Investigating the Effect of Social Intelligence on Self-determination in Teenagers with the Mediating Role of Mobile Phone Addiction

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A B S T R A C T

Purpose: The excessive use of mobile phones significantly alters human thought patterns and affects individuals' behavior and psycho-social well-being. This study aims to explore the correlation between social intelligence and self-determination in adolescents, focusing on how mobile phone addiction plays a mediating role.
Methodology: The research employed a descriptive-correlational approach and cross-sectional method, utilizing structural equation modeling (SEM) for analysis. The statistical population consisted of teenage boys and girls in Tehran who experienced mobile phone addiction from July to October 2023, with psychologist confirmation of addiction. A sample of 150 teenagers was selected through purposive sampling, with 17 individuals excluded due to incomplete or erroneous questionnaire responses. Research instruments included the Tromso Social Intelligence Scale, Self-Determination Scale, and Mobile Phone Addiction Questionnaire. Data analysis was conducted using SPSS version 27 for overall data and SmartPLS version 4 for path analysis between variables, with a significance level set at 0.05.
Findings: The results of the current study indicated that Social Intelligence had a significant negative impact on mobile phone addiction (β=-0.380, p <0.001). In addition, there was a significant positive effect of Social Intelligence on Behavioral independence (β=0.383, p <0.001), but no significant effect on Psychological Empowerment and Self-determination (p>0.05). Furthermore, the relationship between Social Intelligence and Behavioral independence, as well as Self-determination with the mediating factor of Mobile phone addiction, was found to be significant (p < 0.001). However, the association between Social Intelligence and Psychological Empowerment with the mediating role of Mobile phone addiction was not significant (P>0.05).
Conclusion: The findings of the current research indicate that social intelligence can decrease mobile phone addiction and enhance behavioral independence, while mobile phone addiction can diminish behavioral independence and self-consciousness. However, social intelligence and mobile phone addiction do not impact psychological empowerment. Additionally, mobile phone addiction serves as a mediator in the correlation between social intelligence and the aspects of behavioral independence and self-consciousness.
Keywords: Social intelligence, Self-determination, Mobile Phone Addiction.

1. Introduction

Social intelligence or adaptive behavior is a new concept in psychology that is essential for developing relationships and interacting with others, including oneself, and it enhances human performance in daily activities, contributing to personal and societal progress and development (Esmaili et al., 2024; Shahbaziyankhonig et al., 2021). Any dysfunction or damage to the neurons responsible for these cognitive capacities can negatively impact social functioning (Tovhidiyan et al., 2021). Research has suggested that social intelligence may influence how peers view the behavior of individuals with narcissistic tendencies, particularly in teenage peer groups (Kim & Barry, 2023).

Skills like active participation in society, navigating through academic challenges, transitioning into adulthood, and more are vital for teenagers. Within these skills, the concept of self-determination distinguishes between internal and external motivation, which is crucial for establishing meaningful personal and social objectives (Enayati Shabkolai et al., 2023; Ghahremani et al., 2022; Vaziri et al., 2021; Vicente et al., 2020). These abilities enable individuals to see themselves as the primary drivers of their lives, viewing their actions as deliberate and involving the freedom to choose, make decisions, solve problems, set and achieve goals, self-regulate, self-support, lead, internally control, and self-consciousness, collectively forming the elements of self-determination (Rashidi et al., 2023). According to this theory, meeting a person's basic psychological needs in their environment can enhance intrinsic motivation and internalize extrinsic motivation, leading to a high level of self-determination and active learning (Hao & Lan, 2023).

Research suggests that utilizing social intelligence and creativity can aid in understanding and preventing stress, as well as providing tailored support to young people as they establish their career paths and develop self-determination skills (Chesnokova et al., 2022). Another study's results suggested that a program focused on preventing mobile phone addiction using self-determination theory could effectively enhance individuals' basic psychological needs and self-regulation skills (Kwon & Yu, 2020). Additionally, self-determination factors like effort, perceived pressure, and communication significantly influence behavior, with drivers exhibiting higher levels of internalized regulatory processes being less inclined to use their phones while driving (Truelove, Watson-Brown & Oviedo-Trespalacios, 2023).

