



RESEARCH PAPER

Unmasking Smartphone Addiction: How Loneliness Mediates between Social Anxiety Disorder and Depression

¹Muhammad Adeel Abid*, ²Maliha Riaz and ³Zamam Rafique

1. Lecturer, Department of Management and Administrative Sciences, University of Narowal, Pakistan
2. Research Scholar, Department of Management and Administrative Sciences, University of Narowal, Pakistan
3. Research Scholar, Department of Management and Administrative Sciences, University of Narowal, Pakistan

***Corresponding Author:** adeel.abid@uon.edu.pk

ABSTRACT

This study aims to investigate the influence of social anxiety disorder and depression on the emergence of smartphone addiction. The primary purpose of this study was to evaluate the direct and indirect impacts of smartphone addiction on depression and social anxiety disorder, with a specific emphasis on examining the mediating influence of loneliness. The research employed a quantitative approach to investigate these relationships. A survey instrument consisting of 32 items was used to gather data from the students. A data collection sample of 251 students was obtained using non-probability purposive sampling. The study revealed a clear and statistically significant positive correlation between smartphone addiction and depression and social anxiety disorder. The present study examines the potential mediating effects of loneliness in the relationship between smartphone addiction, depression, and social anxiety. This study offers valuable insights for professionals, therapists, scholars, and anyone engaged in research and academia.

KEYWORDS Depression (DEP), Smartphone Addiction (SA), Smartphones, Social Anxiety Disorder (SAD), Loneliness (LON)

Introduction

Smartphones have become an indispensable element of contemporary daily existence. The global prevalence of smartphone usage is experiencing rapid growth. In the global context, it is observed that approximately 99.4% of individuals possess a smartphone or other portable electronic device. Furthermore, a significant proportion of young individuals, particularly students, approximately 94.2%, utilize mobile phones (Turgeman, Hefner, Bazon, Yehoshua, & Weinstein, 2020). Smartphones possess a multitude of functionalities, including but not limited to capturing photographs and videos, engaging in music consumption, seeing visual content, facilitating online transactions, and accessing news articles, thereby enhancing convenience in daily living. Nevertheless, an increased amount of time dedicated to engaging with social media and the internet through smartphones, specifically among students, has the potential to give rise to distinct psychological concerns. The excessive use of smartphones has been associated with several psychological consequences, such as social isolation, feelings of loneliness, anxiety disorders, despair, and depression. (Yue et al., 2021). Nowadays, numerous corporations employ advanced technology to fabricate mobile devices designed to captivate consumers' interest.

The dominant entities in this industry are Apple, Samsung, Huawei, Oppo, and other notable competitors. An increasing number of technological advancements, such

as smartphones, are being designed to facilitate interpersonal connectivity. The current era is characterized by heavily occupied individuals, impeding their ability to engage in face-to-face interactions. Consequently, there has been a surge in the need for virtual connectivity. (Akhtar et al., 2023). Nevertheless, given that humans are inherently social beings and have a natural inclination for companionship, the emergence of the telephone, subsequently followed by the advancements in cellular technology and the introduction of mobile phones and smartphones, has effectively fulfilled this fundamental want. The utilization of smartphones among young adults has experienced a significant surge over the course of the last decade. Although the perceived benefits are evident, there is also an emerging recognition of its adverse consequences (Zhong et al., 2022).

Smartphone usage is ubiquitous, with individuals consistently observed utilizing their devices in various settings. The utilization of smartphones has become increasingly problematic in modern society. Individuals increasingly rely on their smartphones to such an extent that they experience discomfort when temporarily separated from these devices. These devices have become an indispensable necessity in the lives of individuals nowadays. Excessive use of any substance or activity can be seen as a contributing element to the development of substance addiction, as it poses challenges for individuals in occupying their leisure time. Excessive smartphone usage is similarly applicable in this context. (Ayandele, Popoola, & Oladiji, 2020).

Recent studies have demonstrated that behavioral addiction is the umbrella term that includes internet addiction, social media addiction, and smartphone addiction. A behavior that provides momentary pleasure or delight and may induce persistent conduct despite knowledge of detrimental consequences, i.e., diminished control over the behavior, is known as a behavioral addiction (Alinejad, Parizad, Yarmohammadi, & Radfar, 2022). Smartphone addiction may be caused by various psychological and behavioral characteristics, such as social anxiety disorder, melancholy, loneliness, narcissism, social and natural connections, sleep quality, self-esteem, attention deficit/hyperactivity, and other personality traits. The psychological conditions of social anxiety disorder and depression, with loneliness as a mediating effect that contributes to smartphone addiction, were the primary concerns of this study.

The presence of social anxiety disorder and depression is associated with an increased likelihood of smartphone addiction among students. There exists a significant and positive correlation between an individual's personality traits and their patterns of smartphone usage. The manifestation of psychological traits and issues related to prolonged smartphone usage becomes evident, prompting the need for studies to investigate the impact of excessive smartphone use on the lives of young individuals (Li, Xu, & Cao, 2023). This study aims to address the knowledge gaps regarding the relationship between social anxiety disorder and depression and their potential moderating effect on smartphone addiction among student populations. This article offers valuable insights for professionals, counselors, scholars, and researchers.

Literature Review

Smartphones have grown indispensable within the current society and are integral to the everyday routines of their owners. Mobile phones have become an essential part of our daily lives, being utilized in many activities such as participating in social gatherings, engaging in academic pursuits, and even operating vehicles. The prevalence of smartphone usage, particularly among university students, has emerged as a significant societal concern due to its extensive utilization. The increasing prevalence

of smartphone addiction can be attributed to individuals' persistent attachment to their devices and their incessant compulsion to engage with them, whether prompted by inconsequential alerts or the desire to utilize social networking applications (Nguyen, 2023).

