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Modelling the Relationship between Cyber Fraudulent Trolling and the Dark Tetrad Personality, Considering the Big Six Personality Factors among University Students

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Abstract

The current study aimed to explore the stability of the Dark Tetrad four-dimensional personality model in Arab society, marking the first time within the scope of the current researcher's knowledge. Then, the study tested a model explaining the mediating factors between the Big Six personality factors and Cyber Fraudulent Trolling using the Dark Tetrad four-dimensional personality model. The study also aimed to investigate the impact of gender and academic specialization, as well as their interaction, on Cyber Fraudulent Trolling. The sample consisted of 1093 fourth-year university students of both genders, with literary and scientific majors from the College of Education. The following measures were applied to the sample: the Dark Tetrad four-dimensional personality scale, the Cyber Fraudulent Trolling scale, and the Big Six personality factors scale (Short Form). The results showed the stability of the Dark Tetrad personality model in the Arab environment. There were correlational relationships between the Dark Tetrad personality and the Big Six personality factors on one hand, and Cyber Fraudulent Trolling on the other hand. Cyber Fraudulent Trolling could be predicted through the Dark Tetrad four-dimensional personality and the Big Six personality factors, with differences in predictive ability. The Dark Tetrad four-dimensional personality mediated between the Big Six personality factors and Cyber Fraudulent Trolling. Finally, gender, academic specialization, and their interaction had no statistically significant effect on Cyber Fraudulent Trolling scores.

Keywords: *Cyber Fraudulent Trolling, the Six Big Personality Factors, the Dark Tetrad Personality.*

Introduction

The early 21st century has been distinguished by the emergence of the remarkable Internet, which has compelled most of the world's population to use it in various settings,

(Ebrahim, 2023). The advent of the virtual world has affected numerous aspects of human life, giving rise to various negative social phenomena resulting from internet use, including electronic crimes and cyber fraudulent trolling. It has unintentionally provided an opportunity for some individuals to show antisocial behaviours by offering a readily available and concealed outlet.

The current research aims to explore certain psychological, personality, and demographic foundations that may collectively or individually lead an individual to engage in online cyber fraudulent trolling. This type of trolling is a form of active harmful trolling that can have negative effects on both the individual perpetrating it and the victims. For instance, by creating

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a hostile online environment, disseminating provocative and threatening opinions, and engaging in defamation (Coles & West, 2016). Several studies have indicated that cyber fraudulent trolling is associated with personality traits that are antagonistic towards others (Buckels et al., 2014; Cheng et al., 2017; March 2019; March & Steele, 2020).

To understand the underlying mechanisms of the psychological defence mechanisms behind these associations, and to identify the role of psychological and mood fluctuations, as well as personal factors in fostering hostility and online trolling behaviour, the current researcher aims to investigate the relationships between online trolling and personality traits: narcissism, psychopathy, and Machiavellianism, collectively referred to as the Dark Triad of personality (Paulhus & Williams, 2002). Additionally, the recently added fourth factor to the Dark Triad, known as sadism, is included. Some have emphasized the importance of considering it when dealing with the three-dimensional personality when researching cyber fraudulent trolling (Molenda et al., 2022).

On the other hand, a significant question has emerged regarding the crucial role of personality factors in the Hexaco model presented by Ashton & Lee from the years 2011 to 2019-2022. This model is considered to mediate between cyber fraudulent trolling and the Dark Tetrad four-dimensional personality. This is one of the current research's objectives.

Internet Trolling, or Cyber Fraudulent Trolling

Online trolling is a recent phenomenon but has become more commonly recognized over the past decade of the twenty-first century (Fichman & Sanfilippo, 2016). Internet trolls sow chaos and fear. "Ordinary" internet users fall into such traps, reacting to these activities (Papapicco & Quatera, 2019). Trolling is defined as "a socially and ethically deviant behaviour marked by disruption by an individual online towards others" (Fichman & Sanfilippo, 2016). It is a behaviour primarily focused on eliciting negative emotions in other participants in the discussion through provocation or emotional discharge (Craker & March 2016; Masui, 2019).

Despite the awareness of cyber fraudulent trolling for almost a decade, there is still no widely agreed-upon and accepted definition for the concept of trolling. Various definitions have been put forward, shedding light on various aspects of this phenomenon. For instance, according to Sukaesih & Gemiharto (2020), online trolls use fake online profiles to write provocative or off-topic messages to disrupt discussions, a practice currently referred to as "electronic flies." Hardaker (2010) defines trolls as internet users who present themselves online as part of a group while their true intentions are to disrupt discussions, divert them from their purpose, or provoke the anger of others. Several definitions of trolling revolve around this meaning, with some degree of convergence. Hence, it is essential to distinguish between trolling on the one hand and other forms of online hostility on the other (Goodboy & Martin, 2015; Smith & Slonje, 2012).

Cyber fraudulent trolling closely related to the personal traits of the troll (Smith et al., 2008; Zezulka & Seigfried, 2016). Psychological, personality, and demographic factors still require further investigation and validation by researchers concerned with this phenomenon.