Individuals who have learned self-determination do not allow external factors to influence their performance (Shirzadi et al., 2021). However, one factor that can have a negative effect on the psychological and social performance of teenagers is addiction to mobile phones (Akbari et al., 2022). Research indicates that as mobile phone usage increases, there is a rise in psychological dependence on mobile phones and a decline in social interactions, ultimately harming social relationships (Arab & Rahat Dahmardeh, 2022). Mobile phone addiction is characterized by excessive engagement in activities related to mobile phones, along with a strong craving and dependence on the device, leading to a lack of self-control (Akbari et al., 2022). While mobile phones offer numerous benefits in education and can boost motivation and engagement in teenagers (Atadokht & Ahmadi, 2022), dependency on these devices can result in reduced social engagement, eating disorders, academic struggles, and psychosocial issues (Nik-Farjam & Hojjati, 2019).

A literature review found that mobile phone addiction is associated with issues such as unhappiness with life, depression, anxiety, insomnia, feelings of isolation, and poor academic performance (Parizad et al., 2022). Sadri and colleagues (2021) conducted a study and found that in this situation, addiction to social media on mobile devices plays a role in influencing the impact of self-concept on engaging in risky behaviors (Sadri et al., 2021). Another study demonstrated a strong correlation between mobile phone addiction and the internet with feelings of powerlessness, desensitization, disrespect, social isolation, cultural animosity, and self-loathing (Atadokht & Ahmadi, 2022). Studies have also shown that mobile phone addiction contributes to heightened stress and anxiety in students, which in turn leads to increased procrastination (Moosivand et al., 2022).

Self-determination is a program that can help improve the abnormal behavior of teenagers in various fields and enhance their engagement in educational settings (Shirzadi et al., 2021). Social intelligence plays a crucial role in the lives of teenagers and can enhance their performance (Shahbaziyankhonig et al., 2021). However, there are limited empirical studies on the impact of social intelligence and self-determination on adolescents. Previous research has not investigated the mediating role of mobile phone addiction in adolescents. This research addresses a gap in the literature by examining the relationship between social

intelligence and self-determination in teenagers, with a focus on the mediating role of mobile phone addiction.

2. Methods and Materials

2.1. Study Design and Participants

This study utilized a descriptive-correlational research design along with a cross-sectional research method, employing structural equation modeling (SEM) as the analytical approach. The statistical population for this study consisted of teenage boys and girls in Tehran who exhibited signs of mobile phone addiction from July to October 2023, with confirmation of addiction provided by psychologists in research clinics. A total of 133 teenagers were chosen for the sample through purposive sampling, as they had been referred to counseling clinics by their families due to mobile phone addiction impacting their academic performance and personal lives. Most of the teenagers in the study primarily used their mobile phones to play games, both online and offline. The researchers calculated the sample size for the study using Cohen's formula. This formula considered factors such as the number of observed and latent variables, the expected effect size, and the desired levels of probability and statistical power in the structural equation modeling (SEM) model.

Based on the values mentioned earlier, the researcher computed that there were 119 individuals. In anticipation of potential high attrition rates in the sample group, the researcher decided to include 150 people to offset any dropouts. To be eligible for the study, participants had to attend psychological clinics specializing in mobile phone addiction, provide informed consent, have parental consent (for teenagers), possess sufficient literacy and comprehension skills, and exhibit dependence on mobile phones. The exclusion criteria involved being older than 19 years, having a mental illness that hindered participation, and failing to answer more than 10 questionnaire items, resulting in withdrawal. The research protocol included obtaining necessary approvals from the university, followed by introductions to 5 psychology and counseling clinics in Tehran with assistance from university professors. The names of the clinics were not disclosed to protect the information. They were selected based on their convenient location and success in reaching out to teenagers struggling with mobile phone addiction. The researcher then visited the clinics. Following this, families with a child who had a history of mobile phone addiction and had previously received counseling at the clinics were contacted with details

about the research and invited to participate. Later on, additional details regarding the study were communicated to them using various social media channels. The information included research objectives, research permits, and provisions related to ethical principles compliance. Because of parental cooperation limitations, the research process and online questionnaire completion took three months. A total of 133 out of 150 questionnaires filled were used, with 17 questionnaires excluded due to incomplete or intentionally erroneous completion. The questionnaires were self-reported and administered online. Families were assured that the research forms did not contain personal information and that teenagers could opt out of the research process if desired to adhere to ethical principles.

