithymia in the relationship between Dark Tetrad and trolling.

### The Current Study I

Paulhus and colleagues (2021) developed the 28-item SD4 to measure the Dark Tetrad traits. Although the validity and reliability of the SD4 have been proven, its usability is not high because it is a relatively long scale. Therefore, one of the aims of this study is to develop SD4-VSF without disrupting the four-dimensional structure of SD4. In Study I, the original 28-item short form was transformed into a 16-item very short form. For this purpose, first the translation process was carried out, then the necessary steps were followed and an EFA was carried out. Item selection was

conducted by EFA, taking into account the factor loadings of the items. The three items exhibiting the lowest factor loadings in each dimension were eliminated from the scale.

## Method

### Participants

Study I included 440 participants (75.9% female; 24.1% male) who completed the online survey. The participants' ages ranged from 18 to 37 ( $M_{\text{female}} = 20.40$ ,  $SD_{\text{female}} = 2.44$ ;  $M_{\text{male}} = 20.43$ ,  $SD_{\text{male}} = 2.24$ ). Of the participants, 25 (5.7%) used social media for 0-1 hour per day, 95 (21.6%) used it for 1-2 hours, 155 (35.2%) used it for 2-3 hours, and 165 (37.5%) used it for 3 hours per day.

### Procedure

Online surveys were distributed to participants via Google Forms using a convenience sampling method. First, potential participants were provided with a URL link to an online survey prepared in Google Forms. Potential participants received the URL link through social media applications such as WhatsApp, Twitter, and Instagram. Potential participants were first presented with an informed consent form that included the purpose of the study, the voluntary nature of the study, and information about confidentiality. Those who read this form and agreed to participate in the study proceeded to the section that included data collection tools. These procedures were conducted similarly in Studies I, II, and III.

## Measures

### Short Dark Tetrad Scale

Paulhus and colleagues (2021) developed a 28-item scale to measure the Dark Tetrad per-

sonality traits of individuals. The scale consists of 28 items and is of 5-point Likert type (1 = Strongly disagree; 5 = Strongly agree). The scale includes Machiavellianism (e.g., "It's not wise to let people know your secrets.") and narcissism (e.g., "People see me as a natural leader."), with psychopathy (e.g., "People often say I'm out of control.") and sadism (e.g., "I know how to hurt someone with words alone.") as subdimensions. An increase in the score obtained in each subdimension indicates an increase in the corresponding personality trait. The validity and reliability of the scale have been proven by researchers using different parameters.

#### Data Analysis

EFA was conducted using SPSS 25, employing the principal components method. In this study, SD4 was adapted to Turkish, and its Very Short Form was developed. EFA was firstly performed in this context. EFA was conducted to provide evidence on whether the original four-factor structure of the scale was preserved and whether the items were distributed on the dimensions in which they were originally located. There are several reasons for conducting EFA in this study: 1) The factor loading values obtained through EFA were taken into consideration to reduce the number of items from seven to four. The criterion that factor loadings should be .40 and above was determined (Büyüköztürk, 2002; Field, 2000). 2) The eigenvalues of the sub-dimensions of the scale were determined through EFA. It was examined whether the eigenvalues of the sub-dimensions were greater than one (Field, 2000). 3) The total variance explained was determined as a result of EFA. It was examined whether the total variance explained by the scale was greater than 40% (Field, 2000; Tabachnick & Fidell, 2007). With these values examined as a result of EFA, it

was proven that the factor structure of the very short form of the scale was distributed as per the original and theoretical basis of the scale. As a matter of fact, it shows that the exploratory factor analysis was primarily performed in many studies where the short form of the existing scales was developed (Jonason & Webster, 2010; Meng et al., 2022; Geldhof et al., 2014).

#### Ethics

The principles of the Helsinki Declaration of 1964 were followed throughout this study.