Therefore, the current research aims to explore what has not been investigated yet concerning the dimensions of personality represented in two crucial models: the Big Six Personality Factors and the Dark Tetrad for the first time in the Arab or foreign environment within the limits of the current researcher's knowledge in predicting cyber fraudulent trolling, as one of the major goals of the study.

Cyber Fraudulent Trolling and the Dark Tetrad Personality

That online trolling is often a violation of social norms has been established (Fichman & Sanfilippo, 2016). Results from some studies have shown a positive correlation with antagonistic personality traits reflected by or represented in the Dark Tetrad (March et al., 2017; 2019 Moor & Anderson). These three traits in the Dark Tetrad share commonalities with the core features of malevolence (Jones & Figueredo, 2013; Paulhus, 2014; Rogoza et al., 2022).

However, each trait in the Dark Tetrad has distinct characteristics (Collison et al., 2018; Hare, 1985; Krizan & Herlache, 2018).

Both Paulhus and Williams (2002) determined that psychopathy could be the harshest and most severe trait in the Dark Triad. However, an in-depth analysis of the three dark personality factors conducted by Muris et al. (2017) found that only psychopathy had the highest correlation with aggression, emotional detachment, and harmful behaviours. Psychopathy was also identified as a predictor for a wide range of antisocial behaviours, especially cyber fraudulent trolling (Moor & Anderson, 2019).

In addition, Machiavellianism, and narcissism, based on what the results of some studies have shown, they did not have a clear correlation with cyber fraudulent trolling among Facebook users (Moor & Anderson, 2019; Craker & March 2016).

The results of some previous studies have indicated for example, studies conducted by Buckels et al. (2019), March (2019), and Sest; March (2017) have suggested that the Dark Tetrad, especially the sadism trait within it, serves as a strong predictor of cyber fraudulent trolling. Consequently, trolling behaviour can be considered a sadistic act (Buckels et al., 2019). Therefore, Molenda and her colleagues (2022) concluded their study by recommending that the sadism dimension and variable be considered when studying the relationship between the Dark Tetrad and cyber fraudulent trolling, prompting the current researcher to include it in the present study.

The Six Major Personality Factors

Critiques have highlighted multiple shortcomings in the pentagonal model, noting that it has overlooked crucial factors such as honesty/humility, as demonstrated in cross-cultural studies. This led Ashton and her colleagues (2004) to introduce a new model that has been the subject of hundreds of studies conducted in 18 languages and cultures.

Research into the human characteristics of personality with a stable and consistent structure has been conducted through extensive cross-cultural studies aimed at exploring the structure of personality traits (e.g. Schmitt et al., 2007). This work has produced a composite image of five culturally recurrent personality factors. However, upon closer examination, these results were based on exploratory data analysis frameworks, not confirmatory ones. When confirmatory analytic studies were conducted to verify the findings of exploratory studies, it became apparent that the results were not confirmed (Borkenau & Ostendorf, 1990).

There has been significant interest in the Big Five Personality Factors (e.g. Costa & McCrae, 2008). It has been established that these factors are generalizable across many cultures (e.g. Nye et al., 2008). However, the results are not consistent regarding the number of factors. For instance, several studies have shown that personality traits may consist of only two factors.

(e.g. Ashton & Lee, 2007; De-Raad et al, 2010; Gurven et al., 2013; Musek, 2007; Nel et al, 2012).

It is important to adopt modern methods and approaches in dealing with the accumulated data

related to personality factors. Some researchers have suggested, after examination and critique, the use of what is called Exploratory Structural Equations Modelling (ESEM).

Data was extracted in a study conducted by Lee and Ashton (2018) from five culturally and linguistically diverse cultures. The results showed the presence of six factors after oblique rotation, with a decrease in factor variance, eigenvalues, and the results indicated the presence of six personality factors, which are : Honesty/humility, emotionalism, extraversion, agreeableness, conscientiousness, and openness to experience: (Alshafay, 2023).

The current study is the only study within the scope of the Arabic literature - to the researcher's knowledge - that has focused on studying the major personality traits, cyber fraudulent trolling, and the four factors of the dark personality as a mediating variable among university students.

Then the Problem of the Strategic Study Lies in the Following Questions

- What are the factor components of the dark personality model?
- What is the relationship between cyber fraudulent trolling and each of the four dark personality dimensions and the overall score?
- What is the relationship between cyber-fabricant trolling and the six major personality factors?
- Can cyber fraudulent trolling be predicted by the 4D dark personality and the Big 6 personality factors?
- Are there significant differences between male and female university students in cyber fraudulent trolling?
- Are there fundamental differences between university students in scientific and literary majors in cyber fraudulent Trolling?

Study Objectives

1. Examining the relationship between cyber fraudulent trolling and each of the dark personality factors from its fourfold perspective and the Big Six personality factors among university students to understand and explain the relationship between these psychological and social aspects.
2. Researching intermediate variables capable of understanding, interpreting, and then predicting cyber fraudulent trolling considering the increasing number of Internet users throughout the world and the Arab region.
3. Providing a visualization of a structural equation to model this relationship between cyber fraudulent trolling on the one hand and the six major personality factors, considering the relationship between them being mediated through the four-dimensional dark personality factors.

