RESEARCH ARTICLE / ARAŞTIRMA YAZISI

Examining the Predictive Role of Depression on Smartphone Addiction

Depresyonun Akıllı Telefon Bağımlılığı Üzerindeki Yordayıcı Rolünün İncelenmesi

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Abstract:

The aim of this study was to examine the predictive role of depression on smartphone addiction. A total of 326 adults (219 women and 107 men) participated in the study. The ages of the participants ranged between 18 and 61 years old, and the average age was 26.86±8.05. Within the scope of the research, a demographic information form, DASS-21 (Depression, Anxiety and Stress Scale) depression subscale and Smartphone Addiction Scale-Short Form were applied. Depression has been found to be positively associated with smartphone addiction. The results obtained from the structural equation model showed that depression positively predicted smartphone addiction. This research, which provides a better understanding of the impact of depression, a common psychiatric disorder, on the formation of smartphone addiction, may enable the design of effective interventions within the scope of preventive guidance and the development of methods to reduce excessive use.

Keywords: Depression, Smartphone addiction, Adult.

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Öz:

Bu araştırmanın amacı depresyonun akıllı telefon bağımlılığı üzerindeki yordayıcı rolünü incelemektir. Çalışmaya 219'u kadın, 107'si erkek olmak üzere toplam 326 yetişkin birey katılmıştır. Katılımcıların yaşları 18 ile 61 yaş arasında değişmekte olup, yaş ortalaması 26.86±8.05'tir. Araştırma kapsamında kişisel bilgi formu, DASS-21 (Depresyon, Anksiyete ve Stres Ölçeği) depresyon alt ölçeği ve Akıllı Telefon Bağımlılığı Ölçeği-Kısa Formu uygulanmıştır. Depresyonun akıllı telefon bağımlılığı ile pozitif ilişkili olduğu bulunmuştur. Yapısal eşitlik modelinden elde edilen sonuçlar depresyonun akıllı telefon bağımlılığını pozitif yönde yordadığını göstermiştir. Akıllı telefon bağımlılığının oluşumunda yaygın bir psikiyatrik bozukluk olan depresyonun etkisinin daha iyi anlaşılmasını sağlayan bu araştırma, önleyici rehberlik kapsamında etkili müdahalelerin tasarlanmasını ve aşırı kullanımı azaltacak yöntemlerin geliştirilmesini sağlayabilir.

Anahtar Kelimeler: Depresyon, Akıllı telefon bağımlılığı, Yetişkin.

Introduction

The introduction of the iPhone to global markets in 2007 led to a significant and radical change in the mobile industry and subsequent mobile phone products due to the numerous technological developments that came with it (Frommer, 2011). A smartphone is "an answer phone that performs many of the functions of a computer, typically having a touch-screen interface, internet access, and an operating system that can run downloaded applications." (Rotondi, Stanca, & Tomasuolo, 2017, p. 18) Based on the typology of Internet uses and applications (Song, Singleton, Hill, & Koh, 2004, p.60), the functions of smartphone use can be classified as productivity increase, information seeking, social information and interaction, distraction, relaxation, and entertainment (van Deursen, Bolle, Hegner, & Kommers, 2015, p. 412).

The widespread use of smartphones has brought positive and negative effects for individuals of all generations. Over the last decade, smartphone usage has increased tremendously across all age groups, including young and old users (Busch & McCarthy, 2021, p.14). According to Statista (2023), the number of smartphone users in the world in 2023 is 6.92 billion, which means that 86.11% of the world's population owns a smartphone. On the one hand, using a smartphone is convenient and provides access to countless forms of entertainment, online shopping, virtual socializing, and more. Conversely, there is growing evidence of the various negative effects of excessive smartphone use on mental health and well-being, with all the possibilities the device has to offer (Billieux, Maurage, Lopez-Fernandez, Kuss, & Griffiths, 2015, p.158). As a result, excessive use of digital media, especially smartphone use, has been associated with various mental health problems, highlighting the need for further research and intervention in this area.

