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ORIGINAL PAPER

Moderating Role of Gender in the Relationship between Big Five Personality Traits and Smartphone Addiction

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Abstract
This study contributed to cyberpsychology literature by identifying moderating role of gender in the relationship between personality traits and smartphone addiction. A multi-group SEM analysis was employed to investigate the relationship between five factor personality traits (i.e. Big Five) and smartphone addiction among men and women. Big-Five-Inventory (BFI) and Smartphone Addiction Inventory (SPAI) were used to collect data from 320 undergraduate students. The results suggested a positively significant relationship between neuroticism (emotional imbalance) and smartphone addiction for women only. Whereas, conscientiousness was negatively related with smartphone addiction for women. Further, there was a negatively significant relationship between agreeableness and smartphone addiction for both genders. The findings suggested that gender has a moderating role in the relationship between neuroticism and smartphone addiction.

Keywords Big five · Gender differences · Personality · Smartphone addiction

Introduction

Although smartphone addiction is still in debate [1], it can be defined as maladaptive, excessive, or problematic use of smartphones that disturb individuals' social functions [2]. DSM-V reports that a behavioural addiction should involve withdrawal, compulsive behavior, tolerance, and functional impairment [3]. Thus, smartphone addiction can be defined as an emerging type of behavioral addiction characterized by withdrawal, compulsive behavior,

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tolerance, and functional impairment [4–7]. Accordingly, previous studies indicated that smartphone addiction negatively impacts individuals' physical and mental health, social behaviours, and academic performance [8–10].

Given the negative impacts on people's life, it is important to identify potential predictors of smartphone addiction. Personality traits have been argued as one of the most significant predictors of addictive behaviours [11–14]. For example, Kircaburun and Griffiths [15] focused on the correlation between personality characteristics and social media addiction. Their results suggested that agreeableness, conscientiousness, and self-liking were negatively associated with Instagram addiction, while there was a positive relationship between daily Internet usage and Instagram addiction. Błachnio et al. [16] investigated the relationship between personality characteristics and Internet addiction. They argued that extraversion, conscientiousness, and emotional stability were negatively correlated with the addiction. A similar study focused on the relationship between personality traits and Internet addiction [17]. Findings suggested a negative relationship between conscientiousness and agreeableness with the addiction.

Kuss et al. [18] explored the relationship between problematic Internet use and personality traits. Their results indicated that "a low level of agreeableness" and "a high level of neuroticism" were significantly related with problematic Internet use. In another study, Zhou et al. [19] investigated the relationship between personality characteristics and Internet addiction. The results indicated that neuroticism, extraversion, and openness to new experiences were positively related, whereas conscientiousness and agreeableness were negatively related with the addiction. Servidio [20] focused on the relationship between "Big Five personality traits" and Internet addiction. Results showed that agreeableness and extraversion were negatively related, but openness was positively related with Internet addiction. In another study, Müller et al. [21] investigated antecedents of problematic Internet use and found that "a low level of conscientiousness" and "a high level of neuroticism" significantly predicted the problematic Internet use.

The general consensus of the studies is that Internet addiction is (overall) positively correlated with neuroticism but negatively correlated with agreeableness, conscientiousness, and extraversion. Systematic reviews and meta-analyses results were in accordance with this consensus. Kayiş et al. [22] conducted a meta-analysis on antecedents of Internet addiction. Their findings indicated that neuroticism was positively correlated, however, openness to new experiences, extraversion, agreeableness, and conscientiousness were negatively correlated with the addiction. Likewise, Griffiths [23] conducted a systematic literature review on the relationship between personality traits and Internet addiction. Findings suggested positive correlations between neuroticism and extraversion with Internet addiction, but negative correlations were reported between openness and agreeableness with the addiction.

Recently, several studies have focused on the relationship between personality traits and mobile phone addiction. Roberts, Pullig, and Manolis [14] investigated the correlation between personality characteristics and mobile phone addiction. They found that introversion was negatively associated, while emotional instability (neuroticism) and materialism were positively associated with mobile phone addiction. In another study, Takao [24] examined the relationship between "Big Five personality traits" and problematic mobile phone use. Results showed that problematic mobile phone use was related to neuroticism, extraversion, and openness to new experience, whereas it was not related to agreeableness and conscientiousness. In another study, Pearson and Hussain [25] investigated the correlation between

psychological factors and smartphone addiction. Their results suggested that neuroticism and narcissism were positively correlated with smartphone addiction.

