# Investigating the Relationships Between Excessive Instagram Usage, Perceived Ostracism, and Personality Traits

Aşırı İnstagram Kullanımı, Algılanan Psikolojik Dışlanma ve Kişilik Özellikleri Arasındaki İlişkilerin İncelenmesi

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#### Abstract

Instagram is a widely favored platform among social media users and its utilization is gaining increasing prevalence. Globally, Türkiye ranks fifth in terms of Instagram usage. The extensive and regular use of Instagram entails various issues associated with the excessive usage of the platform. Hence, it is crucial to ascertain the factors that may influence excessive Instagram usage. The current study aimed to investigate the correlations between personality traits, perceived ostracism, and excessive Instagram usage. The research sample comprised a total of 379 university students. Data were collected using the Instagram Addiction Scale, Ostracism Scale, and Basic Personality Traits Inventory and the data was compared with the existing literature. Our findings indicate a negative correlation between excessive Instagram usage and the personality traits of extraversion, conscientiousness, agreeableness, and openness to experience. Additionally, there was a positive correlation between excessive Instagram use and the personality traits of neuroticism, negative valence, and perceived ostracism. Hierarchical regression analysis revealed that gender, conscientiousness, neuroticism, and perceived ostracism were significant predictors of excessive Instagram use. Moreover, a notable difference was observed in Instagram usage, conscientiousness, openness to experience, and negative valence scores based on gender. The current study contributes to the field by investigating the connections between Instagram usage, personality factors, and perceived ostracism in a sample from Türkiye.

**Keywords:** Instagram, Instagram Usage, Ostracism, Personality, Exclusion.

#### Öz

Sosyal medya hesapları arasında popüler olan Instagram'ın kullanımı giderek yaygınlaşmaktadır. İstatistikler de Türkiye'nin Instagram kullanımında dünyada beşinci sırada olduğunu göstermektedir. Ancak Instagramın bu kadar yaygın olarak ve sıklıkla kullanılması beraberinde Instagramın aşırı kullanımı ile ilgili sorunları da getirmektedir. Bu yüzden aşırı İnstagram kullanımının altında yatan nedenlere dair ya da İnstagram kullanımını etkileme olasılığı olan değişkenlerin tespit edilmesi önemlidir. Bu çalışmanın amacı da kişilik özellikleri, algılanan psikolojik dışlanma ve aşırı İnstagram kullanımı arasındaki ilişkilerin incelenmesidir. Bu araştırmanın örneklemi toplamda 379 üniversite öğrencisinden oluşmaktadır. Veri toplama amacıyla Instagram Bağımlılığı Ölçeği, Dışlanma Ölçeği, Temel Kişilik Özellikleri Envanteri kullanılmıştır. Sonuçlar aşırı İnstagram kullanımının dışadönüklük, sorumluluk, uyumluluk ve deneyime açık olma boyutları ile negatif yönlü, nevrotiklik, olumsuz değerlik ve algılanan psikolojik dışlanma ile ise pozitif yönlü anlamlı ilişkili olduğunu göstermiştir. Yapılan hiyerarşik regresyon analizi sonucunda cinsiyet, sorumluluk, nevrotiklik ve algılanan psikolojik dışlanmanın aşırı İnstagram kullanımını yordadığı bulunmuştur. Ayrıca İnstagram kullanımı, sorumluluk, deneyime açıklık ve olumsuz değerlik puanlarında cinsiyete göre anlamlı farklılık bulunmuştur. Bu çalışma, İnstagram kullanımı kişilik özellikleri ve algılanan psikolojik dışlanma arasındaki ilişkileri Türkiye örnekleminde inceleyerek alana katkı sağlamaktadır.

Anahtar Kelimeler: Instagram, Instagram Kullanımı, Psikolojik Dıslanma, Kisilik, Dıslanma.

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# Investigating the Relationships Between Excessive Instagram Usage, Perceived Ostracism, and Personality Traits

The utilization of the Internet and social media is currently very extensive and widespread. Instagram is a widely used media platform with global popularity that serves as both a social media tool and a space for individuals to engage in activities such as self-promotion (Moon et al., 2016; Sheldon et al., 2017), information sharing (Alhabash & Ma, 2017), and social comparison (Jiang & Ngien, 2020; Kavaklı & Ünal, 2021). However, despite its benefits, concerns have been raised about excessive Instagram usage and the associated problems. According to February 2024 data from Statista Türkiye ranks fifth in the world for Instagram usage, with 57.1 million users. India (362.9 million users), the USA (169.65 million users), Brazil (134.6 million users), and Indonesia (100.9 million users) were the countries that ranked ahead of Türkiye (Statista, 2024a). Additionally, the number of Instagram users worldwide in 2023 was 1.35 billion. This number is expected to reach 1.4 billion in 2024 and 1.44 billion in 2025 (Statista, 2024b). Taking into account the ratio of Instagram users to the population of different countries Instagram usage in Türkiye can be considered to be quite common. This makes it important to identify possible variables that may motivate or affect Instagram use.

Excessive Instagram use raises serious concerns regarding its influence on individuals' psychological and emotional well-being. According to the literature, excessive social media use can lead to increased stress (Brailovskaia et al., 2021; Wolfers & Utz, 2022), anxiety (Lopes et al., 2022; O'Day & Heimberg, 2021), and depression (Lin et al., 2016; Shensa et al., 2018), as well as decreased life satisfaction (Marttila et al., 2021) and self-esteem (Hawi & Samaha, 2017; Miljeteig & von Soest, 2022). Furthermore, the pervasive nature of social comparison enabled by platforms such as Instagram has been linked to worsening feelings of inadequacy and the perpetuation of false standards of beauty and success (Ho et al., 2016; Kavaklı & Ünal, 2021; Lup et al., 2015; Tiggemann & Anderberg, 2020). Despite increased recognition of the potential risks related to excessive Instagram use, our understanding of the underlying variables driving this behavior is still limited. Addressing this gap in the evidence is critical in the establishment of effective interventions and methods to promote healthier social media habits while mitigating negative outcomes. Many scholars are quite interested in the phenomena of excessive Internet usage and the underlying reasons of such behavior. The growing online popularity has made theoretical models more necessary to define the idea of problematic Internet usage. In this regard, certain theoretical models developed in the literature have been found to help to explain excessive online behavior. Among these models suggested by Brand et al. (2016), the Interaction of Person-Affect-Cognition-Execution (I-PACE) model stands among the most important. The I-PACE model was developed specifically to explain problematic Internet usage (Brand et al., 2016). Prior to the I-PACE model, Brand et al. (2014) proposed three alternative explanations for Internet addiction: functional Internet use, general Internet addiction, and specific Internet addiction. The I-PACE model is based on these models. In these models, it was suggested that the individual's goals and needs affect their core person's characteristics, which in turn direct cognitive processes and therefore Internet use. However, in both general and specific Internet addiction theories, it has been suggested that psychopathology, individual predispositions, personality traits, loneliness, and perceived social support all play a crucial role, particularly in problematic Internet use. Later, Brand et al. (2016) defined the I-PACE model, arguing that it shares similarities with existing theoretical frameworks for Internet use. The I-PACE model examines excessive Internet use in terms of the dynamic interaction of person characteristics, emotional states, cognitive processes, and executive functions. According to this concept, a variety of factors influence people's basic personal characteristics and Internet usage habits. These include biological characteristics, psychological traits, social cognitions (loneliness, perceived social support), psychopathology, and unique motivations for using the Internet.