The Importance of Studying

The significance of the current study lies in the following:

1. It addresses a new problem and pattern in societies, represented by cyber fraudulent, for the first time in the Arab environment within the limits of the researcher's knowledge.
2. The current study aims to understand the phenomenon of cyber fraudulent by investigating its relationship with both the Dark Tetrad personality and the Big Five personality traits, supplying depth and breadth simultaneously.
3. The current study goes beyond exploring the bivariate relationships between variables to

adopt a more advanced approach, represented by path analysis, testing a theoretical model, and formulating a well-structured model based on results. This contributes to the establishment of methodological scientific mechanisms for researching cyber fraudulent, understanding its motives and triggers, and subsequently developing proactive mechanisms for prevention and treatment. This is envisioned in a subsequent stage following the current study, not within the scope of the current research.

Procedural Terminology of the Study

1. **Cyber fraudulent trolling:** It is a recurrent and disturbed deviant behaviour by an individual online towards others. It primarily focuses on eliciting negative emotions from targeted victims through provocation, aggressive posts, or comments created by the perpetrators for entertainment, extortion.
2. **Dark Tetrad personality:** It is a personality pattern characterized by a combination of individualistic and selfish tendencies, coupled with a diminished sense of empathy to achieve self-centred goals. This personality comprises four factors: psychopathy, Machiavellianism, narcissism, and sadism.
3. **Big Five Personality Traits:** This model, introduced by Lee and Ashton (2018), includes six factors: extraversion, agreeableness, conscientiousness, openness to experience, emotional stability, honesty, and humility as described earlier concerning the characteristics and features of each dimension of the Big Six personality traits.

Study Hypotheses

- S.H.1-** *There is only one factor that links the dark personality traits of university students.*
- S.H.2-** *There are statistically significant positive correlation coefficients between cyber–fraudulent trolling scores and dark personality scores as dimensions and as a total score for university students.*
- S.H.3-** *There are statistically significant correlation coefficients between cyber–fraudulent trolling scores and the scores of the Big Six personality factors for university students.*
- S.H.4-** *Cyber fraudulent trolling; can be predicted through the dark personality with its four dimensions and the Big Six personality factors.*
- S.H.5-** *The dark personality mediates the relationship between the Big Six personality factors and cyber–fraudulent trolling for university students.*
- S.H.6-** *There is no statistically significant effect of gender, major, or their interaction on the scores of university students on the cyber–fraudulent trolling scale.*

Study Methodology: The study followed the steps and rules of the descriptive, correlational, comparative, and predictive research methodology to achieve the objectives of the current study, as well as to test the validity of the hypotheses.

Study Population: The study population consists of students from the Faculty of Education in the second semester of the third academic year, isolating the age factor. The population includes both genders, with a total of 3240 male and female students for the academic year 2022-2023.

Study Sample: The study sample consists of third-year students from both scientific and literary departments, including both genders, with a total of 1093 participants.

Study Tools

1. Cyber Fraudulent Trolling Scale: The current researcher prepared this scale, which is a scale consisting of 8 statements to measure a person's intention to engage in trolling over the Internet. The responses to the statements are according to a five-point Likert Scale, and the developer of the scale verified its validity and reliability in multiple ways. Internal consistency was verified at the statement level with the total score, and the values of the correlation coefficients ranged between (0.69, and 0.89), all of which prove that the scale has internal consistency.

Validity was also verified in several ways: experimental, convergent validity, where the correlation coefficient of the scores of the current scale with the scores of the Problem Behaviour Scale for Internet Use prepared by Alshafay (2018), he was calculated by applying it to a sample of graduate students in the Special Education Division in the second semester of the academic year 2023. Where (n = 230) of both sexes, the correlation coefficient between them was equal to ($r = 0.78$), which is a significant coefficient at a level greater than (0.001). The stability was also verified by re-application with a time interval of four weeks, so the value of the correlation coefficient between the two applications was equal to ($R = 0.81$) which is a significant coefficient at a level greater than (0.001)

2. Life Orientation Scale (Dark Personality): This scale was prepared by Jones & Paulhus (2014); Arabized by Alshafay (2021). It is a scale consisting of 27 statements that measure three dimensions or sub-components of the dark or melancholic personality. These three dimensions are: Machiavellianism, psychopathy, and narcissism, and each dimension has one. 9 statements. The scale was built based on the theoretical model first proposed by Paul and Williams in 2002. We will only review what the current researcher has done. Internal consistency has been verified on several levels:

Level One: Correlation coefficients were calculated between the score of each item and the total score of the scale for a sample of 298 participants. The correlation coefficients ranged between (32.0, and 76.0), and all of them were statistically significant at a level greater than 0.01.

Level Two: Correlation coefficients were calculated between the score of each item, the score of the dimension to which the item belongs, and the dimensions. Here, there are three dimensions based on the theoretical framework of the Dark Personality adopted by the researcher. The results showed that the correlation coefficients between the item score, and the score of the dimension it belongs to, ranged between (12.0, and 67.0), and they were statistically significant at a level greater than 0.01.

