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Association between Self-Esteem and Smartphone Addiction: The Mediating Role of Self-Control

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Abstract. The aim of this study was to investigate whether self-control acts as a mediator in the connection between self-esteem and smartphone addiction in a sizable group of adults (N = 1118; age range = 18 to 63 years) residing in various regions of Azerbaijan. The findings revealed a positive association between participants' self-esteem and their self-control, while their level of smartphone addiction exhibited a negative association with self-esteem and self-control. The results obtained from structural equation modeling indicated that self-control fully mediated the relationship between self-esteem and smartphone addiction. Thus, there was a statistically significant indirect impact of self-esteem on smartphone addiction through self-control.

Keywords. Smartphone addiction, self-esteem, self-control, structural equation modelling

Introduction

In the modern era, the influence of smartphones on our lives is expanding rapidly. Through them, people send and receive messages and phone calls from each other. People are spending more and more time with their smartphones, which in itself is addictive. The digital transformation of everyday life is associated with the integration of smartphones into the daily experience of a person in society. Digital transformation has affected not only the economic, but also the social and cultural areas of society. The interest of social researchers in the phenomenon of mobile technology began with the study of mobile devices as a means of communication (e.g., Kutuk, 2023).

Today, smartphones are used not only as a means of communication, but also as a device that can solve various types of problems. Mobile technologies give us access to online conferences, training, various jobs, entertainment, and even documents on a work computer. In short, there is no limit to what we can do with a smartphone. Prolonged smartphone use is an indicator of addiction (West et al., 2021). However, frequent use of smartphones, whether used for work, study or just entertainment, is "addictive". In accordance with the American Psychiatric Association, addiction is a complex condition, a sort of brain disease that despite the harmful effects is manifested by the compulsive use of psychoactive substances (APA,

2013). Addiction is dependence on any substance or activity (Grant & Chamberlain, 2016). According to Hansen (2021), looking at smartphones, having fun on social networks, texting, playing games, videos, chatting with others causes the brain to release more of the substance called dopamine every day than it should. Because dopamine is a pleasure hormone, it is addictive in humans. However, when the phone and social network demands are not met and the brain cannot find the dose of dopamine it is accustomed to from another source, a person becomes aggressive, loses his/her temper, and certain symptoms appear. There are 2 types of addiction: drugs, alcohol, caffeine, stimulants; gaming, internet and smartphone addiction (Elhai et al., 2017). Smartphone addiction is defined as compulsive and problematic behavioral patterns of smartphone use. This includes the inability to control or regulate the smartphone, withdrawal syndrome in the absence of the smartphone, increased tolerance to higher levels of use, and functional impairment in personal and social relationships. (Lin et al., 2014; Zhang & Wu, 2020). Excessive smartphone use can lead to maladaptive behavior difficulties and interfere with education or work (Venkatesh et al., 2017). It reduces both real-life social interactions and academic abilities (Kuss & Griffiths, 2011) and physical health problems. (Kwon et al., 2013). Smartphone addiction is consistently associated with poor mental health outcomes (Guitierrez et al., 2016; Kim et al., 2018). Mental health indicators include increased depression, anxiety, stress, and suicidal thoughts (Kim et al., 2017).

The tendency to use smartphones for a long time can be related to many variables as well as self-esteem. Self-esteem is defined in various ways as the degree to which an individual value, approve, and like themselves (Aliyev, 2014). Self-esteem is also defined as self-appreciation, self-worth, and self-acceptance. According to Rosenberg (1965) for those who associate their self-esteem with the consent of others, self-esteem is closely related to their relationships with peers. Empirical studies have found a negative relationship between self-esteem and smartphone addiction, noting that low self-esteem is more likely to lead to the development of smartphone addiction. (You et al., 2019; Ding et al., 2022). Social networks allow their users to interact with others and enjoy the pleasant experience of making friends online using a "fake self" (Brand et al., 2016). However, at this time, people with low self-esteem experience increased anxiety as they try to maintain a "false self-image." (Rosenberg, 1965). Khang et al. (2013) found that smartphone users with low self-esteem were more susceptible to pathological immersion than users with high self-esteem. People with low self-esteem tend to have higher social anxiety and are sensitive to the evaluations of significant others, suggesting that these people turn to mass cell phone use to gain reassurance in emotional relationships (Billieux, 2015). Wang et al. (2017) note that high self-esteem in humans may be a protective factor against smartphone addiction.