#### Results

##### Translation

First, the permissions were obtained to conduct the Turkish validity and reliability study of the very short form of the SD4 (Paulhus et al., 2021). Subsequently, the scale was translated. First, the English version of the scale was independently translated by four experts in personality research fluent in both English and Turkish. Following the translation process, the experts worked on four files and an approved translation document was produced. Later, the scale was back-translated by four experts fluent in Turkish and English. The English translation was assessed for semantic integrity and consistency against the original text. Ultimately, the Turkish form underwent a review, and the application form was finalized.

There are some differences between the item structures obtained after translation in this study and the item structures obtained in the study where Aytac (2022) adapted SD4. Aytac (2022) preferred to use more words in the translation process, but shorter and clearer words were preferred in the translation process in this study (e.g., item 3). In this respect, it is clear that the translation



was carried out using different methods in the two studies. In addition, the use of the word 'fraudulent', which is not included in the original scale in Aytac's (2022) translation, may increase the social desirability bias. As a result, there are some differences in terms of language nuances in these two translations.

### EFA and Item Selection

Before conducting EFA, it was examined whether the original structure of the scale consisting of 28 items was confirmed. As a result of the confirmatory factor analysis, the goodness of fit indexes of the original structure of the scale were obtained as follows: " $\chi^2 = 886.053$ ,  $df = 344$ ,  $\chi^2/df = 2.576$ ,  $GFI = .866$ ,  $AGFI = .842$ ,  $CFI = .820$ ,  $IFI = .822$ ,  $TLI = .803$ ,  $RMSEA = .060$ ,  $SRMR = .071$ ). Since these values are outside the acceptable limits (Hu & Bentler, 1999), one could say that the original structure of the scale is not confirmed in the Turkish culture.

For a scale to be considered valid and reliable, each of its subscales must consist of at least three items. It is widely acknowledged that sub-dimensions of valid and reliable measurement tools used to measure dark personality traits typically comprise four items (Jonason & Webster, 2010; Meng et al., 2022; Satici et al., 2018). Therefore, this study aimed to reduce the number of items in each dimension of SD4 from seven to four, thus, increasing the usability of SD4.

First, using the principal components analysis method, EFA was performed on Version 1 (28 items). The Promax rotation method was used because it was thought that there was a relationship between the factors of the scale (Field, 2000). The number of factors was fixed at four in line with the four-factor structure of SD4 and theoretical explanations about the Dark Tetrad personality. The total explained variance was 43.35%. The eigenvalues for the

four sub-dimensions were 6.12, 2.66, 1.99, and 1.36, respectively. After conducting the initial EFA, it was noted that four items did not meet the minimum item factor loading requirement of .40 in any sub-dimension. According to the accepted criteria, factor loadings must be above .40 (Büyüköztürk, 2002; Field, 2000). Subsequently, these items were removed, and EFA was conducted again. The explained variance was found to be 45.99%. The analysis yielded eigenvalues of 5.20, 2.63, 1.86, and 1.35 for the four sub-dimensions. Thus, 5 items remain in the Machiavellianism sub-dimension; 6 items in the narcissism subscale; 6 items remain in the psychopathy subscale and 7 items in the sadism subscale. At this stage, the factor loadings of the items were taken into account to reduce the number of items in each subscale to four. Consequently, the 12 items with the lowest item loading factor were removed from the scale. Items 1 (It's not wise to let people know your secrets.), 5 (Manipulating the situation takes planning.), and 7 (I love it when a tricky plan succeeds.) were removed from the Machiavellianism dimension of the scale. Items 10 (Group activities tend to be dull without me.), 12 (I have some exceptional qualities.), and 14 (I like to show off every now and then.) were removed from the Narcissism dimension of the scale. Items 16 (I tend to fight against authorities and their rules.), 19 (I've been in trouble with the law.), and 21 (People who mess with me always regret it.) were removed from the Psychopathy dimension of the scale. Finally, items 22 (Watching a fist-fight excites me.), 24 (It's funny when idiots fall flat on their face), and 27 (Just for kicks, I've said mean things on social media) were removed from the sadism dimension of the scale.