Brand and colleagues (2019) modified the I-PACE model and classified the addiction process into early and later stages. Individuals utilize the Internet for reward seeking and escape motivation in the early stages, but as they progress, their use becomes more compulsive, automated, and uncontrollable. Personality traits, psychopathology, genetic and neurobiological predispositions are all effective factors in the early and later stages of Internet use. Furthermore, external and internal triggers, reward seeking, and escape motivation on the Internet are the main factors that drive first-time use. Individuals' emotional and cognitive reactions to Internet use strengthen, decision-making processes become more impulsive, and compulsive use patterns emerge. At this point, the individual's inhibition control is weakened, making it more difficult to limit Internet use and raising the likelihood of addiction (Brand et al., 2019). The I-PACE model can also explain different types of behavioral addictions associated with Internet use in a wide sense. One example could be excessive use of social media. The I-PACE model also offers a useful framework for explaining excessive social media use. Indeed, several research studies within the scope of this model have investigated issues such as game addiction (Kim et al., 2021; Li et al., 2024), problematic smartphone use (Mehmood et al., 2021; Zhou et al., 2024), and pornography addiction (Hatch et al., 2022; Kumalaratih & Margono, 2023). However, it is clear that studies particularly addressing excessive Instagram use within the framework of the I-PACE model are limited. In recent years, excessive social media use has emerged as a key research topic within the context of problematic Internet use. Individuals can use social media platforms to develop social connections, express themselves, and gain access to information more easily. However, excessive and uncontrolled social media use can have a harmful impact on people. Excessive Instagram use can similarly be addressed using the I-PACE model in a similar way. Personality traits, psychological aspects, internal and external triggers, and cognitive processes described in the model can all help to explain how and why people use Instagram excessively. For example, as stated in the model, personality influences the development of excessive Internet or social media use (Brand et al., 2019; Brandtner et al., 2021). One of the model's probable external triggers might be ostracism. Perceived ostracism can also cause these individuals to spend more time on social media, including excessive Instagram use. Individuals who sense ostracism may consider social media as an escape (Knausenberger & Echterhoff, 2018; Seidman, 2013). As a result, in this study, the associations between personality traits, perceived ostracism, and excessive Instagram use were explored.

Personality is characterized by qualities that influence how people think, act, and feel; these features are considered to be permanent (Caspi & Shiner, 2006). Researchers attempting to understand personality have proposed several models; however, the Five-Factor Model of personality, introduced by Costa and McCrae (1992), is widely accepted as the primary framework for understanding the structure of personality in recent studies (McCrae & Costa, 1997). According to this model, personality is composed of five distinct dimensions: extraversion, conscientiousness, openness to experience, agreeableness, and neuroticism. In addition to the dimensions outlined in the Big Five model, a new dimension called "negative valence" emerged during the creation of the Turkish version of the scale. This dimension specifically pertains to an individual's negative self-perceptions or self-attributions about themselves (Gençöz & Öncül, 2012).

Studies suggest that the personality of an individual may be related to their Internet and social media usage behaviors (Calaresi et al., 2024; Hasani et al., 2024). Furthermore, as previously indicated, the I-PACE model identifies personality as one of the most critical characteristics influencing Internet and, by extension, social media usage (Brand et al., 2019). For example, a study examining the relationship between personality and social media use reported that extraversion, openness to experience, and

neuroticism were positively related to social media use (Correa et al., 2010). In a study conducted by Nikel et al., (2024), Internet addiction was found to be negatively associated with extraversion, consciousness, and agreeableness, but positively associated with neuroticism. Another study from Indonesia where Instagram is also very widely used reported that, extraversion, agreeableness, and neuroticism were positively related, whereas openness to experience was negatively related to social media addiction (Sumaryanti et al., 2020). Hawi and Samaha (2019) reported that openness to experiences, neuroticism, conscientiousness, agreeableness, and self-esteem were predictors of both Internet addiction and social media addiction as well. A meta-analysis on the relationship between personality and social media addiction showed that neuroticism was a risk factor for social media addiction, while agreeableness and conscientiousness could function as protective factors (Huang, 2022). Another study reported that social media addiction was positively related to agreeableness, conscientiousness, and openness to experience, but no significant relationship with neuroticism and extraversion was detected (Mercan & Uysal, 2023). Berdida (2025) asserted that agreeableness and openness to experience positively influenced high-risk social media addiction, whereas conscientiousness exerted a negative effect. Another study indicated that neuroticism had a positive correlation with social media addiction while demonstrating a negative correlation with the personality traits of extraversion, agreeableness, and conscientiousness (Isbulan et al., 2024). Research on the correlation between personality and social media usage seems inconsistent, making it difficult to arrive at a definitive conclusion. The broad nature of social media usage may be one contributing factor to this issue. Various types of social media might show different correlations with components of personality. Consequently, it is believed that investigating the correlations between personality traits and the excessive use of various social media platforms, such as Instagram, will improve the relevant literature.