Studies have shown several connections between smartphone use and symptom-related negative outcomes in the user's daily life (Busch & McCarthy, 2021, p.1). These include social withdrawal, loss of productivity, poor academic performance, poor social relationships, physical health problems, and emotional distress (Wacks & Weinstein, 2021, pp. 2-3). Given the variety of negative outcomes associated with smartphone addiction and its increasing prevalence, understanding the underlying factors and their impact on individuals' daily functioning is crucial to addressing this emerging construct.

Smartphone addiction can be defined in various ways. In the first of these definitions, smartphone addiction involves having a strong internal urge to use the smartphone and impaired self-control ability (Ding et al, 2022, p. 2). In the second definition, smartphone addiction includes prioritizing smartphone use over other activities (Panova & Carbonell, 2018, p.254). The third definition refers to the continuation of smartphone use despite its negative consequences (Saunders et al., 2017). In short, typical symptoms of smartphone addiction include both psychological (e.g. cravings, loss of salience and control) and physical (e.g. tolerance and withdrawal) dependence (Panova & Carbonell, 2018, p. 253). Besides "smartphone addiction," other terms used to describe this construct of smartphone use include "problem smartphone use," "overuse," "compulsive use," and "compensatory use." (Kardefelt-Winther, 2014).

Many researchers have explained smartphone addiction in the context of addictive disorders and conceptualized it as a behavioral addiction (Busch & McCarthy, 2021, pp. 2-3). In recent years, it has been determined that smartphone addiction may be associated with excessive use of smartphones and addiction symptoms, causing smartphone addiction to resemble behavioral addictions such as gambling and game addiction (Derevensky, Hayman, & Gilbeau, 2019, p.1172). Moreover, Billieux et al. (2015) showed that smartphone addiction has the basic components of addictive behavior, such as cognitive salience, loss of control, mood change, tolerance development, withdrawal, conflict and relapse. Kwon et al. (2013) revealed that smartphone addiction consists of six symptoms: discomfort in daily life, positive expectation, deprivation, cyberspace-oriented relationship, excessive use and deprivation.

According to Pivetta, Harkin, Billieux, Kanjo, and Kuss (2019, p. 106), researchers agree that smartphone addiction is an addictive behavior and is characterized by impaired use control that interferes with daily activities and causes dysfunction. Disruption of usage control may not only mean using smartphones more than intended but may also include use driven by a compulsive and unconscious impulse (Lin, Lin, Yang, & Kuo, 2017, p. 341). Additionally, even though people try to avoid using smartphones, smartphone addicts often experience discomfort following cessation of use, leading them to relapse into smartphone use to eliminate negative emotions. Therefore, repeated failures to regulate smartphone use have also been conceptualized as a

defining feature of smartphone addiction (Cheng & Meng, 2021, p.1).

From a comprehensive perspective, findings from studies examining the relationship between smartphone addiction and depression can be grouped into three groups. First, some studies have suggested that smartphone addiction may predict depression and anxiety. Geng, Gu, Wang, and Zhang (2021, p.418) found that smartphone addiction predicts depression. In a study conducted by Gao, Li, Zhu, Liu, and Liu (2016, p.7), they determined that smartphone addiction may be a risk factor for depression and anxiety. Bian and Leung (2015, p.2) stated that high levels of smartphone addiction can predict depression. On the contrary, some researchers (Mi, Jung, Hyun, Min, Hye, June, 2014; Wang, Lei, Wang, Nie, Chu, & Jin, 2018) were of the opinion that depression could predict smartphone addiction. Wang, et al. (2018) examined the moderating role of depression in the relationship between sensation-seeking and smartphone addiction in adolescents and determined that depression predicted smartphone addiction. Mi et al. (2014) found that depression predicted smartphone addiction. Kim, Cho and Kim (2017, p.6) revealed that depression and loneliness play a serial mediating role in the relationship between anxious attachment and smartphone addiction. Finally, some researchers (Elhai, Levine, Dvorak, & Hall, 2017, p.77; Kim, Seo, & David, 2015, p.442; Stanković, Nešić, Čičević, & Shi, 2021, p.441) have suggested that depression is in a bidirectional relationship with smartphone addiction. For example, Stanković et al. (2021) found that depression was bidirectionally related to smartphone addiction.