Following the removal of items, the 16-item scale underwent EFA. The analysis revealed that 53.70% of the total variance was explained. The eigenvalues of the sub-dimen-

sions were 3.62%, 2.07%, 1.70%, and 1.20%. During the EFA, all items demonstrated sufficient item factor loadings (>.40). Table 1 presents the results of the EFA for SD4-VSF. The scale items are presented in the appendix. The Cronbach's alpha coefficients for the sub-dimensions identified in EFA were .61 for Machiavellianism, .73 for narcissism, .70 for psychopathy, and .71 for sadism.

### The Current Study II

In Study II, confirmatory factor analysis (CFA) was used to verify the factor structure of SD4-VSF.  $\chi^2/df$ , GFI, AGFI, CFI, IFI, TLI, SRMR, and RMSEA values were used as fit index values.

### Participants

Study II consisted of 456 (63.2% female; 36.8% male) participants. Participants' ages ranged from 18 to 33 ( $M_{\text{female}} = 22.31$ ,  $SD_{\text{female}} = 3.22$ ;  $M_{\text{male}} = 23.05$ ,  $SD_{\text{male}} = 3.67$ ). 16 (3.5%) participants reported using social media for 0-1 hour per day, 81 (17.8%) for 1-2 hours, 142 (31.1%) for 2-3 hours, and 217 (47.6%) for 3-4 hours.

### Measurement

The measurement tool used at this stage was SD4-VSF, which consists of 16 items and 4 sub-dimensions and was identified through EFA.

Table 1 *Factor loadings, communalities, mean and standard deviation of the SD4-VSF*

Item	Factor				Communalities	M	SD
	1	2	3	4			
Item 1 (3)	.81				.65	2.80	1.28
Item 2 (4)	.71				.52	2.96	1.39
Item 3 (2)	.64				.45	2.68	1.33
Item 4 (6)	.45				.35	2.40	1.41
Item 5 (9)		.76			.58	3.18	1.10
Item 6 (8)		.75			.59	2.74	1.22
Item 7 (11)		.74			.60	2.94	1.24
Item 8 (13)		.72			.51	2.76	1.25
Item 9 (18)			.81		.57	2.03	1.18
Item 10 (15)			.71		.55	1.96	1.18
Item 11 (17)			.66		.55	1.71	1.07
Item 12 (20)			.57		.53	1.74	1.08
Item 13 (25)				.85	.67	1.78	1.22
Item 14 (23)				.77	.60	1.85	1.23
Item 15 (26)				.66	.49	2.78	1.51
Item 16 (28)				.57	.39	3.28	1.49

*Note.* 1 = Machiavellianism; 2 = Narcissism; 3 = Psychopathy; 4 = Sadism; M = Mean; SD = Standard deviation



**Data Analysis**

Maximum likelihood estimation was used in AMOS to perform confirmatory factor analysis for SD4-VSF. Model fit was evaluated using  $\chi^2/df$ , GFI, CFI, AGFI, IFI, TLI, RMSEA, and SRMR (Putnick & Bornstein, 2016). In the study,  $\chi^2/df < 5$ , GFI, AGFI, CFI, IFI, TLI,  $>.90$ , SRMR, and RMSEA  $<.08$  values were used as the evaluation standards of the fit index (Hu & Bentler, 1999; Tabachnick & Fidell, 2007). Additionally, Cronbach's alpha, McDonald's omega, and composite reliability were used to determine the scale's reliability.