However, research investigating the correlation between personality traits and Instagram use are relatively scarce. Some studies have inferred personality traits based on the photographs that individuals share on Instagram (Cooper et al., 2020; Harris & Bardey, 2019; Ferwerda & Tkalcic, 2018; Osterholz et al., 2023; Skowron et al., 2016). One study suggested that that agreeableness and conscientiousness were negatively associated with Instagram addiction, while neuroticism was positively associated (Kircaburun & Griffiths, 2018). Similarly, Sharifi Fard et al. (2025) discovered a positive correlation between neuroticism and problematic Instagram use, whereas conscientiousness, openness to experience, agreeableness, and extraversion showed negative correlations. Another study on the association between personality traits and attitudes toward Instagram discovered a positive relationship between extraversion and total number of Instagram posts and social media addiction tendency. There was also a positive correlation between Instagram attitude and addictive tendencies and neuroticism. There was a negative correlation discovered between conscientiousness and Instagram posts, number of accounts followed, and addictive tendencies. There was no significant association identified between openness to experience, agreeableness, and Instagram usage (Moore & Craciun, 2021). Santos et al. (2023) discovered a positive significant association between Instagram use and neuroticism, but a negative significant relationship with conscientiousness. Hussain et al. (2023) found a positive association between problematic Instagram use and neuroticism, but a negative relationship with extraversion, agreeableness, conscientiousness, and openness to experience. Another study discovered a positive significant association between problematic Instagram use and neuroticism, a negative significant relationship between agreeableness and conscientiousness, and no significant relationship with extraversion (Marengo et al., 2024). However, another study failed to establish a correlation between personality characteristics and addictions to Instagram, Facebook, or Snapchat. The same study reported that only extraversion and conscientiousness were significantly associated with Snapchat and Facebook addiction (Sheldon et al., 2021). Studies that examine the direct relationship between Instagram usage and personality traits are relatively rare; moreover the existing findings seems

inconsistent. Therefore, one of the goals of the current study was to determine the presence of a link between personality traits and excessive Instagram usage.

One of the variables that is thought to affect Instagram usage is ostracism. Furthermore, perceived ostracism, such as loneliness and perceived social support, might be considered external triggers in the context of the I-PACE model. Ostracism is a distressing experience that is characterized by being ignored and excluded (Williams, 2007, 2009). particularly from social gatherings, or isolation without explicit notification (Reinhard et al., 2020). The temporal need-threat model posits that such circumstances compromise basic psychological needs, including self-esteem, need to belong, meaningful existence, and control (Williams, 2009). Because ostracism threatens the psychological needs listed above, individuals may seek to satisfy those needs in some way. Individuals who have experienced ostracism may use the Internet for a variety of reasons. One of these is that people who have experienced ostracism may use social media to satisfy their threatening needs (Deters & Mehl, 2013; Knausenberger & Echterhoff, 2018; Seidman, 2013; Sheldon et al., 2011). People who experience ostracism use a variety of strategies to alleviate need threats and meet their endangered psychological needs, such as self-esteem, belonging, control, and meaningful existence. The Internet and social media may help individuals cope with the negative effects of ostracism. Individuals may isolate themselves and withdraw from their social surroundings if they experience ostracism. In such circumstances, the virtual world may be a viable option for meeting the needs threatened by ostracism. Indeed, research indicates that ostracism is associated with increased use of social media and the Internet usage. Joining new groups and meeting new individuals online appears to be less costly and easier than in person. As a result, it appears to be an ideal setting for satisfying psychological needs and recovering a sense of belonging. Indeed, research have shown that social media and the Internet can help mitigate the detrimental impacts of ostracism (Knausenberger & Echterhoff, 2018; Knausenberger et al., 2015). Seidman (2013) also proposed in her study that Facebook users might meet their need to belong by communicating with others.

Although there is a possibility of being exposed to ostracism on social media (Smith et al., 2017), the Internet and social media can also be used to cope with ostracism encountered in real life (Kavaklı, 2018; Kavaklı & Aydın, 2024). For instance, studies suggest that ostracism is positively related to social media addiction or Internet use (Coskun et al., 2024; Kavaklı & Aydın, 2024; Poon, 2018; Turan et al., 2024). According to Taş (2023), ostracism positively influences social media addiction. Another study reported that ostracism is positively significantly related to social media addiction (Kaya & Cenkseven-Önder, 2025). Zhang et al. (2024) stated that social exclusion is positively related to short video addiction. Yue et al. (2023) revealed that social exclusion and social media addiction are positively associated. Lim (2019) also reported that social exclusion is positively associated with Facebook addiction. Social anxiety may explain why people who have experienced ostracism turn to social media and the Internet (Lim, 2019). According to Shi et al. (2025), ostracism can intensify social anxiety and create a sense of need-related threat. Social media appears to have the potential to alleviate social anxiety and promote relaxation (Angelini & Gini, 2024; Huang et al., 2024). In fact, Wu et al. (2024) discovered in their systematic review study that social anxiety is positively associated with problematic social media use. However, the number of studies specifically on the relationship between ostracism and Instagram use is quite limited (Lee et al., 2022). One of the aims of the current study was to examine the relationship between perceived ostracism and Instagram usage.

## **Present Study**

Excessive social media use, particularly on Instagram, has emerged as a significant behavioral phenomenon associated with individuals' psychological well-being and personality features (Mackson et al., 2019; Perugini & Solano, 2021). The incorporation of social media platforms into daily life is very widespread, and Instagram in particular gaining immense popularity among college students. Social media sites, especially Instagram, have become essential for modern social interactions, influencing many aspects of the lives of its users'. Understanding the factors that influence Instagram usage can provide significant insights into the platform's psychological and social effects. Given the considerable number of users that Instagram has amassed, particularly in countries such as Türkiye, it is imperative to understand the elements contributing to its widespread adoption.

The purpose of this study is to investigate how personality and perceived ostracism predict excessive Instagram use. The I-PACE Model, established by Brand et al. (2016, 2019), serves as the theoretical basis for this study. According to this model, problematic technology use is influenced by the interaction of personality factors and emotional-cognitive processes. In this context, the purpose of this study is to investigate the association between perceived ostracism, personality factors, and excessive Instagram use, as well as to assess how these variables predict excessive Instagram use using hierarchical regression analysis. According to the I-PACE model, personality is one of the most essential aspects influencing a person's core characteristics. Personality traits are also seen as determining factors in problematic social media use (Kırcaburun et al., 2020). According to the Five-Factor Personality Model (McCrae & Costa, 1997), neuroticism might cause people to exhibit excessive emotional reactivity and utilize social media to cope with stress (Gugushvili et al., 2024). On the other hand, extraversion is expected to encourage Instagram use by increasing social interaction motivation, while conscientiousness is expected to help individuals better regulate their social media use (Bowden-Green et al., 2020).