In this study, the theory that depression predicts smartphone addiction was adopted. Considering the views that depression may play a crucial role in the etiology of smartphone addiction (Boumosleh & Jaalouk, 2017, p.3), it is of great importance to determine under what conditions intense depression can lead to smartphone addiction. Conducting research on the conditions under which depression leads to smartphone addiction necessitates research investigating the relationship between depression and smartphone addiction. As research is conducted showing the relationship between depression and smartphone addiction and more evidence is obtained regarding the existence of this relationship, the process will evolve into research on the conditions under which this relationship occurs.

Due to the prevalence of smartphone ownership among college students, this group emerges as a particularly vulnerable population to the negative effects of smartphone use. Although all age groups now use smartphones, the most important part of the users are university students and the majority of them use their smartphones for four to six hours a day (Ataş & Çelik, 2019, p.61; Parent, Bond, Wu, & Shapka, 2022, p.2). According to research literature, excessive use of digital media is associated with increased mental health problems, especially among college students (Lattie, Lipson, & Eisenberg, 2019, p.2). Moreover, a large-scale epidemiological study shows that diagnoses of psychopathology in college students increased from 22% to 36% between 2007 and 2017, when the first smartphone and social media gained popularity (Lipson, Lattie, & Eisenberg, 2019, p.2). These findings highlight the need for further investigation of the relationship between smartphone use and mental health problems among college students and point the way to a comprehensive understanding of smartphone addiction.

Positive and negative reinforcement play an important role in understanding the development and maintenance of smartphone addiction. Positive reinforcement provides a desired stimulus, such as praise or reward, to reinforce a behavior that produces pleasure or satisfaction (Yin, Yahaya, Sangryeol, Maakip, & Maalip, 2019, p.4). Negative reinforcement reduces an aversive stimulus, such as eliminating an unpleasant task. Both positive and negative reinforcement crave positive emotion and attempt to reduce negative emotion and increase the likelihood of the behavior being repeated (Wanigaratne, 2006). Operant conditioning may explain the phenomenon of smartphone addiction and suggest how positive reinforcement can lead to and promote smartphone addiction. Positive reinforcement, such as instant gratification and rewards provided by online activities, can create a reinforcement cycle that strengthens smartphone addiction (Lee & Kim, 2022, p. 70). Addiction motivated by negative reinforcement is often referred to as avoidance conditioning, affect regulation, or even self-medication, as the user attempts to alleviate negative emotions (Parent et al., 2022, p.8). By examining the effect of positive reinforcement in creating a reinforcement cycle and the role of negative reinforcement in alleviating negative emotions, operant conditioning provides valuable insight into the mechanisms underlying smartphone addiction.

One of the approaches to explain the development and maintenance of smartphone addiction includes a theory proposed by Kardefelt-Winther (2014) that points to emotionally motivated smartphone use that may eventually lead to addiction, as hypothesized in the operant conditioning model of addiction. This theory, called Compensatory Internet Use Theory, suggests that negative life situations such as stress or depressive symptoms may lead individuals to spend time online in an attempt to alleviate negative emotions (Elhai, Levine, & Hall, 2019, p. 46; Kardefelt-Winther, 2014). According to the theory, the root of the problem is the reaction to negative life situations and unmet needs that are compensated for by excessive internet use, such as smartphone addiction (Elhai et al., 2019). Users are motivated to consume online media to relieve negative emotions (Kim et al., 2015, p. 441). This behavior may become a habit over time. Ultimately, it can lead to negative consequences and addiction, as a high level of compensation is needed to relieve negative emotions. For people with persistent problems, the need to compensate can be constant and lead to smartphone addiction (Kardefelt-Winther, 2014). Elhai et al. (2019) emphasized that compensatory internet use and operant conditioning models can be called self-treatment or affect regulation models, and smartphone addiction, which can be seen as a behavioral addiction, can be a tool to alleviate negative emotion.

Compensatory use, often referred to as "self-medication" or "emotion regulation," suggests that addiction developed as a way to cope with negative emotions (Baker, Piper, McCarthy, Majeskie, & Fioere, 2004, p. 34). Compensatory use can cause subconscious associations that encourage automatic motivation to engage in behaviors (Baker et al., 2004). However, failure to engage in this automated behavior leads to increased negative mood. Therefore, it offers a possible mechanism for

maintaining compensatory use. "Compensatory use" may not be exactly the same as dependent use, but this type of use may provide opportunities to escape real-world problems and tasks and/or avoid negative feelings and emotions (Kardefelt-Winther, 2014).