**Results**

In this stage of the research, CFA of SD4-VSF was conducted. Then, the scale's reliability was analyzed using various methods, including Cronbach's alpha, McDonald's omega, and composite reliability. The CFA demonstrated a good model fit for the 16-item and 4-subscale SD4-VSF:  $\chi^2 = 274.789$ ,  $df = 98$ ,  $\chi^2/df = 2.804$ , GFI = .927, AGFI = .899, CFI = .922, IFI = .922, TLI = .904, RMSEA = .063, SRMR = .064 (Marcoulides & Schumacher, 2001; Tabachnick & Fidell, 2007). Figure 1 shows the CFA for a four-factor model of SD4-VSF. After confirm-

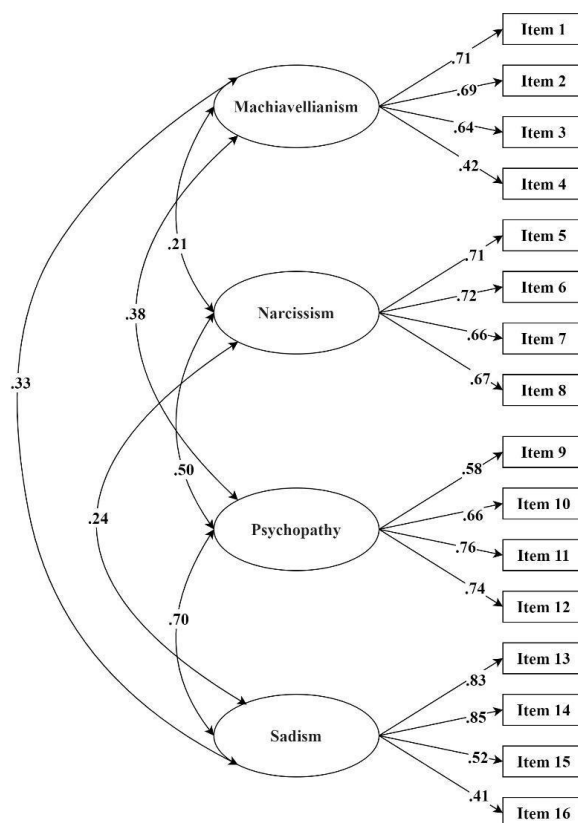


Figure 1 Confirmatory factor analysis of SD4-VSF.

Table 2 CFA results of second order and four-factor models

Models	$\chi^2/df$	GFI	CFI	AGFI	IFI	TLI	RMSEA	SRMR
Four-factor model	2.804	.927	.922	.899	.922	.904	.063	.064
Second-order model	2.822	.926	.919	.900	.920	.903	.063	.064

Table 3 Reliability results of the SD4-VSF

	Machiavellianism	Narcissism	Psychopathy	Sadism	Total S-SD4
Cronbach's alpha	.70	.78	.78	.75	.91
McDonald's omega	.71	.78	.78	.74	.90
Composite reliability	.71	.78	.78	.76	.95

ing the four-factor model, the second-order model was tested. The CFA demonstrated a good model fit for the second-order model:  $\chi^2 = 282.222$ ,  $df = 100$ ,  $\chi^2/df = 2.822$ ,  $GFI = .926$ ,  $AGFI = .900$ ,  $CFI = .919$ ,  $IFI = .920$ ,  $TLI = .903$ ,  $RMSEA = .063$ ,  $SRMR = .064$  (Marcoulides & Schumacher, 2001; Tabachnick & Fidell, 2007). In the second-order model, first-order factors are grouped under a higher-order factor that explains the underlying structure of these first-order factors (Brown, 2015). In this study, a second-order model was employed to regress four personality factors (Machiavellianism, narcissism, psychopathy, and sadism) onto a higher-order Dark Tetrad factor. Table 2 presents the results of confirmatory factor analysis for various models. The final version of SD4-VSF is included in the Online Supplementary Material.

Finally, reliability coefficients of the 16-item and 4-subdimensional SD4-VSF were determined using Cronbach's alpha and McDonald's omega. The subscales of the scale had Cronbach's alpha coefficients ranging from .70 to .75, while the total score had a Cronbach's alpha coefficient of .91. The sub-dimensions of the scale had McDonald's omega coefficients ranging from .71 to .78, while the total

score had a McDonald's omega coefficient of .90. The composite reliability coefficients of the scale range from .71 to .78, indicating its reliability (Hu & Bentler, 1999; Büyüköztürk, 2002). Table 3 provides the reliability coefficients of the scale.