Furthermore, perceived ostracism, such as loneliness and perceived social support, might be considered external triggers in the context of the I-PACE model. Ostracism is a stressful feeling that involves being ignored and excluded (Williams, 2007, 2009). Perceived ostracism refers to individuals' perception of being socially rejected or ignored (Williams, 2007). Previous research suggests that individuals experiencing ostracism may try to establish social ties by using social media platforms more (Kavaklı & Aydın, 2024; Knausenberger & Echterhoff, 2018; Seidman, 2013). According to the Need-Threat Model (Williams, 2009), people who perceive a high level of ostracism see a danger to their basic psychological needs. It appears reasonable to utilize social media to avoid the need threat and unpleasant emotions associated with ostracism, or to satisfy basic psychological needs. Furthermore, according to the I-PACE Model, psychosocial stressors like ostracism can act as emotional regulation by increasing people's social media use (Brand et al., 2016, 2019).

Previous research has produced conflicting results, necessitating a more thorough investigation into whether personality traits such as extraversion, conscientiousness, openness to experience, agreeableness, neuroticism, and negative valence have a significant impact on an individual's tendencies for excessive Instagram use. Beyond analyzing individual features, the primary goal of this study is to look into potential links between perceived ostracism and personality traits associated with excessive Instagram use. The purpose of this study is to gain a better understanding of the individual and psychological aspects related with excessive Instagram use, as well as to contribute to digital media psychology.

RQ1: Do age, gender, basic personality traits, and perceived ostracism significantly predict excessive Instagram usage?

Furthermore, demographic variables such as age and gender might be considered to influence a person's core characteristics within the context of the I-PACE model. For example, one study found that increased social media use by young people aged 18 to 29 was related to better mental health, whereas the converse was true for participants aged 30 and up (Hardy & Castonguay, 2018). Another study conducted with the neurosurgical community found a similar difference in social media use between the 25-34 age group and the 55-plus age group. According to Udawatta et al. (2019), young people benefit more from using social media than elderly people. However, it is possible to conclude that there are some inconsistent results relating to age and social media. One study found that being young and female was associated with addictive social media use (Andreassen et al., 2017). Some studies on older people have also found that social media use is negatively related to loneliness (Bryne et al., 2021) and positively correlated with life satisfaction (Gaia et al., 2021; Sala et al., 2023). The studies in question focused on Facebook. Instagram's structure may explain why it is more popular among young people. There are also researches that show gender differences in social media use (Karatsoli & Nathanail, 2020; Wei et al., 2024). For example, in research on adolescents, there was no gender difference in the use of Facebook, Instagram, X, and Snapchat, but females reported using TikTok more than males (Manago et al., 2023). Given these findings, it is reasonable to conclude that demographic variables such as gender and age can also influence social media use. As a result, in this study, both age and gender data were used as control variables in the first step of the regression model.

The hierarchical regression analysis revealed a statistically significant association between gender and Instagram usage in this study. As a result, the study's scope included an evaluation of gender-based Instagram usage differences. Furthermore, recent research has demonstrated that personality traits (Hartas, 2024; Krems et al., 2024; Marengo et al., 2024) and perceived ostracism (Saito et al., 2012; Simpson et al., 2024; Webster et al., 2024; Zimmerman et al., 2016) may differ by gender. In line with these findings, we investigated whether personality traits and perceived ostracism differed by gender.

RQ2: Are there gender differences in Instagram usage, perceived ostracism, and basic personality traits?

# Method

A cross-sectional study was conducted with university students studying at a state university in Türkiye. In this study, 379 participants aged 18-40 years were included (M = 20.99, SD = 2.81). The participants included 77 males (20.3%) and 302 females (79.7%), who were selected using the convenience sampling method. An informed consent form stating the details of the research was provided to all participants, and only those participants who volunteered for the study, approved the form and consented to participate were included in the study sample.

## **Measures**

# Demographic Information Form

The ages and genders of the participants were gathered using a standard demographics questionnaire.

# **Instagram Addiction Scale**

The Instagram Addiction Scale was developed by D'Souza and colleagues (2018) in order to measure excessive Instagram usage. This scale was adapted to the Turkish by Kavaklı and İnan (2021). The

Instagram Addiction Scale is a 5-point Likert type scale ranging from *never* (1) to *all the time* (5); the Turkish version of the scale consists of 21 items. The scale has five-factor structure, which include lack of control, disengagement, escapism, health and interpersonal troubles, and obsession; additionally, the total score is also calculated. The total excessive Instagram usage score was used in the current study. The Cronbach Alpha and McDonald Omega reliability coefficients were both found to be .94 for the total score. Sample items for the Instagram Addiction Scale include: "I often upload photos or videos on Instagram" and "I use Instagram when I am stressed".

# Ostracism Experience Scale

The Ostracism Experience Scale was developed by Gilman et al. (2013), and adapted to the Turkish by Sertelin-Mercan (2016). The Ostracism Experience Scale is a 5-point Likert type scale ranging from *never* (1) to *always* (5). The scale has two factor structure, namely ignored and exclusion. The current study made no differentiation between the subtypes, and ostracism was treated as a single construct. Additionally, the Ostracism Experience Scale was originally developed for use with adolescents. However, Kavaklı (2018) stated that the psychometric properties of the scale were suitable in a university student sample and could be used with this group as well. In the current study, the Cronbach Alpha coefficient values of the scale was found to be .85. The McDonald Omega reliability coefficient values of the scale was found to be .83. Sample items for the Ostracism Experience Scale are: "In general, others treat me as if I am invisible" and "In general, others include me in their plans for the holidays".

# Basic Personality Traits Inventory

The Basic Personality Traits Inventory was developed by Gençöz and Öncül (2012). The scale is a 5-point Likert type scale ranging from *not suitable at all* (1) to *very suitable* (5) and the inventory consists of 45 items. The inventory has a six-factor structure, namely extraversion, conscientiousness, agreeableness, neuroticism, openness to experience, and negative valence. The Cronbach Alpha reliability coefficients of the scale were calculated as .83 for extraversion, .81 for conscientiousness, .86 for agreeableness, .79 for neuroticism, .82 for openness to experience, and .66 for negative valence, respectively. The McDonald Omega reliability coefficients of the scale were calculated as .84 for extraversion, .82 for conscientiousness, .86 for agreeableness, .78 for neuroticism, .83 for openness to experience, and .66 for negative valence, respectively. Sample items for The Basic Personality Traits Inventory are: "passive", "shy", and "disciplined".