Research shows that self-esteem and self-control are considered to be the main factors influencing smartphone addiction. Self-control explains the ability of people to resist internal desires and external temptations to reach long-term goals (Tangney et al., 2004). It is a cognitive process for self-regulating behavior in pursuit of personal aims. This advanced executive process makes it possible to inhibit ourselves from impulsive reactions in behavior, favoring more appropriate, context-specific behavior (Ent et al., 2015). Khang et al. (2012) note that compared to self-esteem and self-efficacy, self-control is the most significant predictor of pathological smartphone use. A number of studies have also confirmed that self-control is a protective factor against smartphone addiction in people (Kim et al., 2018; Sok et al., 2019). Fabio et al. (2022) claim that people with high smartphone addiction have less self-control. When self-control is low, it can lead to negative consequences in people's daily life, such as difficulty in performing cognitive tasks and slower reactions to events. The researchers also

note that people with low levels of smartphone addiction have better perceptions of general well-being and quality of life, exhibit less sluggish behavior, and have less fear of isolation. Caplan (2010) found that smartphone communication reduced the anxiety caused by real social interaction but also led to distorted self-control. Such poor self-control, in turn, leads to negative consequences in people's lives.

According to research, self-esteem also affects self-control (Michaels & Norton 2015). As self-esteem increases, it leads to increased social adaptation and self-control. (Martin et al., 2014). You et al. (2019) note that people with low self-esteem typically have cognitive distortions and maladaptive emotional regulation (Billieux, 2012). At the same time it also leads to higher social anxiety and excessive use of smartphones to gain trust in emotional relationships. Li et al. (2021) note that people with low self-control and escapist mindsets are tend to have higher smartphone addiction. According to Jiang and Zhao (2016), the short-term pleasure and satisfaction of interacting with a smartphone increases addiction and lowers self-control.

The present study

Even though a number of studies have been conducted in this direction all over the world, it has not been investigated so widely in Azerbaijan. In recent times, smartphone use in Azerbaijan is 59.6% among 18-24-year-olds, and 33.7% among 25-34-year-olds, and it is observed that it is statistically increasing (Start.io, 2023). Therefore, using a smartphone can lead to many psychological, sociological and economic differences. In this research, the way how this problem can be handled from a psychological point of view has been elaborated. The results of the study can be useful both in educating people and regulating self-esteem and self-control in excessive smartphone use. The purpose of the research is to determine the mediating role of self-control between self-esteem and smartphone addiction as a result of the mentioned theoretical and practical studies.

According to our purpose, the following questions were asked in the research.

1. Does self-esteem predict self-control?
2. Does self-esteem predict smartphone addiction?
3. Does self-control predict smartphone addiction?
4. Does self-esteem and self-control mediate smartphone addiction?

Method

Participants and Procedure

To gather data, a convenience sampling method was employed in Baku for this study. The sample consisted of 1118 participants, with 887 females (79.3%) and 231 males (20.7%). The age range of the participants varied from 18 to 63, with an average age of 20.69 (SD = 5.91). Out of the total sample, 109 participants (9.7%) were married, while 1009 (90.3%) were single. Around half of the participants identified themselves as having a moderate economic status (61.4%). In terms of employment, 130 participants (11.6%) were employed in the public sector, 164 (14.7%) worked in private companies, and 824 (73.7%) were currently unemployed. Additionally, 92 participants (8.2%) reported being parents, whereas the remaining 1026 (9.8%) did not have children. The participants were categorized based on the number of hours they reported using their phones per day. Among the participants, 92 individuals (8.2%) reported using their phones for 1-2 hours daily, while 249 participants (22.3%) reported using their phones for 3-4 hours. A larger portion of the sample, 385 participants (34.4%), reported using their phones for 5-7 hours per day. Furthermore, 211 participants (18.9%) reported using their

phones for 8-10 hours, and 181 participants (16.2%) claimed to use their phones for the entire day. The participants were categorized based on their reported primary usage purposes. Among the participants, 652 individuals (58.3%) reported using their phones primarily for internet-related activities. Additionally, 58 participants (5.2%) reported using their phones mainly for business calls and meetings. For entertainment purposes, 239 participants (21.4%) reported using their phones, while 156 participants (13.9%) reported using their phones primarily to stay updated with news. Lastly, 13 participants (1.2%) reported using their phones primarily for gaming.