### The Current Study III

Previous studies have demonstrated that Dark Tetrad characteristics are associated with cyber-antisocial activities such as trolling (Craker & March, 2016; Volkmer et al., 2023). Considering that antisocial behaviors are more likely to be seen in people with alexithymia (Liao et al., 2024), it can be said that those with the Dark Tetrad traits of alexithymia have an increased risk of exhibiting cyber antisocial behaviors. As a result, Study III examined whether alexithymia mediates the relationship between trolling and Dark Tetrad traits. The hypotheses in Study III are as follows:

H<sub>1</sub>: The mediating role of alexithymia in the relationship between Machiavellianism and internet trolling is significant.

H<sub>2</sub>: The mediating role of alexithymia in the relationship between narcissism and internet trolling is significant.

H<sub>3</sub>: The mediating role of alexithymia in the relationship between psychopathy and internet trolling is significant.

H<sub>4</sub>: The mediating role of alexithymia in the relationship between sadism and internet trolling is significant.

H<sub>5</sub>: The mediating role of alexithymia in the relationship between Dark Tetrad personality traits and internet trolling is significant.

## Method

### Participants

Study III, included 394 participants (56.1% female; 43.9% male). Participants' ages ranged from 18 to 29 years ( $M_{\text{female}} = 19.53$ ,  $SD_{\text{female}} = 1.34$ ;  $M_{\text{male}} = 21.44$ ,  $SD_{\text{male}} = 2.33$ ). Of the participants, 10.9% used social media for 0-1 hours daily, 21.8% for 1-2 hours, 40.1% for 2-3 hours, and 27.2% for 3-4 hours.

### Measures

Study III also employed the following measurement tools in addition to the SD4-VSF:

#### *Global Assessment of Internet Trolling-Revised*

Sest and March (2017) developed a scale to measure trolling behaviors in online environments. The Turkish adaptation of the scale was carried out in this study. The Turkish form of the scale, which originally consisted of 8 items, consists of 7 items. An item with a low factor loading was removed from the scale in the Turkish adaptation study. The Turkish version of the scale has acceptable fit indices: ( $\chi^2/df = 2.20$ ,  $GFI = .98$ ,  $CFI = .92$ ,  $AGFI = .96$ ,  $IFI = .92$ ,  $RMSEA = .06$ ;  $SRMR = .04$ ). The scale is a 5-point Likert type (1 = Strongly disagree; 5 = Strongly agree). The score increase on the

scale suggests an increase in the participant's trolling behavior in the online environment. The scale had a Cronbach's alpha coefficient of .65 in this study.

#### *20-Item Toronto Alexithymia Scale*

Bagby and colleagues (1994) developed a 20-item scale to measure individuals' alexithymia levels. The scale, consisting of 20 items, is of the 5-point Likert type (1 = I never agree; 5 = I always agree) type. An increase in the score indicates an increase in the participant's alexithymia level. The Turkish version of the scale (Gülec et al., 2009) has acceptable fit indices: ( $\chi^2/df = 2.21$ ,  $GFI = .94$ ,  $CFI = .96$ ,  $AGFI = .92$ ,  $NNFI = .96$ ,  $TLI = .93$ ,  $RMSEA = .05$ ;  $SRMR = .05$ ). The scale's reliability coefficient in this study was .82.