## **Procedure**

Ethical approval was obtained from a state university's ethics committee before collecting data (Approval Date: 19/01/2024, Approval Number: 2024/62). The questionnaire booklet was prepared with consideration for order effects. The data was collected online using Google Forms. Prior to recruitment, all participants received an informed consent form outlining the key points of the study and were assured that participation was entirely voluntary. Individuals who confirmed their voluntary participation completed the questionnaire. JASP, an open-source statistical program, was used to analyze the data. Pearson correlation analysis was used to examine the relationships between the variables. The effect of perceived ostracism and personality on excessive Instagram usage was determined using hierarchical multiple regression analysis. Gender differences were examined using an independent samples t-test.

#### Results

The statistical analysis of the data collected in the current study is presented here. To test the assumption of normal distribution, the skewness and kurtosis coefficients of all variables in the study were calculated prior to analysis. All skewness and kurtosis values were within the  $\pm 2$  range (George & Mallery, 2016), indicating that the data met the assumption of normal distribution (Table 1).

Pearson correlation analyses were carried out to determine the relationship between excessive Instagram usage, personality, and perceived ostracism. Excessive Instagram usage was negatively related with extraversion (r = -.22, p < .001), conscientiousness (r = -.25, p < .001), agreeableness (r = -.11, p < .05), and openness to experience (r = -.14, p < .01). Excessive Instagram usage was positively related with neuroticism (r = .35, p < .001), negative valence (r = .22, p < .001), and perceived ostracism (r = .31, p < .001). Perceived ostracism was negatively related with extraversion (r = -.38, p < .001), conscientiousness (r = -.13, p < .05), agreeableness (r = -.23, p < .001), and openness to experience (r = .25, p < .001). Perceived ostracism was positively related with neuroticism (r = .17, p < .001), and negative valence (r = .31, p < .001).

**Table 1**The Associations Among Excessive Instagram Usage, Perceived Ostracism, and Personality

	1	2	3	4	5	6	7	8	α	ω
INS	-								.94	.94
EX	22***	-							.83	.84
CON	25***	.29***	-						.81	.82
AGG	11*	.28***	.42***	-					.86	.86
NEU	.35***	33***	21***	23***	-				.79	.78
OE	14**	.52***	.51***	.42***	13*	-			.82	.83
NV	.22***	18***	21***	40***	.31***	12*	-		.66	.66
OST	.31***	38***	13*	23***	.17***	25***	.31***	-	.85	.83
M	50.05	27.23	28.47	33.63	25.60	18.42	9.73	23.87		
SD	17.11	6.50	5.71	4.92	6.58	3.93	3.38	6.85		
SK	.42	17	32	64	08	30	1.34	1.22		
KR	42	38	.06	10	35	48	2.16	1.17		

Note. INS: excessive Instagram usage total score, EX: extraversion, CON: conscientiousness, AGG: agreeableness, NEU: neuroticism, OE: openness to experience, NV: negative valence, OST: perceived ostracism, M: mean, SD: standard deviation, α: cronbach alpha coefficient, ω: McDonald's omega reliability coefficient SK: skewness, KR: kurtosis, \*p<.05, \*\*p<.01, \*\*\*p<.001

Prior to conducting a hierarchical multiple regression analysis, the relevant assumptions for the analyses were verified. Gender was converted into a dummy variable. First, Mahalanobis and Cook's distance was used to identify any multivariate outliers; however, none were discovered. Additionally, multicollinearity was assessed using Tolerance and Variance Inflation Factor (VIF) statistics, which

indicated that the assumptions were within an acceptable range. This indicated that multicollinearity was not an issue (Pallant, 2020). Scatter plots and residuals were also examined, confirming linearity, normality, and homoscedasticity. Subsequently, a three-stage hierarchical regression analysis was conducted utilizing a theoretical framework, with excessive Instagram usage serving as the dependent variable.

 Table 2

 Hierarchical Regression Analysis Results for Excessive Instagram Usage

Predictor	В	β	t	p	95% CI		$R^2$	$R^2$	<i>E</i> .	
					Lower	Upper	Κ	change	$F_{ m change}$	p
Step 1							.028		5.38	.005
Age	67	11	-2.14	.033	-1.28	054				
Gender	-5.13	12	-2.37	.018	-9.39	873				
Step 2							.197	.169	12.98	.000
Age	39	06	-1.36	.176	957	.176				
Gender	-5.31	12	-2.45	.015	-9.56	-1.05				
EX	23	09	-1.55	.122	533	.063				
CON	59	20	-3.48	.001	931	259				
AGG	.34	.10	1.70	.090	054	.733				
NEU	.63	.24	4.59	.000	.361	.904				
OE	.19	.04	0.66	.509	368	.741				
NV	.79	.16	2.83	.005	.244	1.35				
Step 3							.251	.054	26.63	.000
Age	41	07	-1.46	.144	955	.140				
Gender	-6.36	15	-3.02	.003	-10.49	-2.23				
EX	02	01	-0.12	.902	319	.281				
CON	66	22	-3.96	.000	982	330				
AGG	.37	.11	1.90	.058	013	.748				
NEU	.63	.24	4.75	.000	.371	.895				
OE	.31	.07	1.14	.256	227	.850				
NV	.49	.10	1.78	.076	051	1.04				
OST	1.23	.26	5.15	.000	.760	1.70				

*Note.* EX: extraversion, CON: conscientiousness, AGG: agreeableness, NEU: neuroticism, OE: openness to experience, NV: negative valence, OST: perceived ostracism, \*p<.05, \*\*p<.01, \*\*\*p<.001

Hierarchical multiple regression was used to assess the ability of personality and perceived ostracism to predict levels of excessive Instagram usage, after controlling for age and gender. Age and gender were entered at Step 1, and explained approximately 2.8% of the variance in excessive Instagram usage. After entry of the personality traits at Step 2, the total variance explained by the model as a whole was about 19.7% (F(8, 369) = 11.34, p<.001). Personality traits explained an additional 16.9% of the variance in excessive Instagram usage, after controlling for age and gender ( $R^2$ -thange = .169, F-thange = 12.98, p<.001). After entry of the perceived ostracism at Step 3, the total variance explained by the model as a whole was about 25.1% (F(9, 368) = 13.74, p<.001). Perceived ostracism explained an additional 5.4% of the variance in excessive Instagram usage ( $R^2$ -thange = .054, F-thange = 26.63, p<.001). In the final model, gender ( $\beta$  = -.15, t = -3.02, p < .01), conscientiousness ( $\beta$  = -.22, t = -3.96, p < .001) neuroticism ( $\beta$  = .24, t = 4.78, p < .001), and perceived ostracism ( $\beta$  = .26, t = 5.16, p < .001) could significantly predict excessive Instagram usage. Consideration of all variables in the study accounted for 25.1% of the variance in excessive Instagram usage (Table 2).