Lane and Manner [26] focused on the relationship between "Big Five personality traits" and smartphone use and ownership. Their results showed that extraverts were more likely to have a smartphone and they use texting function of the smartphones more than others. While, agreeable people use call function of the smartphones more than other functions. Another study examined the relationship between psychological traits and compulsive smartphone use [27]. Their results suggested that compulsive smartphone use was positively correlated to the psychological traits such as social interaction anxiety, locus of control, need for touch, and materialism. On the other hand, Panda and Jain [28] explored the relationship between personality characteristics and compulsive smartphone use. Their results suggested that extraversion and conscientiousness were positively correlated, whereas openness to new experiences, agreeableness, and neuroticism were negatively correlated with compulsive smartphone use. In all these studies except one [28], a consensus result is that smartphone addiction is positively correlated with neuroticism but negatively correlated with introversion.

Although significant correlations between personality traits and various behavioral addictions (e.g. Internet addiction, smartphone addiction etc.) have been identified by previous studies, none of the studies have focused on moderating role of gender in the relationship between personality traits and smartphone addiction. However, several studies emphasized critical role of individual differences, specifically gender, in human behaviour in the online environment [29, 30]. Accordingly, the following research question was investigated:

RQ: What is the role of gender in the relationship between "Big Five personality traits" and smartphone addiction?

Method

Sample and Procedure

A convenience sample of 320 undergraduate students were willingly participated from a governmental university located in Turkey. Of the participants, 34.2% were male and 65.8% were female (*Mean* age = 20.36 *SD* = 2.35). Most of the participants were freshmen students (44.8%) majoring in different departments. All procedures were complied with ethical standards of the IRB of the affiliated university and informed-consent forms were obtained from each participants before the online questionnaire containing the 44-item BFI, 26-item SPAI, and demographic variables was administered in their IT classes.

Instruments

Big Five Inventory Scale (BFI) The study used a 44-item five-point scale (1: "strongly disagree"; 5: "strongly agree") developed by Benet & Martinez [31]and adapted into Turkish by [32]. The scale has five dimensions including "openness," "agreeableness," "conscientiousness," "extraversion," and "neuroticism." Reliability coefficients of the subscales ranged from .70 to .77. Sample items included "I see myself as someone who is depressed, blue," "I see myself as someone who is outgoing, sociable," and "I see myself as someone who gets nervous easily."

Smartphone Addiction Inventory (SPAI) The study used a 26-item four-point scale (1: "very much unfit"; 4: "very much fit") developed by [2] and adapted into Turkish by [4]. The scale has four subscales including "compulsive behavior," "functional impairment," "withdrawal," and "tolerance." Reliability coefficients of the subscales ranged from .70 to .84. Sample items included "I feel restless and irritable when the smartphone is unavailable," "I feel very vigorous upon smartphone use regardless of the fatigues experienced," and "I use smartphone for a longer period of time and spend more money than I had intended."

Results

Factorability, Reliability, and Normality

Kaiser-Meyer-Olkin sampling adequacy measures ranged from .66 to .87 along with the Bartlett's test results ($p < .001$) indicated that a factor analysis was appropriate for the data. Further, all subscales were normally distributed and showed minimal kurtosis and skewness. Table 1 shows results of the factorability, reliability, and normality test.

Instrument Validity

Confirmatory-Factor-Analysis (CFA) by using SPSS AMOS (ver. 23) was employed to assess construct validity of structural model and measurement models at item-level. "Maximum likelihood estimation" procedures were employed to test fit of the measurement models and structural model. Results provided in Table 2 suggested an adequate support for the measurement and structural validity [33, 34].