### Data Analysis

Study III investigated the mediating role of alexithymia in the relationship between Dark Tetrad traits and trolling. Before the mediation analysis, assumptions were verified. The variables were first examined for univariate normality by analyzing the skewness and kurtosis coefficients. It was observed that the skewness coefficients of the variables were  $<|2|$  and the kurtosis coefficients were  $<7$ , and these values indicate that the data set met the univariate normality assumption (Finney & DiStefano, 2013). The multivariate normality assumption was then checked. For this assumption, the Scatter Diagram Matrix was examined. Since elliptical distribution was observed as a result of the analysis, the data set also meets the multivariate normality assumption. Then, the multicollinearity assumption was checked. The fact that the correlation between variables is lower than .90 indicates that there is no multicollinearity problem in the data set (Cokluk et al., 2012).

After the hypotheses were tested, mediation analysis was performed using Model 4 from the SPSS Process Macro application.

### Results

The correlation between internet trolling and Machiavellianism ( $r = .14, p < .01$ ), narcissism ( $r = .11, p < .01$ ), psychopathy ( $r = .37, p < .01$ ), and sadism ( $r = .33, p < .01$ ) is positive. Additionally, a positive correlation was found between internet trolling and alexithymia ( $r = .22, p < .01$ ). All correlation values are included in Table 4.

This section presents the findings of the mediation analysis according to the research hypotheses. First, Machiavellianism positively predicts internet trolling ( $\beta = .05; p < .05$ ) and alexithymia ( $\beta = .13; p < .001$ ). The mediating role of alexithymia in the relationship between Machiavellianism and internet trolling was found to be significant ( $\beta = .02;$

95% CI = .006; .029). Therefore, the first hypothesis was supported. The analysis conducted within the scope of the second hypothesis show that narcissism positively predicts internet trolling ( $\beta = .06; p < .05$ ). However, it appears that narcissism does not significantly predict alexithymia ( $\beta = -.07; p > .05$ ). The mediating role of alexithymia in the relationship between narcissism and internet trolling was not found to be significant ( $\beta = -.01; 95\% \text{ CI} = -.023; .001$ ). Therefore, hypothesis 2 was not confirmed. The analysis conducted for the third hypothesis shows that psychopathy positively predicts internet trolling ( $\beta = .16; p < .001$ ) and alexithymia ( $\beta = .17; p < .001$ ). The mediating role of alexithymia in the relationship between psychopathy and internet trolling was found to be significant ( $\beta = .02; 95\% \text{ CI} = .005; .030$ ), hence hypothesis 3 was confirmed. The analysis conducted to test the fourth hypothesis showed that sadism positively predicts internet trolling ( $\beta = .12; p <$

Table 4 *Descriptive statistics and correlation coefficient among study variables*

Variables	1	2	3	4	5	6	7	Skewness	Kurtosis
1. Dark Tetrad Trait	-								
2. Machiavellianism	.59**	-						.43	-.09
3. Narcissism	.58**	.11*	-					.16	-.44
4. Psychopathy	.71**	.21**	.26**	-				1.18	1.11
5. Sadism	.73**	.25**	.16**	.44**	-			.48	-.36
6. Alexithymia	.21**	.18**	-.09	.22**	.23**	-		.21	-.67
7. Internet Trolling	.37**	.14**	.11**	.37**	.33**	.22**	-	1.58	2.24

Table 5 *Indirect effects for the mediational models*

Indirect effects	Effect	S.E.	95% C.I.	
			Lower	Upper
Machiavellianism → Alexithymia → Internet Trolling	.02	.006	.006	.029
Narcissism → Alexithymia → Internet Trolling	-.01	.006	-.023	.001
Psychopathy → Alexithymia → Internet Trolling	.02	.006	.005	.030
Sadism → Alexithymia → Internet Trolling	.01	.005	.005	.025
Dark Tetrad Trait → Alexithymia → Internet Trolling	.02	.008	.006	.039