An independent samples t-test was conducted to determine the role of gender in excessive Instagram usage, personality traits and perceived ostracism (Table 3). Female participants showed significantly higher excessive Instagram usage (M = 51.14, SD = 17.16) compared to the male participants (M = 45.77, SD = 16.32). Extraversion (M = 28.67, SD = 6.16) was significantly higher among the male participants compared to the female participants (M = 26.88, SD = 6.55). Additionally, openness to experience was significantly higher among the male participants (M = 20.01, SD = 3.57) compared to the female participants (M = 18.02, SD = 3.92). Lastly, negative valence was significantly higher among the male participants (M = 11.43, SD = 4.20) compared to the female participants (M = 9.29, SD = 2.99).

 Table 3

 Independent Samples t-test Results

	Group	N	M	SD	t	р	d
INS	Female	302	51.14	17.16	2.48	.014	0.32
111/2	Male	77	45.77	16.32	2.40		
EX	Female	302	26.88	6.55	-2.20	.028	-0.28
EA	Male	77	28.67	6.16	-2.20	.028	
CON	Female	302	28.38	5.78	640	.523	-0.08
CON	Male	77	28.84	5.45	040	.525	
AGG	Female	302	33.80	4.74	1.36	.175	0.17
7100	Male	77	32.95	5.56	1.50	.175	
NEU	Female	302	25.92	6.55	1.89	.059	0.24
NEC	Male	77	24.34	6.59	1.07		
OE	Female	302	18.02	3.92	4.05	000	-0.52
OE	Male	77	20.01	3.57	-4.05	.000	
NV	Female	302	9.29	2.99	4.20	000	-0.65
	Male	77	11.43	4.20	-4.20	.000	
OST	Female	302	23.53	6.86	-1.99	.052	-0.25
	Male	77	25.23	6.69	-1.99	.032	

*Note.* EX: extraversion, CON: conscientiousness, AGG: agreeableness, NEU: neuroticism, OE: openness to experience, NV: negative valence, OST: perceived ostracism, M: mean, SD: standard deviation, d = Cohen's d \*p<.05, \*\*p<.01, \*\*\*p<.001

#### **Discussion**

The current study aimed to identify associations between personality traits, perceived ostracism, and excessive Instagram usage, as well as to determine whether a model based on age, gender, personality, and perceived ostracism could explain excessive Instagram usage in a Turkish sample. The associations among the previously stated variables were analyzed. Then, hierarchical regression analyses were conducted to determine whether gender, personality, and perceived ostracism predict excessive Instagram usage. The significant findings obtained in this study are presented in order.

The correlation analysis results showed that excessive Instagram use was negatively associated with the personality traits of extraversion, conscientiousness, agreeableness, and openness to experience while being positively associated with neuroticism and negative valence. The I-PACE Model, established by Brand et al. (2016, 2019), serves as the theoretical basis for this study. According to this model, problematic technology use is influenced by the interaction of personality factors and emotionalcognitive processes, and personality is one of the most essential aspects influencing a person's core characteristics. Moreover, perceived ostracism, such as loneliness and perceived social support, might be considered external triggers in the context of the I-PACE model. This study explored the correlation between excessive Instagram usage, personality traits, and perceived ostracism. While the literature indicates a negative correlation between excessive Instagram usage and the traits of conscientiousness, agreeableness, and openness to experience (Isbulan et al., 2024; Kircaburun & Griffiths, 2018; Nikel et al., 2024), some studies present contrary findings (Akhtar et al., 2024; Berdida, 2025). Multiple factors may contribute to the discrepancies observed in the results of various studies. One of these could be culture. The inconsistent or differing research results regarding Instagram or social media use and personality dimensions suggest that this relationship warrants further investigation. Cultural differences may affect the strength and direction of these relationships. For example, Kircaburun and Griffiths' (2018) study, conducted in Türkiye, yielded findings largely similar to ours. However, Sheldon and colleagues' (2021) study involved participants who identified as Caucasian, African American, Asian American, Hispanic, and Native American, and their results differed from ours. These examples indicate that inconsistencies and differences may be due to cultural factors or at least the frequency or level of use. Statistics show that Türkiye ranks fifth in the world with 57 million Instagram users (Statista, 2024a). Sheldon et al. (2021) also noted inconsistent results between personality traits and social media and Internet addiction. They suggest that these differences can be explained within the context of uses and gratification theory and that the motivations for using certain social media platforms may vary between individuals. Additionally, variables examined in relation to personality may include various social media platforms, such as Instagram, X, Snapchat, and Facebook. Distinct characteristics of the social media account under examination may account for variations in the results. Sheldon et al. (2021) found no relationship between personality and Instagram, Facebook, and Snapchat; however, extraversion and conscientiousness were significantly associated with addiction to Snapchat and Facebook. However, it seems reasonable that extraversion is negatively associated with excessive Instagram usage. Individuals exhibiting high levels of extraversion tend to engage more actively in both daily and professional contexts, often allocating greater time to social events and physical activities (Mesurado et al., 2014). In summary, rather than engaging with Instagram in a problematic manner, individuals appear to utilize social media in a more balanced style that does not interfere with their daily obligations and responsibilities.