Level Three: Correlation coefficients were calculated between the scores of the three dimensions with each other and with the total score on the scale after excluding the dimension score. The results showed that the correlation coefficients ranged between (23.0, and 76.0), and they were statistically significant at a level greater than 0.01. Through these three levels of internal consistency, it can be concluded that the Dark Personality Scale has a high degree of internal consistency.

Validity: Validity was verified through exploratory factor analysis using the Principal Component method of Hotelling and Oblique Rotation. The analysis revealed the presence of a single factor that encompasses the three dimensions upon which the scale was theoretically built. This factor has an Eigenvalue greater than one and explains more than 56% of the total factor variance.

Reliability: Reliability was verified through the Test Re-Test method by calculating correlation

coefficients between the scores of individuals in the reliability sample ($n = 298$) across two administrations separated by a 4-week interval. The correlation coefficient was found to be ($r = 0.88$), indicating a significant level at $p < 0.001$. Additionally, reliability was assessed using Cronbach's Alpha, and the extracted value was $\alpha = 0.71$.

3. List of the Six Major Personality Factors (The Brief Image)

The Big Six Factors of Personality Scale (Abbreviated Version- EXACO)

This scale was originally developed by Ashton and his colleagues (2014) and translated into Arabic by Alshafay (2022). The list consists of 60 statements representing each of the 10 statements (dimensions) or factors of the Big Six personality traits. Respondents answer each item on a five-point Likert scale. The internal consistency of the statements for each factor was verified concerning the total score for that factor, covering all five factors. Verification of reliability and validity indicated that the Arabic version of the scale is reliable and valid. To avoid redundancy, detailed information about the scale, its psychometric properties, and usage instructions are provided in the accompanying manual. The Arabic version of the scale has been used by the researcher and other scholars in various studies between 2020 and 2023.

4. Sadism Scale: This scale was originally developed by Buckels (2018), and the current researcher translated it into Arabic. The scale consists of 12 statements designed to measure a person's inhumane enjoyment of the pain and suffering of others. It includes, respondents provide their responses on a five-point Likert scale. The scale's validity and reliability were verified through multiple methods, all confirming its validity and reliability. The internal consistency of the scale was checked at the level of individual statements with the dimension, at the level of dimensions collectively on one hand, and with the total score on the other hand, all confirming the scale's internal consistency. The scale's validity was verified through various methods, including experimental and convergent validity. For example, when applied to a sample of postgraduate students (Special Education branch in the second semester of the academic year 2023, with $n = 230$ for both genders), the correlation coefficient with the Psychopathy scale from Alshafay's (2021) Dark Personality Inventory was found to be ($r = 0.78$), indicating significance at a level greater than 0.001. Test-retest reliability was also assessed over a four-week interval, with the correlation coefficient between the two applications being ($r = 0.93$), significant at a level greater than 0.001.

Study Results

Hypothesis One: *There is one general factor linking the four-dimensional dark personality dimensions of university students. To test the validity of this hypothesis, a factor analysis was conducted using the principal components method and oblique rotation using the Opelman method.*

By using factor analysis with the principal components Analysis (PCA) oblique rotation/Oblimin.

The results have shown that the commonalities values were as follows: Sadism = (0.284), Machiavellianism = (0.664), Psychopathy = (0.624), and Narcissism = (0.68). The commonalities matrix values were Sadism = (0.62), Machiavellianism = (0.8), Psychopathy = (0.79), and Narcissism = (0.83). There is one general factor that connects these four dimensions, namely Sadism, Machiavellianism, Narcissism, and Psychopathy, with its latent root Eigen Value = (2.33). The percentage of explained overall variance is (58.33%). This result leads to the acceptance of the first hypothesis.

Hypothesis Two: *There are statistically significant positive correlations between cyber fraudulent trolling scores and dark personality scores as dimensions and as a total score among university students. To verify this hypothesis, correlation coefficients were calculated between cyber fraudulent trolling and dark personality components. The results revealed that the correlation coefficients were as follows: Sadism ($r = 0.71$), Machiavellianism ($r = 0.39$), Psychopathy ($r = 0.32$), Narcissism ($r = 0.39$), and finally, with the total score ($r = 0.44$). This indicates that all correlation coefficients between cyber fraudulent trolling on one side, and the four components of dark personality and the total scores of those components combined on the other side, are statistically significant at the required significance level (.001). This means that the four components of dark personality and the total scores of those components are positively and significantly associated with cyber fraudulent trolling in both directions.*

It is noteworthy that sadistic personality is considered the most strongly correlated among the four personalities with cyber fraudulent trolling, with a correlation coefficient of ($r = 0.71$, $p < 0.001$). Following closely is Machiavellianism, which is equally correlated with Narcissism ($r = 0.39$, $p < 0.001$). Lastly, Psychopathy shows a correlation of ($r = 0.32$, $p < 0.001$). The four components of dark personality in the current study sample (Sadism, Machiavellianism, Psychopathy, and Narcissism) constitute dimensions of personalities with tendencies, attitudes, and motivations leading to undesirable negative behaviour characterized by independence, aggression, and a lack of guilt about causing harm to others. This may potentially lead students to engage in various forms of cyberbullying (Jones & Paulhus, 2010; Jones & Paulhus, 2011).