2.2. Measures

2.2.1. Social Intelligence

Silvera, Martinussen, and Dahl developed this self-report questionnaire in 2001 for the purpose of evaluating social intelligence (Silvera et al., 2001). This questionnaire consists of 21 questions covering social information processing (SIP), social awareness (SA), and social skills (SS). Participants rate each item on a 7-point Likert scale ranging from 1 to 7, resulting in total scores ranging from 21 to 147. The overall score for social intelligence is calculated by summing individual scores, with higher scores indicating higher levels of social intelligence. Silvera et al. (2001) reported a test-retest reliability of 0.83 for the questionnaire. Researchers in Iran conducted a study and discovered that the scale's internal consistency was 0.75 (Azizi Nejad & Jenaabadi, 2014). In the current study, the researcher determined the Cronbach's alpha coefficient of the questionnaire to be 0.88 and its composite reliability value as 0.838.

2.2.2. Self-Determination

The Self-Determination Scale Questionnaire, developed by Gomez-Vela and colleagues in 2012, is a self-administered questionnaire designed to assess self-determination (Gomez-Vela et al., 2012). It comprises 63 questions and measures behavioral independence, psychological empowerment, and Self-determination. The first component includes 32 questions with scores ranging from 0 to 64. The second component consists of 16 questions with scores ranging from 0 to 32. The third component comprises 15 questions with scores ranging from 0 to 30.

Responses are recorded on a 2-point Likert scale, with higher scores indicating greater levels of self-determination. A study in Iran found the internal consistency of the components to be 0.83, 0.87, and 0.75 (Shamradloo & Seyf, 2016). The study also reported Cronbach's alpha coefficients of 0.942 for Behavioral independence, 0.986 for Psychological Empowerment, and 0.963 for Self-determination. The overall reliability coefficient for the components was calculated to be 0.941 for Behavioral independence, 0.986 for Psychological Empowerment, and 0.964 for Self-determination.

2.2.3. *Mobile Phone Addiction*

In 2009, Koo developed a questionnaire to assess mobile phone addiction levels in individuals (Koo, 2009). The questionnaire consists of 20 questions, categorized into three areas: tolerance of deprivation (7 question), disruption in life (6 question), and compulsion-insistence (7 question). Each question offers four response options, ranging from very high (5) to very low (1). Scores over 70 indicate addiction, 63-70 suggest severe use, and below 63 indicate moderate use. The validity of the questionnaire was confirmed through factor analysis by Koo, 2009. In Iran, researchers reported a high internal consistency of the scale with a Cronbach's alpha coefficient of 0.92 (Khazaie et al., 2012). In the current study, the researcher determined the Cronbach's alpha coefficient for the scale to be 0.91.

2.3. *Data Analysis*

Descriptive statistics were conducted using SPSS version 27, while the path analysis between variables was analyzed using SmartPLS version 4. The normality of the distribution of research variables was checked using the Kolmogorov-Smirnov test, which showed significance for the variables, indicating a non-normal distribution. Therefore, SmartPLS was utilized for further analysis. A significance level of 0.05 was applied in the study.

3. Findings and Results

Initially, the researcher examined the descriptive statistics of the research variables. The teenagers were categorized into three age brackets: 15 to 16 years old (47.4%), 16 to 17 years old (28.6%), and 18 to 19 years old (24.1%). Similarly, the participants were segregated into two groups based on gender - boys (57.1%) and girls (42.9%). The researcher also analyzed the number of hours spent using mobile phones. As a result, the participants were split into four groups: 1 to 2 hours of mobile phone usage per day (15.8%), 2 to 3 hours (10.5%), 3 to 4 hours (42.9%), and over 4 hours of mobile phone usage per day (30.8%).