Examples of agreeableness toward others include sympathy, courteousness, interpersonal adaptability, kindness, trust, and forgiveness (Costa & McCrae, 1992). Individuals exhibiting high levels of agreeableness are likely to favor face-to-face interactions over social media connections. Research

indicates a negative correlation between agreeableness and social media use (Kircaburun & Griffiths, 2018; Sharifi Fard et al., 2025). A similar assessment is applicable to the conscientiousness dimension. The cybernetic big five theory posits that conscientiousness primarily involves protecting long-term goals against short-term temptations. Conscientiousness refers to the tendency to stick to rules and prefer long-term objectives over immediate gratification (DeYoung, 2015). Individuals exhibiting high levels of conscientiousness are likely to engage in less excessive use of social media than those with lower levels of this trait (Bunz, 2021; Santos et al., 2023; Whaite et al., 2018). Research findings regarding the association between openness to experience, particularly neuroticism, and social media usage are notably consistent (Correa et al., 2010; Gugushvili et al., 2024; Montag & Markett, 2024). Studies indicate a negative correlation between social media use and openness to experience, whereas a positive correlation exists with neuroticism (Gil de Zúñiga et al., 2017). Individuals with high openness to experience are inclined to explore new ideas and express themselves meaningfully, suggesting a lower likelihood of excessive social media use, such as passive content consumption or repetitive interactions (Wartberg et al., 2023). A meta-analysis indicated that low openness correlates with problematic social media use (Meynadier et al., 2024). Research supports a positive relationship between neuroticism and excessive use of Instagram (Blackwell et al., 2017; Nikel et al., 2024). Moreover, neuroticism exhibits a positive correlation with pathological variables, including depression (Hou et al., 2024), anxiety, panic disorder (He et al., 2024), and stress (Yin et al., 2024). Individuals exhibiting psychopathological traits alongside elevated neuroticism may utilize social media to alleviate anxiety (Hussain et al., 2023; Sharifi Fard et al., 2025). Additionally, negative valence, which emerged as a dimension specific to Türkiye, was found to be positively related to Instagram use. This dimension specifically pertains to an individual's negative self-perceptions or self-attributions (Gençöz & Öncül, 2012). It is an expected result that negative valence, as in neuroticism, is positively correlated with excessive Instagram usage.

High levels of Instagram usage were positively correlated with perceived ostracism. In the context of the I-PACE model, perceived ostracism was identified as an external trigger in this study. Research indicates a positive correlation between perceived ostracism and excessive social media usage (Kavaklı & Aydın, 2024; Knausenberger & Echterhoff, 2018; Seidman, 2013). As with neuroticism, it can be anticipated that individuals experiencing high levels of perceived ostracism might turn to social media to address their impaired psychological needs.

Although Instagram use is associated with all personality traits in our study, the hierarchical regression analysis results indicate that only gender, conscientiousness, neuroticism, and perceived ostracism predict excessive Instagram use in the final step. Demographic variables such as age and gender might be considered to influence a person's core characteristics within the context of the I-PACE model. For example, there are research that show gender differences in social media use (Karatsoli & Nathanail, 2020; Wei et al., 2024). For instance, in research on adolescents, there was no gender difference in the use of Facebook, Instagram, X, and Snapchat, but females reported using TikTok more than males (Manago et al., 2023). One study found that increased social media use by young people aged 18 to 29 was related to better mental health, whereas the converse was true for participants aged 30 and up (Hardy and Castonguay, 2018). Given these findings, it is reasonable to conclude that demographic variables such as gender and age can also influence social media use. Therefore, the first step of the regression model in this study used both age and gender data as control variables. In the final step of the hierarchical regression analysis, gender predicted the excessive Instagram usage, but age did not predict it.

This study involved university students and individuals within a specific age range. Consequently, it appears that age is not a reliable predictor of Instagram usage. Gender was a predictor of Instagram usage. T-test analyses were conducted to examine the effects of gender on personality and perceived ostracism, specifically investigating potential gender differences. The results indicated that females exhibited statistically higher total scores of excessive Instagram usage compared to males. While there are varied findings regarding gender differences in social media and Internet usage (Alnjadat et al., 2019), a significant portion of the research indicates a gender difference (Dumford et al., 2023; Twenge & Martin, 2020). Many studies indicate that female participants' social media usage rates are higher than those of males, which supports our findings about gender differences. This finding is consistent with the literature. In conclusion, this study suggests that being female might be a risk factor for excessive use of Instagram. However, the difference in social media usage between genders may also be attributed to their differing purposes for using these platforms. For instance, Krasnova et al. (2017) found that males use social media primarily to obtain general information, while females use it to maintain close relationships and obtain social information. Additionally, our study results indicated that male's extraversion, openness to experience, and negative valence scores were higher than those of females. This finding differs from the literature. For example, Rahmani and Lawasani (2012) found that females had higher openness to experience scores. In our study, males had higher negative valence scores, a dimension related to neuroticism. However, another study conducted in Türkiye reported that females had higher levels of neuroticism (Kaya & Karahasanoğlu, 2019). A study involving participants from 55 countries indicated that, in contrast to our findings, males exhibited lower mean scores for neuroticism and extraversion compared to females (Schmitt et al., 2008). The study revealed varying results regarding openness to experience across different cultures. It was reported that males exhibited higher openness to experience scores than females across 37 countries; however, the statistically significant difference was observed in only 8 of these countries. Females exhibited higher openness to experience scores than males across 18 cultures, with significant differences observed in only 4 cultures. Schmitt et al. (2008) indicated that these findings were anticipated, noting that females exhibited greater openness to emotions, whereas males demonstrated more openness to new ideas, suggesting that these discrepancies may arise from this distinction. The self-report measurement tools for openness to experience were not designed to differentiate the relevant distinctions. The observed higher openness to experience scores in males compared to females in this study may be attributed to these differences. Nonetheless, it is challenging to make a comparable assertion regarding extraversion and negative valence. The unequal gender distribution among participants may account for the inconsistency of the results in this study concerning personality traits. Therefore, we must assess the relevant findings while acknowledging this limitation. To validate these varying outcomes, conducting replication studies and additional research with diverse samples may be essential.

The second predictor in hierarchical regression analysis is conscientiousness. Conscientiousness negatively predicts excessive Instagram usage, while neuroticism and perceived ostracism positively predict it. Conscientiousness primarily involves protecting long-term objectives against short-term temptations. Conscientiousness reflects the inclination to keep to regulations and prioritize long-term objectives over immediate gratification (DeYoung, 2015). Individuals exhibiting high levels of conscientiousness are likely to engage in less excessive use of social media than those with lower levels of conscientiousness (Bunz, 2021; Santos et al., 2023; Whaite et al., 2018). Moreover, individuals exhibiting high levels of conscientiousness tend to possess better time management and self-regulation skills (Bayer et al., 2016; Peters, 2009), potentially resulting in reduced time spent on social media. Andreassen et al. (2012) found a correlation between Facebook addiction and low conscientiousness. A separate study indicated a negative correlation between consciousness and the number of Instagram posts, accounts followed, and tendencies toward addiction (Moore & Craciun, 2021). The meta-analysis

by Meynadier et al. (2024) found a negative correlation between low conscientiousness and problematic social media use. Huang (2022) stated that high conscientiousness may serve as a protective factor against excessive social media use. The findings of the mentioned research support the results obtained in this study.