Multi-Group Analysis Results

A multi-group Structural-Equation-Modelling (SEM) analysis by using SPSS AMOS (ver. 23) was conducted to investigate gender differences in the relationship between "Big Five personality traits" and smartphone addiction. The results indicated that there was a positively significant relationship between neuroticism (emotional imbalance) and smartphone addiction ($\beta = .18$; $t = 1.98$; $p < .05$) for women. Whereas, agreeableness ($\beta = -.18$; $t = -2.05$; $p < .05$)

Table 1 Factorability, skewness, kurtosis, and reliability coefficients

Scale	Subscales	KMO	Chi-Square	Sig.	Skewness(SE = .136)	Kurtosis(SE = .272)	α
BFI	Extraversion	.762	611.91	*	−.086	.125	.70
	Agreeableness	.707	326.74	*	.074	−.103	.72
	Conscientiousness	.775	505.78	*	−.187	−.065	.71
	Neuroticism	.657	293.99	*	.153	.327	.72
	Openness	.816	569.50	*	−.078	.091	.77
SPAI	Tolerance	.675	131.96	*	−.198	−.190	.70
	Withdrawal	.797	411.53	*	−.37	−.371	.76
	Compulsive Behavior	.866	888.46	*	.112	−.049	.84
	Functional Impairment	.840	527.03	*	.095	−.398	.80

* $p < .001$

Table 2 Model fit indices

Fit Indices	Measurement Models		Structural Model ($n = 320$)	Reference Value(s)
	BFI	SPAI		
χ^2	241.29	388.78	360.30	
p value	< .001	< .001	< .001	
χ^2/df	1.64	2.00	1.85	< 3
GFI	.93	.90	.91	≥ .90
AGFI	.90	.87	.88	≥ .80
NFI	.90	.90	.90	≥ .90
TLI	.90	.90	.90	≥ .90
CFI	.91	.92	.91	≥ .90
IFI	.91	.92	.92	≥ .90
RMSEA	.05	.06	.05	≤ .08
SRMR	.06	.05	.06	≤ .08

and conscientiousness (β = −.16; $t = -1.99$; $p < .05$) were negatively related with smartphone addiction. Figure 1 illustrates the structural model of the relationship between "Big Five personality traits" and smartphone addiction for women. In the model, smartphone addiction included as a latent factor with four subscales.

On the other hand, the results revealed that only agreeableness was significantly associated with smartphone addiction for men (β = −.33, $t = -2.46$, $p < .05$). The results indicated that agreeableness was significantly (negative) related with smartphone addiction for both men and women. However, for women only, neuroticism was positively related and conscientiousness was negatively related with smartphone addiction. Figure 2 illustrates the structural model of the relationship between "Big Five personality traits" and smartphone addiction for men.

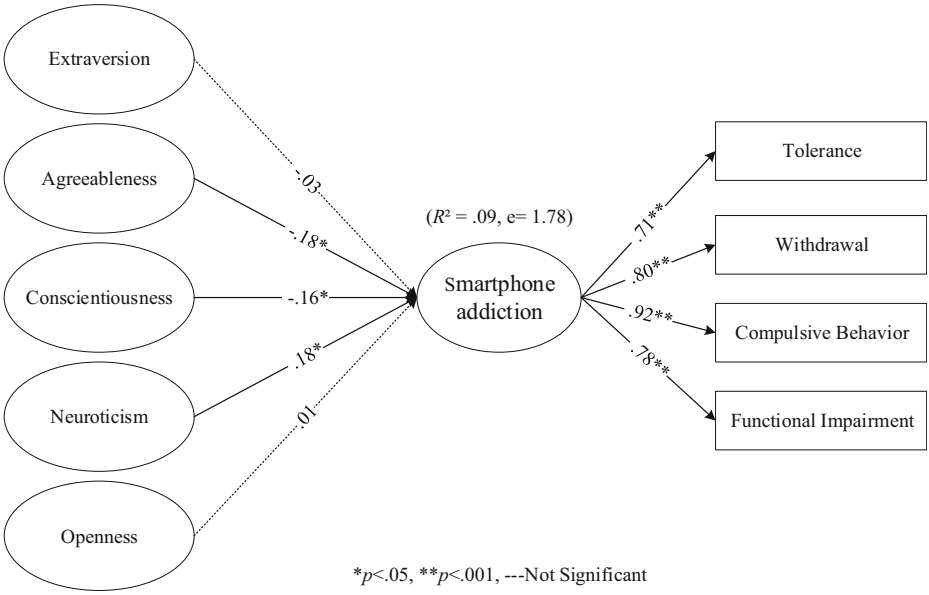


Fig. 1 The structural model of the relationship between five factor personality traits and smartphone addiction for women