Compensatory use plays an important role in understanding the development and persistence of smartphone addiction. Compensatory use attempts to reduce negative emotion and increase the likelihood of the behaviour being repeated (Wanigaratne, 2006). Positive reinforcement, such as instant gratification and rewards provided by online activities, can create a reinforcement loop that strengthens smartphone addiction (Lee & Kim, 2022, p.70). Addiction motivated by negative reinforcement is often referred to as avoidance conditioning, affect regulation, or even self-medication, as the user attempts to alleviate negative emotions (Parent et al., 2022, p.2). By examining the effect of positive reinforcement in creating a reinforcement cycle and the role of negative reinforcement in alleviating negative emotions, compensatory use provides valuable insight into the mechanisms underlying smartphone addiction.

Although the relationship between smartphone addiction and depression has between investigated in many studies, it is not clear whether smartphone addiction causes depression or depression causes smartphone addiction (Sarman & Çiftci, 2024, p.151). However, studies examining the link between smartphone addiction and depression are insufficient to reveal the excessive smartphone use behaviors of individuals at risk for depression. Many of the studies conducted in this context appear to use models that assume that more smartphone use is associated with increased levels of depression. For example, Park and Lee (2022, p.2) examined the relationship between smartphone addiction and depression among adolescents using the Internet Paradox Model. In the Internet Paradox Model, it is suggested that more smartphone use leads to more depression. In addition, there are other researchers (Bian & Leung, 2015, p.66; Sarman & Çiftci, 2024, p.154) who suggest that smartphone addiction leads to depression and loneliness. To summarize, studies examining the predictive effect of depression on smartphone addiction (Demirci, Akgönül, & Akpinar, 2015, p.88; Elhai et al., 2017; Kim et al., 2015) are quite limited.

Therefore, this study aimed to examine the predictive effect of depression on smartphone addiction by making use of the Compensatory Use Theory (Kardefelt-Winther, 2014). This research will contribute to both determining the direction of the relationship between depression and smartphone addiction and revealing to what extent individuals experiencing depression are at risk in terms of smartphone addiction. Determining that depressed individuals turn to their mobile phones to get rid of their negative emotions pushes them towards smartphone addiction (Mun & Lee, 2021, p. 400), making it important to reveal the predictive effect of depression on smartphone addiction. In this regard, this research, which aims to examine the predictive of depression on smartphone addiction, will contribute to the design of intervention programs aiming to reduce depression and smartphone addiction.

For all these reasons, this study aimed to test the role of depression in the formation of smartphone addiction in the context of Compensatory Use Theory. For this purpose, the following hypothesis was tested in this research:

H1: Depression positively predicts smartphone addiction.

Method

Research Design
This study was designed in accordance with relational research, which is one of the quantitative research designs. Relational models are research models that aim to determine the existence of co-variation between two or more variables (Fraenkel, Wallen, & Hyun., 2015, p. 331). In line with the nature of correlational research, the purpose of this study is to examine the relationship between depression and smartphone addiction.

Research Group
G*Power 3.1 program was used to determine the sample size. The minimum number of samples for models with effect size (F^2) =.0.18, alpha level 0.05 and power level 0.95 was 325. This number is considered sufficient for the sample size in the current study (Faul, Erdfelder, Lang, & Buchner, 2007, p.176). The study group of this research consisted of a total of 326 adult individuals, 219 of whom were women (67.2 %) and 107 of whom were men (32. 8 %). The average age of the participants, whose ages ranged from 18 to 61, was (Mean=26.86, SD=8.05).

Data Collection Tools
In this study, the Demographic Information Form, Depression Anxiety Stress Scale and Smartphone Addiction Scale- Short Version were used as data collection tools. Information about the tools is presented below.

Demographic Information Form: The Demographic Information Form developed by the researchers aimed to collect personal information about university students. Accordingly, the form included expressions containing information such as age and gender.