Measures

Participants in the research first completed a questionnaire created by the researchers. The survey was created to gather demographic information from responders. The questions concerned the participant's work activity.

The Rosenberg Self-Esteem Scale (Rosenberg, 1965) has subsequently become one of the most extensively used measures of adult self-esteem. A ten-item scale that assesses overall self-worth by assessing both positive and negative thoughts about oneself. The scale is thought to be one-dimensional. All items are graded on a 4-point Likert scale from strongly agree to strongly disagree.

The Brief Self-Control Scale (BSCS) (Tangney et al., 2004) is a 13-item variant of the lengthier Self Control Scale that is intended to focus on the behavioral components of self-control, such as breaking undesirable habits or persevering through a task. The BSCS assesses trait self-control with items on a 5-point Likert scale, with 1 indicating "not at all" and 5 indicating "extremely," so higher scores indicate stronger levels of self-control. The designers of the measure linked self-control to behavioral and psychological health domains such as achievement, impulse control, psychological adjustment, interpersonal connections, moral emotions, and personality.

The Smartphone Addiction Scale-Short Version (SAS-SV) (Kwon et al., 2013) is a 10-item questionnaire with a 6-point Likert scale ranging from 1 to 6, with 1 being strongly disagree and 6 being strongly agree. The SAS has 10 elements (for example, "Having my smartphone in my mind even when I am not using it") that deal with daily-life disruption, positive anticipation, withdrawal, cyberspace-oriented relationships, overuse, and tolerance. A total score is determined, with higher numbers indicating more problematic smartphone use.

Data analysis

IBM SPSS Statistics 22 and AMOS Graphics software were utilized for the statistical analysis in this study. To provide an overview of the data, descriptive statistics were calculated. Pearson's correlation analyses were then conducted to explore the relationships among the variables under investigation. The association between self-esteem and smartphone addiction, as well as the potential mediating role of self-control, was investigated using structural equation modeling (SEM). To assess the goodness of fit of the SEM model, several fit indices recommended by Hu and Bentler (1999) were employed. These indices included the ratio of χ^2 to degrees of freedom (ideally below 5.0), standardized root mean square residual (SRMR), root mean square error of approximation (RMSEA, ideally below 0.08), comparative fit index (CFI), goodness-of-fit index (GFI), incremental fit index (IFI), and Tucker-Lewis index (TLI) (ideally above 0.90). The significance level for this study was set at .05, indicating that findings with p-values below this threshold were considered statistically significant.

Results

The descriptive statistics and Pearson correlation coefficients for all study variables are presented in Table 1. The results revealed a significant positive correlation between self-esteem and self-control ($r = 0.395, p < 0.001$), indicating a strong association between these two variables. Furthermore, self-esteem showed a negative correlation with smartphone addiction ($r = -0.223, p < 0.001$), suggesting a significant relationship between these variables. Lastly, smartphone addiction exhibited a negative correlation with self-control ($r = -0.448, p < 0.001$), underscoring a significant positive association between these variables.

Table 1
Descriptive statistics and correlations among study variables

Variable	Self-esteem	Smartphone addiction	Self-control
Self-esteem	–		
Smartphone addiction	-.223**	–	
Self-control	.395**	-.448**	–
Mean	28.81	30.33	44.87
Standard deviation	5.11	11.27	8.51
Skewness	-.394	.206	-.134
Kurtosis	.090	-.571	-.028

** $p < .001$

Measurement Model

The measurement model, which included three latent variables (smartphone addiction, self-esteem, and self-control) and seven observed variables, was thoroughly assessed. The fit indices of the measurement model produced the following outcomes: $\chi^2_{(17, N=1118)} = 77.82, p < .001$; $\chi^2/df = 7.08$; CFI = 0.980; RFI = 0.955; GFI = 0.982; NFI = 0.976; IFI = 0.980; TLI = 0.961; SRMR = 0.042; RMSEA = 0.074, C.I. [0.059, 0.090]. It is important to highlight that all standardized factor loadings were determined to be statistically significant, ranging from 0.530 to 0.915 ($ps < .001$). These results reinforce the robustness and reliability of the measurement model, indicating the strong relationship between the observed variables and the underlying latent constructs. Overall, these results provide substantial evidence for the validity and reliability of the measurement model, highlighting the significant relationships between the latent variables and observed indicators in the study.