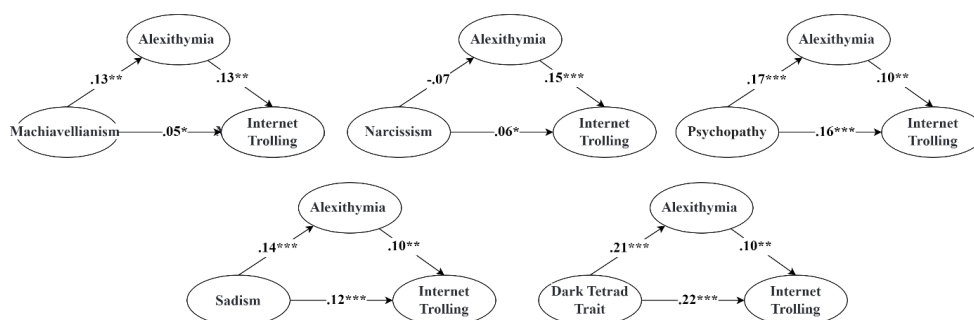


Figure 2 Mediation models for Dark Tetrad traits (Machiavellianism, Narcissism, Psychopathy, Sadism) and Internet trolling via alexithymia.

.001) and alexithymia ( $\beta = .14$ ;  $p < .001$ ). The mediating role of alexithymia in the relationship between sadism and internet trolling was found to be significant ( $\beta = .01$ ; 95% CI = .005; .025). Thus, hypothesis 4 was supported. The analysis conducted to test the last hypothesis revealed that the Dark Tetrad personality traits positively predict internet trolling ( $\beta = .22$ ;  $p < .001$ ) and alexithymia ( $\beta = .21$ ;  $p < .001$ ). The mediating role of alexithymia in the relationship between Dark Tetrad traits and internet trolling was found to be significant ( $\beta = .02$ ; 95% CI = .006; .039). Figure 2 shows the direct effects of the mediation analysis, and Table 5 shows the indirect effects.

### Discussion

This study assessed the psychometric properties of the SD4-VSF in a general adult population. This study is important not only for evaluating the Dark Tetrad personality traits but also for explaining the relationship between them and trolling. The study determined that each trait of the Dark Tetrad positively predicted trolling. This finding revealed that to prevent trolling, individuals with the Dark Tetrad personality should be focused on. The study also revealed the role of alexithymia in

the relationship between the Dark Tetrad and trolling. This finding shows that alexithymia is one of the risk factors for trolling behaviors.

Overall, the results of this study provide evidence for the validity of the SD4-VSF. As a result of EFA, item factor loadings being over .40 and the total variance explained being 53.70% are acceptable values in the literature (Büyüköztürk, 2002; Field, 2000). In addition, as a result of CFA, the goodness of fit values of the four-factor model ( $\chi^2 = 274.789$ ,  $df = 98$ ,  $\chi^2/df = 2.804$ ,  $GFI = .927$ ,  $AGFI = .899$ ,  $CFI = .922$ ,  $IFI = .922$ ,  $TLI = .904$ ,  $RMSEA = .063$ ,  $SRMR = .064$ ) and the two-factor model ( $\chi^2 = 282.222$ ,  $df = 100$ ,  $\chi^2/df = 2.822$ ,  $GFI = .926$ ,  $AGFI = .900$ ,  $CFI = .919$ ,  $IFI = .920$ ,  $TLI = .903$ ,  $RMSEA = .063$ ,  $SRMR = .064$ ) were obtained within acceptable limits. After establishing the validity of the scale, the reliability of the scale was determined with Cronbach alpha, McDonalds omega and composite reliability coefficients. The Cronbach's alpha coefficient of the scale varies between .70 and .78. The McDonalds omega coefficient of the scale sub-dimensions varies between .71 and .78. Finally, composite reliability varies between .71 and .78. As a result, all reliability coefficients were found to be within acceptable values.