Depression, Anxiety, and Stress Scale: DASS-21 was developed by Lovibond and Lovibond (1995a, p.340) by selecting the items of DASS-42 in order to shorten the duration. DASS-21 contains 7 items for each scale and the results are multiplied by two in evaluation (Lovibond & Lovibond,1995b, p.33). Turkish adaptation of the short form of the scale was conducted by Sarıçam (2018, p.19). The short form consists of 21 items, three subscales (depression, anxiety and stress) and a 4-point Likert-type scoring system (between 0: Never and 3: Always). The total score of each sub-dimension is calculated by adding the scores of the items obtained from the sub-dimension. High scores obtained from the sub-dimensions mean that the individual's feelings towards the relevant sub-dimension are intense. Cronbach's alpha internal consistency coefficients for depression, anxiety and stress subscales were found to be 0.87, 0.85 and 0.91, respectively. The depression subscale was used in this study and the Cronbach's alpha internal consistency coefficient was calculated as 0.91.

Smartphone Addiction Scale-Short Version: This scale was developed by Kwon, Kim, Cho and Yang (2013, p.5) to assess individuals' smartphone addiction risk. The scale consists of 10 items. The evaluation method of the scale is Likert type and the scale items are scored between '1', strongly disagree, and '6', strongly agree Scale scores range from the lowest of 10 to the highest of 60. It is

evaluated that as the score obtained from the test increases, the risk for addiction increases. The scale has a single factor and has subscales. In the Korean sample, the cut-off score for men is 31 and for women is 33. The Cronbach's alpha coefficient of the internal consistency and concurrent validity of the original form is a 0.91. Validity and reliability studies of the scale on individuals from Turkish culture were conducted by Noyan, Darcin, Nurmedov and Yilmaz (2015, p. 78). As a result of the validity and reliability analysis conducted, the Cronbach alpha coefficient, which indicates the reliability of the scale on individuals in Turkish culture, was measured at a=0.867. The test/retest reliability coefficient is a = 0.926. The Cronbach alpha coefficient obtained within the scope of this study was calculated as 0.88.

Data Collection

After the planning phase of the research was completed, the necessary ethical permissions were obtained. Ethical permission for the research was received from Afyon Kocatepe University Social and Human Sciences Scientific Research and Publication Ethics Board on 20.03.2024 with document number 259324. Then, the research data was prepared via Google Forms and the data was collected online. The researchers sent the data collection tools to university students via e-mail and invited them to participate in the research. In addition, the university students to whom the e-mails were sent were asked to include them in the research by sending these e-mails to their acquaintances. Thus, it was aimed to reach a larger of participants. During the collection of research data, participants were constantly contacted to clarify points they did not understand, and when necessary, meetings were held via Zoom with the camera turned off, and it was stated that they could ask any questions they wanted.

The inclusion criteria of the study are using a smartphone and being at risk for smartphone addiction. Participants with psychiatric disorders were excluded from the study. Participants were informed that participation in the study was voluntary. Participants who agreed to participate in the study were informed about the purpose of the research and informed consent was obtained from the participants. Confidentiality was taken into consideration during the data collection process, and it was determined that the participants could leave the research at any time without any explanation. Filling the measuring tools takes approximately 15 minutes. The online data collection process of the research was completed in approximately thirty days.

Data Analysis

To test the hypothesis of this study, the two-stage process suggested by Anderson and Gerbing (1988, p.411) was applied. First, the measurement model was tested to examine whether the latent variables were adequately represented by their indicators. After it was confirmed that the measurement model provided sufficient evidence in terms of goodness-of-fit criteria, the testing of structural models based on latent variables began to examine the predictive relationship. Model determination in the analysis of structural models; model identification; interpretation of parameter estimates; Stages such as evaluating model fit and reporting the results were followed (Byrne, 2010; Hoyle, 2014; Kline, 2016; Schumacker & Lomax, 2010, p.10).