Some have argued that dark personality traits were supposed to lead to cyber fraudulent through elevated normative beliefs about aggression (Ang & Taleb, 2011), impulsivity, decreased empathy (Jonason & Krause, 2013), as well as weakened moral reasoning (Karandikar et al., 2019). Moral disengagement (Egan et al., 2015). Moral disengagement may be particularly important due to its strong associations with other potential mechanisms linking dark personality traits to previously mentioned cyberbullying and cyber dominance (such as decreased empathy and weakened moral reasoning) (Detert et al., 2008).

Therefore, ethical standards in different environments serve as a normative mechanism significantly responsible for the elevated levels of the four dimensions of dark personality (Nocera et al., 2021). Several previous studies support the overall findings of the current study, including studies by Anna et al. (2023), Mitch et al. (2016), Siti et al. (2022), and Taylor & Tric (2017). However, these results differ from some previous studies such as Hala (2121), Mith et al. (2016), and Rauthmann & Kolar (2012).

Hypothesis Three: *There are statistically significant positive correlations between cyber fraudulent trolling and the Big Six personality factors among university students. To verify this hypothesis, correlation coefficients were calculated, and the results were as follows: Neuroticism ($r = 0.22$), Extraversion ($r = 0.22$ -), Agreeableness ($r = 0.08$), Openness ($r = 0.14$), Conscientiousness ($r = 0.22$), and Honesty/Humility ($r = 0.21$ -). All correlation coefficients between cyber fraudulent trolling and the Big Six personality factors were statistically significant and positive, except for Extraversion ($r = 0.22$ -, $p < 0.001$) and Honesty/Humility ($r = 0.21$ -, $p < 0.001$).*

These values are statistically significant, but negatively and inversely associated with cyber fraudulent trolling. In other words, as the levels of Extraversion and Honesty/Humility increase, the levels of cyber fraudulent trolling decrease, and vice versa.

The negative inverse correlation between conscientiousness and sincerity/humility on one hand, and cyber fraudulent victimization on the other, can be explained by the fact that these traits in the personalities of the individuals in the current study sample are distinguished by ethical integrity, non-manipulation, and refraining from deceiving others. Emphasizing the importance of respecting values and customs, such positive attributes contradict with the characteristics of those who engage in cyber fraudulent victimization. These individuals are known for using electronic communication inappropriately, causing harm and fostering hatred towards others (Mostapha et al., 2019). They also exhibit low self-control and erratic, disorganized behaviour. The interplay between these two variables results in deviant behaviour characterized by bullying and cyber fraudulent victimization (Alshewely, 2018).

From here, there was an inverse correlation relationship between extraversion and sincerity/humility on one side and cyber fraudulent victimization on the other. The findings of this partial aspect align with the results of studies such as Abdulaziz (2019) and Alqahtani (2019). Regarding the explanation of the existence of positive inverse relationships between the remaining four factors forming the six major personality factors and cyber fraudulent victimization, some previous studies have indicated the same result either entirely or partially, as seen in studies such as Alqahtani (2019), Alsayah (2019), and Celik et al. (2012)

Some studies have indicated that individuals characterized by delinquency exhibit deviant behaviours and higher levels of cyberbullying (Giovazolias & Mitsopoulou, 2015; Van et al., 2017). Therefore, there was a positive inverse relationship between delinquency and cyber fraudulent victimization.

Openness to experience is a personality trait describing curious and imaginative individuals who seek to experience new things (Gordon, 2021). Some previous studies consider openness as an indicator of cyber dominance because individuals with this personality have an experimental mindset and desire to engage in new experiences (Alonso & Romero, 2017). Such curiosity may lead to trespassing on values and social commitments, driving individuals towards cyberbullying in all its forms and methods. Despite the existence of studies that suggested the opposite (Alsayeh, 2019; Mohammad et al., 2022), regarding the relationship between openness and online dominance, further studies are needed to provide a logical and scientific explanation for this result, utilizing more comprehensive tools and diverse samples from various environments. This approach would lead to a scientifically acceptable interpretation that could be leveraged in future studies in this field.

Considering these results, a partial acceptance of the third hypothesis of the current study is possible, given the lack of complete achievement and alignment of the results with the hypothesis content.

Hypothesis Four: *Can cyber fraud trolling be predicted through the four-dimensional dark personality and the six major factors of personality? To test the validity of this hypothesis, the researcher performed the calculation of Multiple Regression Analysis, and the tables (1), (2), and (3) present the results obtained. In table (1), multiple values of the regression model summary for the four dimensions of the dark personality are highlighted for cyber fraudulent trolling.*

Table 1: Model Summary of Regression of the Dark Personal Traits of Cyber Fraudulent Trolling.

Model	R	R Square	Adjusted R Square	% of Variance
1	.705 a	.496	.496	3.55
2	.718 b	.516	.515	3.48
3	.723 c	.523	.522	3.45
4	.725 d	.525	.523	3.45

N= 1095.

Source: All numbers, results, and values in all study tables were extracted based on the questionnaire form and applying the study standards to university students on October 3 and 4, 2023, then analyzing the students' answers using a statistical program SPSS2.