After establishing the validity and reliability of the SD4-VSF, its relationship with alexithymia and internet trolling was examined. In this regard, the mediating role of alexithymia in the relationship between Dark Tetrad and trolling was examined. Findings show that alexithymia mediates the relationships between trolling and other dark personality traits other than narcissism. First, this section discusses the finding of the significant mediating role of alexithymia in the relationship between Machiavellianism and trolling. The results suggest that alexithymia mediates the relationships between trolling and other dark personality traits, except for narcissism. Specifically, individuals with higher levels of Machiavellianism tend to have higher levels of alexithymia, which in turn leads to higher levels of internet trolling. This finding is supported by research findings that have found a positive relationship between Machiavellianism and alexithymia (Jonason & Krause, 2013). It is also known that alexithymia can reduce empathy in individuals (Jonason & Krause, 2013). In other words, as the alexithymia levels of Machiavellian individuals increase, their internet trolling may also increase.

The study found a significant mediating role of alexithymia in the relationship between psychopathy and trolling. Individuals with psychopathic personalities exhibit low levels of empathy (Schimmenti et al., 2019) and high levels of moral disengagement (Orue & Calvate, 2019). Moral dissociation can lead to harmful behavior towards others without remorse or guilt (Bandura, 2002). Therefore, it can be concluded that there is a correlation between psychopathy and internet trolling. There are studies that found a positive correlation between psychopathy and internet trolling (Sest & March, 2017; Wu et al., 2023). Alexithymia is a condition characterized by difficulties in recognizing and expressing emotions effectively. Therefore, alexithymia

may contribute to anger issues (Kahramanol & Dag, 2018), leading to harmful behavior towards others (Isaksson et al., 2020). Therefore, the mediating role of alexithymia in the relationship between psychopathy and trolling may have been significant.

The study found a significant mediating role of alexithymia in the relationship between sadism and trolling. Both sadistic personalities and individuals who troll share similar characteristics, such as deriving pleasure from the suffering of others and underestimating their pain (Buckels et al., 2018). Previous research findings support the idea that there is a positive relationship between sadism and trolling (Sest & March, 2017; Buckels et al., 2018). Alexithymia is a risk factor for engaging in behaviors that harm others (Kahramanol & Dag, 2018; McErlean & Lim, 2020). Individuals with high levels of alexithymia tend to have low empathy skills (Yegen & Ozdemir Bişkin, 2024), which may result in reduced feelings of remorse when causing harm to others. Therefore, the role of alexithymia in the relationship between sadism and trolling may actually be significant.

Finally, this study found no significant mediating role of alexithymia in the relationship between narcissism and trolling. Conflicting findings exist regarding the relationship between narcissism and alexithymia. For instance, Martinano and colleagues (2022) concluded that there is no significant relationship between narcissism and alexithymia, while another study found a negative relationship between narcissism and alexithymia (Lyvers et al., 2022). Jonason and Krause (2013) found a positive relationship between narcissism and difficulty identifying feelings and difficulty describing feelings, which are dimensions of alexithymia. However, they concluded that there was no significant relationship between narcissism, alexithymia, and externally oriented thinking, one of the dimensions. As a



result, it seems that the relationship between narcissism and alexithymia is contradictory.

### Limitations and Future Directions

This study conducted the Turkish validity and reliability of the SD4-VSF, eliminating the lack of measurement tools regarding the Dark Tetrad. First, the data were collected through self-report surveys in an adult population in Türkiye, which is a limitation of this study. In future studies, the validity and reliability of the scale can be examined using different samples, such as university students, adolescents, and the elderly. Additionally, the third part of this research analyzed the relationships between variables using cross-sectional data, which means that causal conclusions cannot be drawn within the scope of this research. To reach causal conclusions between variables, longitudinal or experimental studies should be conducted in future research.

### Conclusion

This study developed the SD4-VSF. The results showed that the scale is valid and reliable. By reducing the number of items, the scale's usefulness was increased. Another result of the study shows that the Dark Tetrad (without narcissism) leads to more alexithymia, and high alexithymia leads to more internet trolling.

### Author's ORCID

Muhammed Akat

<https://orcid.org/0000-0002-8543-8022>

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