Before performing statistical operations on the data obtained, the data set was reviewed and some editing operations were made. In this regard, the dataset was examined in terms of extreme values and normal distribution (Field, 2013). Within the scope of the study, extreme values were investigated by converting the total scores for the variables into standardized z scores. It was observed that the Z statistics were between -3 and +3, so the data set was free of extreme values (Tabachnick & Fidell, 2014, p.79). Descriptive statistics for the variables were calculated and skewness and kurtosis values were found to be between -2 and +2. In this regard, it was determined that the data was normally distributed (George & Mallery, 2019, p.124). After the dataset was ready, the testing phase of the predictive model was started. For this purpose, the IBM AMOS Graphics program was used and structural equation modeling was carried out according to maximum likelihood estimation. As a result of structural equation modeling analysis, various fit indices were examined. For the χ^2/sd goodness of fit value among these fit indices, χ^2/sd ratio of three or lower in small samples and five or lower in large samples is expressed as a good level of fit (Tabachnick & Fidell, 2014, p. 720). For the NFI goodness of fit value, values between .90 and .95 were found to be acceptable, and values of .95 and above indicated perfect fit (Schermelleh-Engel, Moosbrugger, & Müller, 2003, p. 40). For the CFI goodness of fit value, it was emphasized that values between .95 and .97 are acceptable, and values of .97 and above indicate fit (Hu & Bentler, 1999, p.1). Although there are different evaluations for SRMR and RMSEA goodness of fit values, it is reported that values between .08 and .05 are acceptable, and values lower than .05 indicate perfect fit (Schermelleh-Engel et al., 2003, pp. 36-37; Tabachnick & Fidell, 2014, pp.721-725).

Results

Correlation Analysis Results

To examine the relationships between depression and smartphone addiction, first the correlation values were examined. Table 1 shows the relationship between variables, means, standard deviations, skewness and kurtosis values. As a result of the correlation analysis, a positive significant relationship was found between depression and smartphone addiction (r = 0.391, p < .001; % 95 CI [0.301, 0.480]). The descriptive values of the measurement tools and the relationships between the observed variables are presented in Table 1.

Table 1. Descriptive values and relationships for measurement tools

Variables	1	2
Depression	1	
Smartphone addiction	0.391***	1
Mean	6.914	30.819
Standard deviation	5.288	10.629
Skewness	0.790	-0.009
Kurtosis	0.161	-0.566

***p < .001

Measurement Model Analysis Results

The measurement model consists of two latent (depression and smartphone addiction) and seventeen observed

variables. As a result of the analysis, the goodness of fit values of the measurement model were examined and it was determined that some of the goodness of fit values of the model were lower than acceptable ranges (X^2 $_{(df = 18, N = 326)}$ = 508.680, p < .001, X^2/df = 4.311, CFI = 0.867, NFI = 0.834, RMSEA = 0.101 % 90 BCa (.092, .110), and $SRMR$ = .073). When the model modification suggestions were examined, it was seen that error correlations were high between smartphone addiction items 1 and 2, 4 and 5, and 5 and 6. Three modifications were made to the measurement model, respectively, and the goodness of fit values of the measurement model were found to be acceptable (X^2 $_{(df = 115, N = 326)}$ = 275.207, p < .001, X^2/df = 2.393, CFI = 0.945, NFI = 0.910, $RMSEA$ = 0.065 % 90 BCa (.056, .075), and $SRMR$ = .063).