- a. Sadism.
- b. Sadism, Machiavellianism.
- c. Sadism, Machiavellianism, Narcissism.
- d. Sadism, Machiavellianism, Narcissism, Psychopathy.

Through table (1), it is evident that the four components of the dark personality have high determination coefficients. Specifically, they are as follows, in sequence: Sadism = (0.705), then Sadism with Machiavellianism = (0.718), Sadism, Machiavellianism, and Narcissism = (0.723). Finally, the sum of all four factors.(0.725) =

To assess the predictive capability of the four components of the dark personality in cyber fraudulent trolling, the following statistical analysis was conducted to identify beta values, conduct t-tests, and determine the significance level for the regression of the four components of the dark personality on cyber fraudulent trolling. Table (2) presents the results obtained from this analysis.

Table 2 : Values of Regression Constant, Beta Coefficient, t-test, and Significant Level of Dark Tetrad Personality on Cyber Fraudulent Trolling

Model	B	Std. Error	Beta	T	Sig.
(Constant)	2.718	.392	-	6.93	.000
Sadism	.508	.015	.705	32.82	.000
(Constant)	.064	.554	-	.115	.908
Sadism	.467	.016	.649	28.62	.000
Machiavellian	.122	.018	.151	6.64	.000
(Constant)	-1.440	.663	-	-2.171	.030
Sadism	.453	.017	.629	27.29	.000
Machiavellian	.064	.021	.103	408	.000
Narcissism	.100	.025	.103	4.06	.000
(Constant)	-2.048	.728	-	-2.81	.005
Sadism	.452	.017	.627	27.22	.000
Machiavellian	.072	.021	.088	3.36	.001
Narcissism	.079	.027	.81	2.95	.003
Psychopathy	0.052	.026	.13	2.01	.044

N = 1095.

From table (2), it is evident that both multiple and individual regression models, as well as cumulative stepwise models, indicate that the four factors have the ability to predict cyber fraudulent trolling. Therefore, the predictive equation can be formulated as follows:

Cyber Fraud Predilection (C) = $-2.048 + 0.63 \times \text{Sadism (S)} + 0.1 \times \text{Machiavellianism (A)} + 0.1 \times \text{Narcissism (Y)} + 0.1 \times \text{Psychopathy (M)}$.

Regarding the results of the multiple regression analysis for the six major personality factors regarding the extent of predicting cyber fraud, tables (3), (4), and (5) present the findings obtained.

Table 3: Model Summary of Regression of the Big Six Factors of Personality on Cyber Fraudulent Trolling.

Model	R	R Square	Adjusted R Square	Std Error of the estimate
1	a) .220	.048	.048	4.88
2	b) .253	.048	.062	4.84
3	c) .262	.069	.066	4.83
4	d) .276	.76	.073	4.81

N=1095.

- a. Predictor (constant) = Extraversion.
- b. Predictor (constant) = Extraversion and Conscientiousness.
- c. Predictor (constant) = Extroversion, Conscientiousness, Honesty/Humility.
- b. Predictor (constant) = extraversion, conscientiousness, honesty/humility, agreeableness.

From table (3), it is evident that the six major personality factors have high determination coefficients, with the respective values being: Elation = (0.22), Elation and Conscientiousness = (0.25), then Elation, Conscientiousness, and Honesty/Humility = (0.26), and finally, Elation, Conscientiousness, Honesty/Humility, and Agreeableness .(0.28) = To validate the previous result, a variance regression analysis was conducted for the six major personality factors on cyber fraudulent trolling based on the apparent values. The results are presented in table.(4)

Table 4 :Regression Variance Analysis of the Big Six Factors of Personality on Syber Fraudulent Trolling.

Model	Sum of Squares	Df	Mean Square	F	Sig.
Regression	1328.25	1	1328.25	55.70	
Residual	26060.97	1093	23.84	-	.000 b
Total	27389.22	1094	-	-	
Regression	1748.00	2	874.00	37.22	
Residual	2564.22	1092	23.48	-	.000 c
Total	27389.22	1094	-	-	
Regression	1880.47	3	626.82	26.80	
Residual	25508.75	1091	23.38	-	.000 d
Total	27389.22	1094	-	-	
Regression	2081.599	4	520.40	22.41	
Residual	25307.63	1090	23.21	-	.000 e
Total	27389.22	1094	-	-	

N=1095.

- a) Dependent Variable, Cyber Fraudulent Trolling.
- b) Predictor (constant), extroversion.
- c) Predictor (constant), extraversion and conscientiousness.

- d) Predictor (constant), extraversion, conscientiousness, honesty/humility.
 e) Predictor (constant), extraversion, conscientiousness, honesty/humility, and agreeableness.

From table (4), it is evident that all values (F) have statistical significance at a level greater than 0.001. This means that all six factors of the personality model can enter the equation to predict cyber fraudulent trolling. To determine the ability of the six major personality factors to predict cyber fraudulent trolling, the following statistical analysis was conducted to reveal the beta values, (t) values, and the significance level of the regression of the six major personality factors on cyber trolling, as in the table (5) which presents the results obtained.