Table 1 shows the mean and standard deviation of the research variables.

Table 1

Description of the main research variables

Variables	Mean±SD	Max	Min	N	Skewness	Kurtosis
Social intelligence	77.6165±8.59	98	60	133	0.392	-0.793
Addiction to mobile phones	53.1128±9.74	71	40	133	0.41	-1.268
Behavioral independence	42.5865±5.07	53	30	133	0.198	-0.142
Psychological Empowerment	21.6466±2.21	28	19	133	1.494	1.269
Self-determination	20.9624±3.38	27	15	133	0.164	-1.208

Table 2 shows the correlation between research variables based on Pearson's correlation coefficient.

Table 2

Correlation between variables

Variables	1	2	3	4	5
Social intelligence	-				
Addiction to mobile phones	-0.380	-			
Behavioral independence	0.578	-0.659	-		
Psychological Empowerment	0.075	-0.091	0.207	-	

Self-determination	٠.336	-٠.609	٠.676	٠.137	-

According to the results presented in Table 2, there was a significant positive relationship between the Social Intelligence variable and the aspects of Behavioral independence and Self-determination. However, there was no significant correlation with the component of Psychological Empowerment (P>0.05). "The variable Mobile phone addiction showed a strong negative relationship with Behavioral independence and Self-determination components, but did not show any significant correlation with Psychological Empowerment (P>0.05)."

Table 3

Standard research coefficients in general

Paths	Path coefficient	STDEV	p	T-value	Result
Addiction to mobile phones -> Behavioral independence	-0.514	0.040	p <0.001	12.821	Confirmed
Addiction to mobile phones -> Psychological Empowerment	-0.073		0.413	0.819	Rejected
Addiction to mobile phones -> Self-determination	-0.562	0.059	p <0.001	9.559	Confirmed
Social intelligence -> Addiction to mobile phones	-0.380	0.069	p <0.001	5.496	Confirmed
Social intelligence -> Behavioral independence	0.383	0.054	p <0.001	7.108	Confirmed
Social intelligence -> Psychological Empowerment	0.047	0.094	0.615	0.503	Rejected
Social intelligence -> Self-determination	0.122	0.077	0.111	1.594	Rejected

Based on Table 3, it is clear that there was a significant negative influence of Social Intelligence on mobile phone Addiction, as indicated by a beta coefficient of -0.380 and a p-value of less than 0.001. Likewise, Social Intelligence had a notable positive impact on Behavioral independence (β=0.383, p <0.001), but did not have a significant effect on Psychological Empowerment and Self-determination (p>0.05). On the other hand, mobile phone addiction had a detrimental effect on Behavioral independence and Self-determination (p < 0.001), with no significant impact on Psychological Empowerment (p>0.05).

Another criterion for model fit is the overall fit index (GOF). Based on the GOF formula and the results in Table 8, the GOF value was 0.421, which is greater than the benchmark value of 0.3, indicating an adequate model fit.

Table 4

Results of Structural Model Evaluation for Hypothesis Testing

Path	Path coefficient	STDEV	p	T-value
Social intelligence->Addiction to mobile phones->Behavioral independence	0.195	0.038	0.000	5.131
Social intelligence-> Addiction to mobile phones->Psychological Empowerment	0.028	0.035	0.428	0.792
Social intelligence -> Addiction to mobile phones -> Self-determination	0.213	0.047	0.000	4.498

According to the findings from the bootstrap analysis in Table 4, the connection between Social intelligence and the components of Behavioral independence and Self-determination, with the mediating variable of Mobile phone addiction, showed significance (p < 0.001). However, the relationship between Social intelligence and Psychological Empowerment, mediated by Mobile phone addiction, was not found to be significant (P>0.05). The researcher employed the Sobel test to assess the importance of the mediating variable in the study, which was computed using a specific formula.

$$Z - value = \frac{a * b}{\sqrt{(b^2 * s_a^2) + (a^2 * s_b^2) + (s_a^2 * s_b^2)}}$$

The Z value for the variable Mobile phone addiction as a mediator between Social intelligence and Self-determination was 4.76773, suggesting statistical significance. However, the Z value for the variable Mobile phone addiction as a mediator between Social intelligence and Psychological Empowerment was only 0.8112, indicating insignificance.