Structural Model Analysis Results

In this study, the structural model was tested to examine the predictive role of depression on smartphone addiction. Parameter estimates for the structural model were calculated and all paths in the model were found to be statistically significant. As a result of the analysis, the goodness of fit values of the structural model were examined and it was determined that some of the goodness of fit values of the model were lower than acceptable ranges (X^2 $_{(df = 18, N = 326)}$ = 508.680, p < .001, X^2/df = 4.311, CFI = 0.867, NFI = 0.834, $RMSEA$ = 0.101 % 90 BCa (.092, .110), and $SRMR$ = .073). When the model modification suggestions were examined, it was seen that error correlations were high between smartphone addiction items 1 and 2, 4 and 5, and 5 and 6. Three modifications were made respectively and the goodness of fit values of the model were found to be acceptable (X^2 $_{(df = 115, N = 326)}$ = 275.207, p < .001, X^2/df = 2.393, CFI = 0.945, NFI = 0.910, $RMSEA$ = 0.065 % 90 BCa (.056, .075), and $SRMR$ = .063). As a result, it was determined that depression positively and significantly predicted smartphone addiction in the structural model (β = 0.416, p < .001). Additionally, depression was found to explain 17% of the variation in smartphone addiction. The findings obtained are shown in Figure 1.
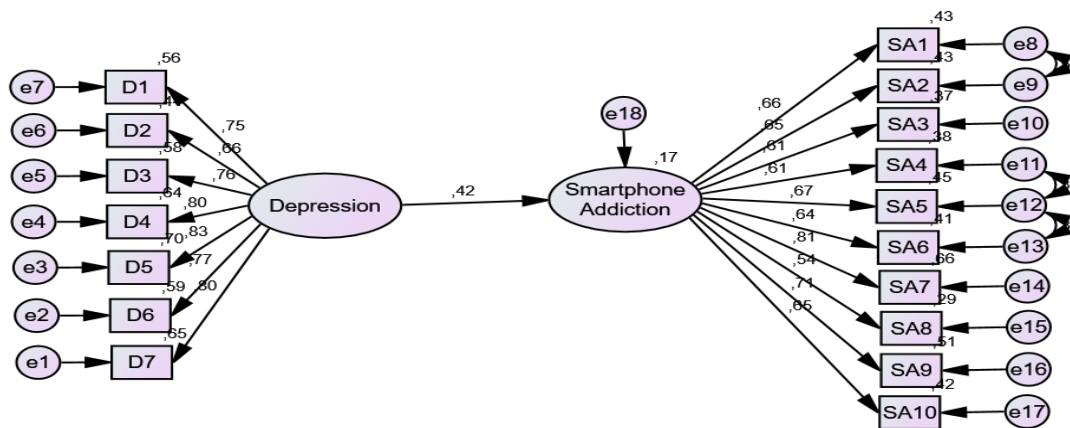
Figure 1. The predictive role of depression in smartphone addiction

Discussion

The theory of compensatory internet use suggests that people facing negative life situations may be motivated to alleviate their negative emotions through excessive smartphone use. People living with depression may be more exposed to smartphone use than people with healthy psychological structures (Kardefelt-Winther, 2014). People with depression tend to withdraw from social interactions due to unrewarding experiences in social relationships (Allen et al., 2006). This tendency towards social withdrawal may extend to smartphone addiction, such that people with depression are more motivated to engage in social contact via smartphones. Moreover, people with depression often experience negative emotions such as sadness and hopelessness (Rottenberg, 2005). Therefore, they are motivated to consume entertainment media content to alleviate negative emotions (Kim et al., 2015). However, due to the lack of self-regulation ability in people with depression, they may be more vulnerable to uncontrolled use of smartphones when seeking hedonic experiences (Elhai et al., 2017).

Additionally, depressed individuals use mobile phones as a coping method to cope with their negative emotions (Kim et al., 2015). Therefore, smartphone use may function as an experiential avoidance strategy to deflect distressing emotional content; however, experiential avoidance is ineffective in achieving this goal and leads to negative emotional consequences (Machell, Goodman, & Kashdan, 2015, p. 352). Thus, pathological use may begin as a positive reinforcement process, as in smartphone addiction. As the behavior becomes mandatory, the person begins to experience negative emotions when not performing the behavior. As a result, the only way to alleviate deprivation is to engage in behavior (Wise & Koob, 2014, p. 257). Alternatively, another way to view positive and negative reinforcement in smartphone addiction is that both types of reinforcement similarly involve the desire for positive emotion to alleviate negative emotion. However, it is also important not to over-pathologize smartphone use (Billieux et al., 2015).

The compensatory potential of smartphones may stem from technological affordances such as navigation and interaction (Sundar & Limperos, 2013, p.513). Smartphones allow users to seamlessly navigate between different interfaces or sites through a variety of hyperlinks, providing people with the opportunity to explore cyberspace for the diversion that requires little mental effort. Dedicated applications that allow users to progress through levels, such as smartphone games, can create a sense of play and encourage people to pursue the next difficulty level, distracting people from focusing on

negative emotions (Cheng & Meng, 2021, p. 3; Sundar & Limperos, 2013, p. 516). Additionally, the interactive feature of smartphones enables users to actively participate in narratives (e.g. video games and interactive movies) that create enjoyment and immersion (Green, Brock, & Kaufman, 2004, p. 322). These emotional and cognitive states associated with the use of smartphones can temporarily alleviate the negative moods of depressed people and rescue them from negative situations (Reinecke, Klatt, & Krämer 2011, p. 194).