Table 5: Values of Regression Constant, Beta Coefficient, t-test, and Significant Level of the Big Six Factors of Personality on Cyber Fraudulent Trolling.

Model	B	Std. Error	Beta	t	Sig
1 (Constant)	9.38	.77	-	12.05	.000
Extraversion	.23	.03	.22	7.46	.000
2 (Constant)	7.79	.85	-	9.07	.000
Extraversion	.16	.03	.15	4.55	.000
Conscience	.14	.03	.14	4.22	.000
3 (Constant)	6.80	.95	-	7.13	.000
Extraversion	.13	0.38	.12	3.65	.000
Conscience	.10	0.39	.10	2.75	.006
Honesty	.09	.04	.08	2.38	.017
4 (Constant)	8.12	1.06	-	7.71	.000
Extraversion	.18	.04	.17	4.52	.000
Conscience	.10	.03	.10	2.76	.005
Honesty	.13	.04	.12	3.11	.002
Acceptability	.12	04	.10	2.04	.003

N = 1097.

From table (5), it is evident that the fourth model (as in the previous table) possesses a high degree of predictability, both at the individual and cumulative variable levels. Therefore, the fourth model exhibits a greater ability to predict cyber fraudulent trolling. Based on this, the predictive equation is as follows :Cyber fraudulent trolling (C) = 8.214 + 0.17 x Extroversion (E) + 0.1 x Conscientiousness (C) + 0.012 x Honesty/Humility (H) - 0.11 x Agreeableness (A).

This result leads to the acceptance of the fourth hypothesis, indicating the ability of some of the six major personality factors to predict cyber fraudulent trolling among university students.

The Fifth Hypothesis: *The dark personality mediates the relationship between the six major personality factors and cyber fraudulent trolling for university students. Based on the results of the regression analysis in its two stages: the first stage, a regression analysis to examine the extent to which the dark tetrad personality predicts cyber fraudulent trolling, and the second stage, a regression analysis to examine the extent to which the six major personality factors predict cyber fraudulent trolling. According to the correlational relationships revealed by the results in hypotheses one, two, and three, the proposed model presented by the current researcher indicates that the dark tetrad personality mediates the relationship between the six major personality factors and cyber fraudulent trolling. This is supported by the statistical analyses and is represented in figure (1).*

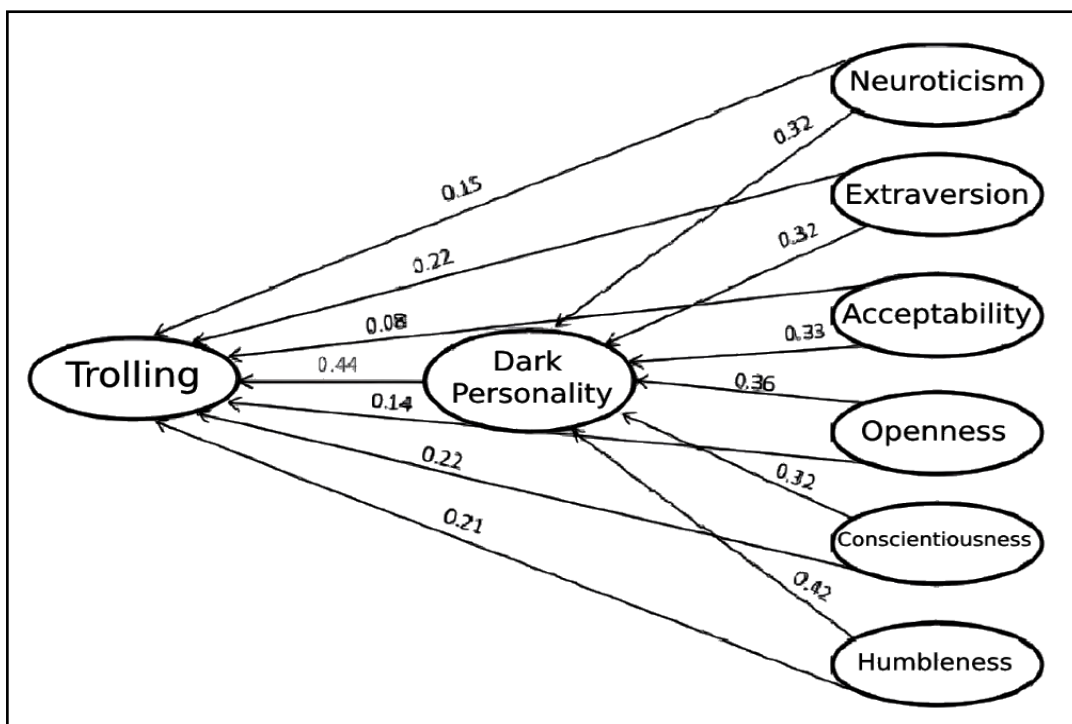


Figure (1) The Dark Personality: The average relationship between the six major personality factors and cyber fraudulent trolling the Big Six Factors of Personality and Cyber Fraudulent Trolling.

Source : The Researcher based on the Data Included in the Research.