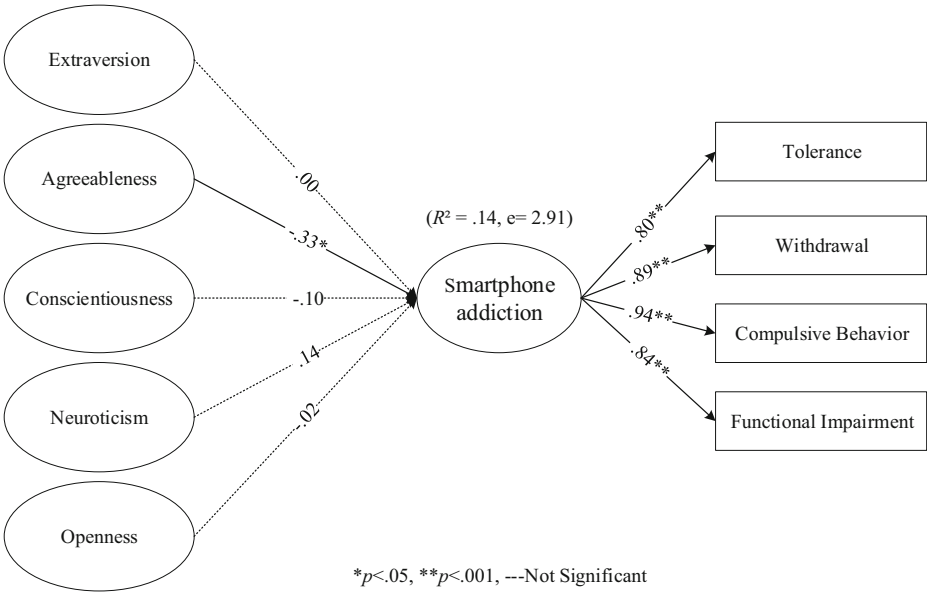


Fig. 2 The structural model of the relationship between five factor personality traits and smartphone addiction for men

Neuroticism was positively related with smartphone addiction for women only. But given the small effect sizes, we further investigated whether the reported gender differences were significant. Bootstrap with bias-corrected confidence intervals (95%) was used to test the role of the moderating variable (gender) in each model. For women, neuroticism was positively related with smartphone addiction (*Estimate* = .61, $p = .046$ two-tailed). However, neuroticism was not significantly related with smartphone addiction (*Estimate* = .46, $p = .549$ two-tailed) for men. Moderation occurs when the strength, direction, or both of the relation between a dependent and independent variable were influenced by a third variable, which is called a moderator [35, 36]. In this study, the relationship between neuroticism and smartphone addiction is moderated by gender.

Discussion and Conclusion

Key Findings and Implications

This study focused on moderating role of gender in the relationship between "Big Five personality traits" and smartphone addiction. Results suggested a positive and significant relationship between neuroticism and smartphone addiction for women only. Conscientiousness was negatively related with smartphone addiction for women. On the other hand, the results indicated that agreeableness was negatively related with smartphone addiction for both genders.

Findings suggested that the relationship between neuroticism and smartphone addiction is moderated by gender. There was a positive and significant relationship

between neuroticism and smartphone addiction for women only. Among women, as the level of neuroticism increases, so does smartphone addiction. Previously, Takao [24] examined the relationship between "Big Five personality traits" and problematic mobile phone use. Results showed that problematic mobile phone use was significantly related to the neuroticism. In a similar study, Pearson and Hussain [27] investigated the correlation between psychological factors and smartphone addiction. Their results suggested that neuroticism and narcissism were positively correlated with smartphone addiction.

Limitations

Findings of the study should be interpreted considering the following limitations. First, the study was based on cross-sectional data and therefore no causality can be inferred. Further studies should employ sequential or longitudinal designs and apply an experimental method in order to explore causal relationships. Second, study sample was university students selected by a convenience sampling method, thus, findings should be generalized to other samples with caution. Lastly, the data were based on self reports, future research should therefore collect qualitative data in order to confirm the study findings.

Compliance with Ethical Standards

Ethical Approval All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

Informed Consent Informed consent was obtained from all individual participants included in the study.

Conflict of Interest Authors declare none.

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