Table 5

Reliability and validity of the model

Variables	Cronbach's Alpha	Composite Reliability	AVE
Social intelligence	0.88	0.838	0.812
Addiction to mobile phones	0.91	0.889	0.881
Behavioral independence	0.942	0.941	0.793
Psychological Empowerment	0.986	0.986	0.722
Self-determination	0.963	0.964	0.781

In Table 5, the variables have Cronbach's alpha reliability above 0.7. The overall reliability of these variables is also above 0.7. The model's validity was assessed using the average variance extracted index, which showed values higher than 0.5 for research variables, confirming the model's validity.

Table 6

Investigating divergent validity by Fornell-Larker method

Row	variables	1	2	3	4	5
1	Social intelligence	0.901				
2	Addiction to mobile phones	-0.380	0.938			
3	Behavioral independence	0.578	-0.659	0.890		
4	Psychological Empowerment	0.075	-0.091	0.207	0.849	
5	Self-determination	0.336	-0.609	0.676	0.137	0.883

The factors in the model have correlation values that are lower than the matrix diameter values, indicating that the divergent validity of the model is supported. Additionally, the SRMR index of 0.072 suggests that the model fits well as it is below the threshold of 0.8.

4.   Discussion and Conclusion

The purpose of this research was to investigate the impact of mobile phone addiction on the relationship between social intelligence and self-determination levels in teenagers. The findings revealed that social intelligence had a negative impact on mobile phone addiction but had a positive effect on behavioral independence. However, it did not significantly affect psychological empowerment and self-consciousness. On the other hand, mobile phone addiction negatively affected behavioral independence and self-consciousness, but not psychological empowerment. The results also indicated a significant relationship between social intelligence and behavioral independence, as well as self-consciousness, with cell phone addiction as a mediator. However, the connection between social intelligence and psychological empowerment with mobile phone addiction as a mediator was not significant. Overall, the results indicate that the role of mobile phone addiction as a mediator in this research is important.

The findings of the research support previous studies that suggest social intelligence has a negative and significant impact on mobile phone addiction (Roostazadeh & Rezaei, 2020; Ugwu et al., 2023). A study indicated that poor social skills, low social intelligence, and lack of emotional intelligence can lead to increased addiction to virtual networks among students (Roostazadeh & Rezaei, 2020). Another study found that individuals with low social intelligence and authoritarian parenting styles are more likely to suffer from Internet addiction (Ugwu et al., 2023). Additionally, research shows that students with lower social intelligence are more likely to experience Internet addiction compared to those with higher social intelligence (Paul et al., 2022). This finding can be explained by stating that individuals who experience greater feelings of loneliness and isolation tend to have fewer real-life and interpersonal connections, leading them to rely more on mobile phones and virtual networks. However, teenagers with strong communication skills and who are adept at interacting with others tend to spend less time on virtual networks and seek out real friendships. People's social intelligence plays a role in their inclination towards using mobile phones and virtual networks; teenagers with high emotional control are more likely to succeed in interpersonal relationships, form positive connections with others, and have lower dependence on mobile phones (Roostazadeh & Rezaei, 2020). Conversely, teenagers who have a higher addiction to the Internet and mobile phones may experience anxiety, social awkwardness, a sense of meaninglessness, social isolation, and hatred. They might use mobile phones and the Internet to cope with and alleviate these feelings. Engaging excessively and uncontrollably in messaging and online

interactions as a way to temporarily ease feelings of anxiety, emptiness, dependence, loneliness, and self-loathing can lead to further complications and result in social alienation among adolescents (Atarodi Beimorghi & Rajabi, 2019).