When dark personality traits converge with antagonism, low honesty/humility, and a lack of conscientiousness or at least its exclusion, as Albert Bandura decided in the modification of his social learning theory (Alshafay, 2023). Combined, these factors lead to engaging in cyber fraudulent trolling in general, especially online, and consequently harming others without objective justification, solely to satisfy the individual's unjustifiable personal desires.

The sixth hypothesis: There is no statistically significant effect of gender, major, and their interaction on the levels of cyber fraudulent trolling among university students. To test the validity of this hypothesis, a two-way analysis of variance was conducted, and table (6) presents the results obtained.

Table 6: Results of Variance Analysis (ANOVA) of the Effect of Gender and Specialization and the Interaction Between Them on Cyber Fraudulent Trolling Scores.

Source of Variation	Sums of Squares	Df	Mean Squares	F	Significant Level
Gender (A)	1.07	1	07.1	004.0	NS
Study Major (B)	2.664	1	2.664	106.0	NS
A x B	4.094	1	4.094	163.0	NS
Error	27379.669	1091	25.096	-	-

Note: N = 1093.

Table (6) presents the values of the analysis of variance ANOVA to detect the existence of statistically significant differences between genders on the scale of cyber fraudulent trolling in

the current study sample. It is evident that there are no statistically significant differences between the average scores of genders among university students on the cyber fraudulent trolling scale. This result can be interpreted by the similarity of environmental influences and social variables surrounding university students to some extent. Such influences did not negatively impact the personality traits of university students and, therefore, did not affect them to varying degrees in terms of aggression, criminality, lack of conscience, or harm to others. These factors could potentially lead to increased individual differences in cyber fraudulent trolling levels among university students. This result contradicts the findings of some previous studies (e.g. Slonja & Smith, 2008; Smith et al., 2008; Yi et al., 2023).

In contrast, the results of many previous studies align with the findings of the current study regarding the absence of gender differences in cyber fraudulent trolling among students (e.g. Eyup, 2023; Nasti et al., 2023). It can be concluded that such differences in the results of previous studies are inherent because the motives for cyber fraudulent trolling vary from one society to another and even from one individual to another within the same society.

In addition, the level of commitment to ethical, social, and religious standards, and material conditions that may drive a person to engage in cyber fraudulent trolling to meet their psychological and emotional needs. Therefore, various environmental factors and conditions that may encourage or inhibit cyber fraudulent trolling operations need to be carefully studied from all perspectives if we intend to confront and reduce its levels and degrees. Alshafay (2023) pointed out that investigating gender differences is a crucial research and scientific issue to understand all the stimuli and variables surrounding the essence of the study problem.

Table (6) presents the values of the one-way analysis of variance to detect statistically significant differences between the literary and scientific majors among university students on the cyber fraudulent trolling scale. From these values, we can infer that there are no statistically significant differences between the average scores of literary and scientific majors in cyber fraudulent trolling.

This result can be explained by the fact that the academic courses taught to students in both literary and scientific majors follow specific educational and ethical principles. These principles are carefully planned and systematically implemented by the university administration, discouraging students from hatred, aggression, selfishness, and narcissism. Such measures aim to strengthen various aspects of motivation and attitudes related to cyberbullying in general and cyber fraudulent trolling specifically among students.

Here, we have a general insight that both literary and scientific majors show no significant differences in supporting and encouraging cyber fraudulent trolling among university students. Both majors follow similar paths in reinforcing ethical values and social standards. Therefore, university majors do not seem to have a direct relationship with cyber fraudulent trolling tendencies among students.

The results align with previous studies such as Ashewely (2018) and Mostapha et al. (2019), which found no significant differences between literary and scientific majors in cyber fraudulent trolling. Conversely, other studies, like Alsayeh (2019), Alhoumaidy et al. (2021), and Shbky & Alshawashra (2021), suggested significant differences favouring literary majors. The discrepancy in findings might stem from variations in motivations for cyber fraudulent trolling, individual characteristics, and cultural differences.

Moreover, the interaction between gender and major does not significantly impact cyber fraudulent trolling scores among university students. The results indicate that the combination

of gender (male and female) and academic major (literary or scientific) does not contribute to the reinforcement of negative attitudes, inclinations, and motivations, such as hatred, resentment, and aggression among students.

In conclusion, the study accepts the fifth hypothesis, as the results align with the content of this hypothesis, indicating no significant impact of gender and major interaction on cyber fraudulent trolling tendencies among university students.

Conclusions

Based on the results of the current study, the dark tetrad personality traits - sadism, Machiavellianism, psychopathy, and narcissism - mediate the relationship between the six major personality factors on one hand and cyber fraudulent trolling victimization among university students of both genders on the other. However, the present study was unable to overcome the problem of a male sample shortage compared to the female sample due to the demographic distribution of students in the College of Education, where there is a significant majority of females and limited males. The current researcher advises caution in generalizing the results of this study to include university students of both genders. Additionally, the variable of religion (Muslim or Christian) was not considered due to the difficulty of isolating this variable in the current study. Therefore, it is essential to consider it in subsequent studies, as research indicates that religiosity and its orientation, as well as ethical considerations, play an influential role in adopting or avoiding Cyber fraudulent trolling behaviours, regardless of their form or domain.

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