Driven by the process, to satisfy the need to escape from constant negative emotions, people with depression may frequently engage in smartphone activities (Shen, Wang, Rost, Gaskin, & Wang, 2019, p.1942). In terms of social motivation, the need for a sense of belonging can create the odor of missing communication with others. To meet this need, people may become obsessed with smartphone control (Elhai, Yang, Fang, Bai, & Hall, 2020, p.5). Smartphones have a wide range of facilities and applications that allow people to meet their multiple needs and purposes in a single device. For example, social networking applications can meet people's needs not only for social interaction but also for entertainment (Sundar & Limperos, 2013, p. 521).

People with depression may initially use smartphones to meet their needs such as distraction and social stimulation, thus relieving their negative emotions. However, with frequent use of smartphones over time, people can develop addiction due to the desire for satisfaction and overuse of smartphones, which is characteristic of smartphone addiction (Billieux et al., 2015). People with depression who lack self-regulation may have difficulty monitoring their actual amount of smartphone use and assessing when their needs are being met (Deng et al., 2018). Therefore, people with depression are thought to be more prone to progressing to smartphone addiction.

Some studies indicate a two-way relationship; Smartphone addiction triggers psychopathology, and psychopathology triggers smartphone addiction (Yen et al., 2012). For example, a depressed individual may turn to excessive use of their smartphone to escape the negative emotion of depression. However, this excessive smartphone use ultimately keeps the person awake late at night, thus causing more depression, irritability and stress. Therefore, smartphone addiction may involve a vicious cycle of psychopathology (Kim et al., 2015).

As a result, it is important to investigate to what extent depression symptoms are associated with intense smartphone use in individuals. Accordingly, this study determined that smartphone addiction predicts depression. It was also found that 17% of the variance of smartphone addiction was explained by depression. In this context, it can be said that people experiencing depressive moods use smartphones more frequently to alleviate negative emotions, which potentially causes more social isolation and an increase in smartphone excessive use. In addition, it can be stated that preferring virtual communication to face-to-face communication exacerbates the effect of depression on smartphone addiction. Moreover, it can be stated that depressed individuals who turn to smartphones avoid their duties and responsibilities in their lives, and this situation further disrupts daily functionality. Depression is associated with unhappiness, lack of enjoyment in life, restlessness, hopelessness and loss of

interest. Although the activities offered by smartphones seem to make depressed individuals happy and eliminate these symptoms, it can be said that they will cause the symptoms of depression to become more severe. Furthermore, it can be stated that depressed individuals will constantly increase their smartphone use in order to reduce the effect of depression, and this will lead to a further increase in the harmful effects of smartphone addiction. Finally, although it is not the subject of this research, it can be expressed that increasing the severity of smartphone addiction will further the severity of depression and put the individual in a vicious circle.

This study examining the relationships between depression and smartphone addiction has several limitations. Various suggestions can be made in the context of these limitations. First, since this study is cross-sectional, causal inferences cannot be made. In this regard, it may be recommended to conduct longitudinal studies that allow examining the cause-effect relationship. Secondly, this research was conducted with a normal population. New studies to be conducted on people diagnosed with depression will contribute to a better understanding of the mechanism of the relationship between depression and smartphone addiction. Thirdly, this research was conducted with university students. Therefore, conducting new research on groups such as adolescents will increase the generalizability of the findings. Finally, this study tested the hypothesis that depression symptoms are a predictive indicator of smartphone addiction. In this regard, the hypothesis depression is a result of smartphone addiction or that both mutually affect each other can be tested. Such a study may contribute to better understanding of the mechanism of this relationship.

Declarations

Sağar, M.E., Kaya, F., Eroğlu, Y., Sinan, D., Çelik, Y., Tosun, C. (2024).

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