A new finding from the research showed that social intelligence has a positive effect on behavioral independence, but it does not have a substantial impact on psychological empowerment and self-consciousness. There were no previous studies directly addressing this issue. However, existing research suggests that social intelligence has a beneficial effect on adolescents, as demonstrated in a study highlighting its role in developing coping strategies and positive emotions during the challenge of self-determination in late adolescence (Chesnokova et al., 2022). Additionally, a separate study found that social intelligence may affect how narcissistic individuals are perceived by their peers (Kim & Barry, 2023). Furthermore, research results demonstrated that emotional and social intelligence are strong predictors of creativity in teenagers (Mukherjee et al., 2021). The study also found that mobile phone addiction negatively affects behavioral independence and self-consciousness, though it does not impact psychological empowerment. This result aligns with previous studies (Eftekhar Saadi, 2022; Hong et al., 2020). Another study focused on dissatisfaction with daily life and mobile phone addiction and found that improving independence satisfaction could help prevent adolescent online addictions (Hao & Lan, 2023). In the same vein, another research study discovered a strong negative association between emotional self-consciousness and mobile phone addiction among students with high intelligence (Eftekhar Saadi, 2022).

This study, like all research, has certain limitations that must be considered when interpreting and applying the findings. The questionnaire on mobile phone addiction used in this study was created in 2009, rendering it somewhat outdated given the rapid changes in technology since that time. The emergence of smartphones, social media platforms, online streaming services, and other digital advancements has significantly altered how people engage with mobile and online platforms. While the questionnaire offers a solid foundation for understanding general trends in mobile phone addiction, its age may limit its applicability to current behaviors and addictions related to mobile phones. Nonetheless, the fundamental principles of the questionnaire remain applicable in the evolving digital landscape. Another limitation of the study was the inability to control variables such as parenting styles, economic status, and parent's education level, which could impact the research outcomes.

The research specifically focused on teenagers aged 15 to 19, as the teenage years are considered a critical period. Thus, caution should be taken when applying the study's findings to other age groups. Future research should explore the social intelligence of adolescents by comparing it with different age groups and examining its impact on social and environmental adaptation. Additionally, conducting studies with a larger sample size can help enhance the generalizability of research results.

The current study's findings indicated that social intelligence can lessen mobile phone addiction and enhance behavioral independence, while mobile phone addiction can also diminish behavioral independence and self-consciousness. However, social intelligence and mobile phone addiction do not impact psychological empowerment. In addition, mobile phone addiction acts as a mediator between social intelligence and the elements of behavioral independence and self-consciousness. Hence, based on the results, decreasing mobile phone addiction in teenagers can be achieved through the utilization of social intelligence. The research findings suggest that educational authorities and policymakers should create empowerment initiatives and foster social intelligence among teenagers. The research suggests implementing programs aimed at enhancing social intelligence by improving people's communication skills and quantity, conducting educational workshops, designing team games with the guidance of consultants and experts in education and behavior, as well as creating group projects to identify factors that hinder social intelligence. Additionally, it proposes organizing educational sessions in schools and universities to educate teenagers and young adults about the benefits and drawbacks of mobile phones and how to use them responsibly. It is important to note that excessive restrictions imposed by parents on mobile phone usage may backfire as teenagers might interpret it as a challenge to their independence, potentially leading to addictive behaviors. On the contrary, the recommendation is for families and schools to grant adolescents a certain level of autonomy and empower them to regulate their behaviors, which can help diminish the likelihood of developing problematic mobile phone habits.

Authors' Contributions

Authors equally contributed to this article.

Declaration

In order to correct and improve the academic writing of our paper, we have used the language model ChatGPT.

Transparency Statement

Data are available for research purposes upon reasonable request to the corresponding author.

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Declaration of Interest

The authors report no conflict of interest.

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Ethics Considerations

In this study, to observe ethical considerations, participants were informed about the goals and importance of the research before the start of the interview and participated in the research with informed consent.

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