Structural Model

After adjusting for gender and age as control variables, we investigated the mediating role of self-control in the association between self-esteem and smartphone addiction. Initially, a partial mediation model was tested. The results of the goodness-of-fit indices indicated that the partial mediation model exhibited an acceptable fit: $\chi^2_{(24, N=1118)} = 98.96, p < .001$; $\chi^2/df = 4.71$; CFI = 0.977; RFI = 0.949; GFI = 0.982; NFI = 0.971; IFI = 0.977; TLI = 0.960; SRMR = 0.0354; RMSEA = 0.058, C.I. [0.046, 0.069], AIC = 146.96; ECVI = 0.132. However, the path from the independent variable to the dependent variable was found to be non-significant ($\beta = 0.013, p > .05$). Therefore, this non-significant path was removed, and a full mediation model

was tested. The full mediation model demonstrated acceptable fit across all goodness-of-fit indices, $\chi^2_{(23, N = 1118)} = 99.08, p < .001; \chi^2/df = 4.50; CFI = 0.977; RFI = 0.952; GFI = 0.981; NFI = 0.970; IFI = 0.977; TLI = 0.962; SRMR = 0.0354; RMSEA = 0.056, C.I. [0.045, 0.067], AIC = 145.08; ECVI = 0.130$. Furthermore, all path coefficients were found to be significant. When comparing the Akaike Information Criterion (AIC) and Expected Cross-Validation Index (ECVI) values, it was observed that the full mediation model had lower AIC and ECVI values. Consequently, the full mediation model was preferred. The path coefficients associated with the full mediation model are presented in Figure 1.

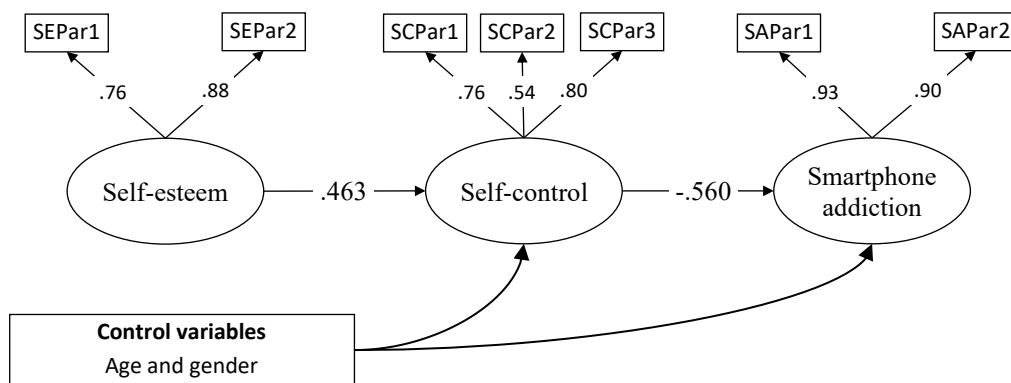


Figure 1. Mediation model results

The analysis indicated a significant direct effect of self-esteem on self-control ($\beta = 0.463, p < 0.001$). Furthermore, a significant direct effect of self-control on smartphone addiction was observed ($\beta = -0.560, p < 0.001$). To further assess the significance of the indirect effects, a bootstrapping procedure with 5000 bootstrap resamples was employed to analyze the mediation model. The results of the bootstrapping analysis revealed that the relationship between self-esteem and smartphone addiction was fully mediated by self-control, with an indirect effect of 0.028 (95% CI = 0.006, 0.065). Overall, the findings suggest that self-control plays a significant mediating role in the relationship between self-esteem and smartphone addiction, as supported by the fit indices and path coefficients in the full mediation model.