The third predictor in hierarchical regression analysis is neuroticism (emotional instability). Neuroticism positively predicts excessive Instagram usage. This study's findings are supported by previous research (Blackwell et al., 2017; Huang et al., 2023; Marengo et al., 2020; Montag et al., 2021). Research indicates a positive correlation between neuroticism and Instagram usage (Kircaburun & Griffiths, 2018; Santos et al., 2023; Sharifi Fard et al., 2025). Bowden-Green et al. (2021) indicated that individuals exhibiting high levels of neuroticism may possess more limited social networks, suggesting that social interaction via social media could serve as a significant motivator for its usage. Huang (2022) found in a meta-analysis study that high neuroticism serves as a risk factor for social media addiction. Meynadier et al. (2024) reported the inclusion of approximately 40 additional samples in the metaanalysis study when compared with Huang (2022). This study, like Huang (2022), identifies neuroticism as a risk factor for problematic social media use (Meynadier et al., 2024). Meynadier et al. (2024) found that neuroticism and conscientiousness accounted for nearly all (91%) of the total variance associated with problematic social media use as predicted by the five-factor personality traits. This result aligns with the findings of our study. Furthermore, people high in neuroticism exhibit characteristics such as vulnerability, anger, hostility, depression, and impulsivity. These individuals may tend to be more pessimistic, dissatisfied, insecure, and emotionally unstable (McCann, 2018; Paulus et al., 2016; Roelofs et al., 2008). Individuals with high neuroticism often have relatively smaller social networks and connections, leading them to use social media more frequently to make friends and establish new relationships (Bowden-Green et al., 2021).

Another last significant predictor of excessive Instagram usage in our hierarchical regression model is perceived ostracism. The I-PACE model identifies external factors contributing to the development of Internet and technology addictions, alongside personality traits. Examples include loneliness and perceived social support (Brand et al., 2019). Perceived ostracism, recognized for its association with variables like loneliness (Kavaklı, 2019) and social support (Teng & Chen, 2012), can be logically categorized as an external factor within the I-PACE model. According to Williams' (2009) need threat model, an experience of ostracism threatens basic psychological needs such as self-esteem, the need to belong, meaningful existence, and control. When self-esteem and the need to belong are threatened, individuals may tend to exhibit prosocial behaviors, such as trying to regain membership status in the group from which they were ostracized, making new friends, and joining new groups. When meaningful existence and the control needs are threatened, individuals may tend to exhibit antisocial behaviors such as aggression. It is relatively easier to make new friends and join new groups and also aggressiveness on social media compared to real life. Therefore, it seems reasonable to try to compensate for psychological needs damaged due to ostracism on social media (Kavaklı, 2018; Knausenberger & Echterhoff, 2018). Studies indicate that perceived ostracism may be associated with excessive Internet use (Coşkun et al., 2024; Kavaklı & Aydın, 2024; Turan et al., 2024). According to Taş (2023), ostracism positively influences social media addiction. Another study reported that ostracism is positively significantly related to social media addiction (Kaya & Cenkseven-Önder, 2025). Zhang et al. (2024) stated that social exclusion is positively related to short video addiction. Yue et al. (2023) revealed that social exclusion and social media addiction are positively associated. Lim (2019) also reported that social exclusion is positively associated with Facebook addiction. The results support the findings of this study. Furthermore, social anxiety may serve as a potential explanation for why individuals experiencing ostracism engage with social media and the Internet (Lim, 2019). Exposure to

ostracism can elevate social anxiety alongside the need threat (Shi et al., 2025). Social media may serve to alleviate heightened social anxiety and promote relaxation (Angelini & Gini, 2024; Huang et al., 2024). Wu et al. (2024) conducted a systematic review indicating a positive correlation between social anxiety and problematic social media usage. Consequently, it is reasonable for individuals facing ostracism to utilize social media as a means of alleviating the need threat and anxiety associated with perceived ostracism.

This study examined the relationships between internal triggers, such as personality, and external triggers, such as perceived ostracism, within the framework of the I-PACE model, in relation to excessive Instagram usage. The study concluded that conscientiousness, neuroticism, and perceived ostracism are predictors of excessive Instagram usage. Individuals exhibiting high levels of conscientiousness may demonstrate reduced tendencies toward excessive Instagram usage, attributable to their more structured and organized lifestyles. Individuals exhibiting high neuroticism traits and higher perceived ostracism levels are believed to utilize social media, particularly Instagram, to manage negative emotional states and anxiety. The results further support the basic assumptions of the I-PACE model. The I-PACE model suggests that individual traits, including personality and perceived ostracism, can influence cognitive emotional processes, potentially resulting in excessive use of Instagram. Individuals exhibiting high levels of neuroticism and perceived ostracism may be inclined to utilize social media platforms, such as Instagram, for emotional regulation. This research enhances the existing literature by clarifying the potential impacts of personality traits and social interaction processes, such as ostracism, on excessive Instagram usage within the framework of the I-PACE model.

Our findings concerning the potential impacts of individual differences, specifically personality and perceived ostracism, on online behaviors align with the predictions of the I-PACE model. Conscientiousness may play a significant role in regulating excessive social media use. Clinicians may design intervention programs based on the observation that individuals exhibiting high neuroticism and perceived ostracism are likely to engage in excessive social media use. Despite its contributions, this research has some limitations. One limitation is that the participants consisted only of university students, representing a specific age group. This sample limits the generalizability of the results to all Instagram users. Additionally, the study was conducted online, presenting challenges inherent to online studies. As a cross-sectional study, it cannot infer directionality or causation. Future studies could use more homogeneous samples to better understand the patterns of Instagram users in Türkiye. Another limitation is the unequal gender distribution of participants, which should be addressed in future research.

## **Compliance with Ethical Standards**

## **Ethical Approval**

Ethical approval for this study was received from Necmettin Erbakan University, Social and Human Sciences Ethics Committee (Approval Date: 19/01/2024, Approval Number: 2024/62).

# **Author Contributions**

Each part of the article prepared by M.K.

## **Declaration of Conflicting Interests**

There is no any conflict of interest.

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