Discussion

While smartphones help us work, play, and perform our daily tasks, at the same time too much smartphone use can turn into addiction (Sheinov, 2021). Smartphone addiction is becoming more and more common as smartphones become personal and professional necessities. And smartphone addiction has a detrimental effect on many important aspects of life (Servidio, 2019). In this research, the mediating role of self-control between self-esteem and smartphone addiction was investigated. The obtained data are discussed as below.

According to the results, a positive prediction is observed between self-esteem and self-control. Self-esteem is considered to be a 'self-esteem or self-attitude', while self-control is considered to be an "interactive aspect between the self and the environment" and are theoretically distinct (Trumpeter et al. 2006), but research suggests that they are interrelated (de Ridder et al. 2011). Self-esteem and self-control are important components of people's self-awareness (Aliyev, 2007), high self-esteem is significantly related to self-control and can positively predict it (Uzun et al., 2020). Research shows that people with higher self-esteem also have a higher level of self-control (Lee et al., 2013). Self-control, which acts as an indicator

of self-esteem, can also contribute to a variety of positive outcomes, such as high academic grades, high psychological adjustment, and high interpersonal relationships (Woessner & Schneider, 2013). This shows that self-esteem is closely related to self-control and can have a direct effect on self-control.

Many factors can influence smartphone addiction, and one of these factors is self-control. The level of self-control is closely related to addictive behavior (Gao et al., 2020). Due to a lack of self-control, some people are unable to either reduce the ever-increasing urge to use a mobile phone, or prevent the transition from a normal level of use to an addictive behavior (Kadzikowska-Wrzosek, 2018). People with low self-control have a strong sense of mobile phone addiction, and strengthening self-control and self-management can be an effective tool to combat mobile phone addiction (Li et al., 2016). Chan et al. (2018) note that as the level of self-control in people increases, the level of addiction to smartphones decreases. Self-control plays an important role in controlling the correct and appropriate use of smartphones, avoiding excessive use and behaviors associated with smartphone addiction (Asih & Fauziah, 2017). According to impulsivity theory, self-control is negatively associated with smartphone addiction, and these results are consistent with the idea that people with higher levels of self-control are less impulsive (Li et al., 2021). Lei et al. (2020) research results suggest that self-control is an important component of a comprehensive internet addiction theory.

Our research shows that self-control acts as a mediator between self-esteem and smartphone addiction. Based on our research, it can be noted that when self-esteem increases, self-control can increase and this, in turn, can be effective in reducing smartphone addiction. Self-esteem is a key component that can help people combat smartphone-addictive behaviors. Recently, the research conducted in China showed that self-esteem has a negative relationship with smartphone addiction (Gao et al., 2021). According to the results of the research, higher self-esteem is mainly associated with lower levels of smartphone addiction, where self-esteem may act as a protective factor against smartphone addiction (Brand et al., 2019) Therefore, eliminating irrational beliefs and increasing self-esteem can reduce smartphone addiction (Servidio, 2021). Zhang et al. (2019) note that self-control has a significant negative relationship with mobile phone addiction, and that self-control becomes less addictive. People with high levels of self-control are able to regulate their thoughts, emotions, and behaviors to better adapt to their environment, learn, work, and live better (Geng et al., 2021). The results showed that self-control has both direct and indirect effects on smartphone addiction (Chen et al., 2019). Therefore, the result obtained in this study is consistent with previous literature.

Limitation

We would like to highlight a few limitations that should be considered when interpreting the research findings. Firstly, there is a gender imbalance in the survey. The number of women participating in the research is more than men. This can affect the calculation of the results. Secondly, the information was gathered through self-reported surveys, which are subject to subjective methodological biases (such as social desirability and memory recall). Thirdly, as a result of the cross-sectional nature of the data, all conclusions were associational and there was no way to establish a link between the variables.

Conclusion

In this research, we have investigated the relationship between self-esteem, social control and smartphone addiction in people in adulthood in Azerbaijan. In the research, we determined that there is a mutual relationship between self-esteem and smartphone addiction in

adults in Azerbaijan. According to the results of the research, self control plays a mediating role here. In other words, a direct relationship between self-esteem and self-control and an inverse relationship between self-control and smartphone addiction were found in adults. That is, the higher the self-esteem in adults, the more positive effect on self-control it has, which also leads to a decrease in smartphone addiction.

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