Smartphone Addiction

This study examines the psychological factors associated with smartphone addiction, specifically social anxiety disorder, feelings of loneliness, and symptoms of depression. When a smartphone has adverse effects on an individual's physical and emotional well-being, as well as their everyday functioning, it gives rise to concern. (Mei et al., 2022). The phenomenon of smartphone addiction can arise due to the overutilization of these devices, even when they facilitate our professional tasks, provide enjoyment, and fulfill our everyday responsibilities. The assessment of Smartphone users' addiction primarily relies on their observable behaviors. The portability and ubiquity of smartphones facilitate the proliferation of internet addiction due to their ability to be utilized in many locations and at any given moment. The internet connectivity of a smartphone facilitates interpersonal communication, social networking, recreational activities such as gaming, and the exploration of online content through web browsing (Nath, 2022).

Social Anxiety Disorder

Social anxiety disorder (SAD) is considered one of the psychological factors contributing to the development of smartphone addiction. The aforementioned phenomenon can be classified as a psychological disorder. The phenomenon of experiencing severe and persistent anxiety in response to the perception of being viewed and evaluated by others is commonly experienced. This concern can potentially impede one's performance at job, school, and other routine tasks. (Foroughi, Griffiths, Iranmanesh, & Salamzadeh, 2021). Symptoms of Social Anxiety Disorder (SAD) encompass physiological manifestations such as increased perspiration, elevated heart rate, the potential for experiencing severe panic attacks in response to a frightening situation, facial flushing, gastrointestinal disturbances, and other related manifestations. Individuals diagnosed with SAD experience heightened levels of anxiety and apprehension prior to and during interpersonal interactions, such as discussions and face-to-face social engagements. Social anxiety disorder, a chronic mental health condition, can be effectively managed by implementing psychotherapy and medication. It can potentially enhance one's self-esteem and reduce inhibitions in social contexts (Ling, 2023).

Depression

Depression is an additional psychological factor contributing to smartphone addiction development. Depression is characterized by its differentiation from ordinary fluctuations in mood and commonplace emotions. The phenomenon can potentially influence several aspects of individuals' lives, encompassing their social relationships with acquaintances, relatives, and the immediate community. There exist multiple mechanisms by which individuals may experience depression. According to Green, Kovacova et al. (2020), the presence of this factor has the potential to disrupt one's routine activities, resulting in a loss of time and a decline in overall productivity. It is possible for relationships and other chronic medical conditions to be influenced by this phenomenon. It could serve as either a causal factor or an indicative manifestation of challenges experienced in professional and educational settings. This medical illness

encompasses a range of symptoms that adversely affect an individual's emotional state, cognitive processes, and behavioral patterns. Individuals with depression commonly exhibit symptoms such as negative affect, diminished interest, reduced energy levels, and difficulties with concentration (Blomberg, Cox, & Langeland, 2022).

Social Anxiety Disorder and Smartphone Addiction

It is apparent from the research that Individuals experiencing mental or health challenges may exhibit heightened levels of stress, leading them to engage in excessive smartphone usage (Nakshine, Thute, et al., 2022). The individuals with problems lack awareness of their addiction's adverse impact on their mental and emotional well-being. The excessive utilization of smartphones has been significantly associated with a decline in overall quality of life, the emergence of self-esteem concerns, and an elevated susceptibility to social anxiety among students. According to Ran, Li et al., (2022), there is a prevailing belief that social anxiety disorder plays a substantial role in manifesting symptoms associated with mobile phone addiction. Numerous empirical investigations have revealed a significant positive association between social anxiety and mobile device addiction. However, alternative research studies have identified a comparatively weaker correlation between these factors.

Depression and Smartphone Addiction

Depression is a general indicator of psychological health and is regarded to be closely associated with smartphone addiction. Most research on this subject connected these two factors (Hitcham, Jackson, & James, 2023). Long-term exposure to social media information makes people more depressed, especially those with negative thought patterns. Additionally, sadness may coexist with the withdrawal symptoms of smartphone addiction. Most people who scored highly on the fear of missing out tend to use their phones excessively (Tao et al., 2023). These people also rate highly on anxiety and depression assessments. This is because excessive smartphone use makes it difficult to engage in social activities, which raises the risk of depression. An individual's depression level will increase if they depend heavily on their smartphone (Mun & Lee, 2023).

Social Anxiety Disorder and Loneliness

Loneliness is a public health issue that has negative impacts on both physical and mental health. However, social anxiety disorder is frequently regarded as a companion to loneliness (Yu, Mo, Zhang, Li, & Lau, 2022). A person with anxiety problems, particularly social anxiety, is more inclined to withdraw from others and decline invitations (Oren-Yagoda, Melamud-Ganani, & Aderka, 2022). Even if he isolates himself, the anxiety can make him feel lonely because it prevents him from interacting with people (Eres, Lim, & Bates, 2023). The results show a strong relationship between the symptoms of social anxiety disorder and loneliness, and they also show that social anxiety is a strong indicator of loneliness (Hu, Mao, & Kim, 2023). For instance, SAD was consistently linked to social isolation, reduced perceived social support, and poor friendship quality, all leading to decreased relationship satisfaction – a crucial aspect of loneliness (Wolters et al., 2023). Similarly, social avoidance is thought to be preferred by lonely people even though loneliness may have developed as a drive to interact with others (Wolters et al., 2023).

Depression and Loneliness

According to research, loneliness influences depression with a clear relationship. Additionally, research has indicated that loneliness has a significant role in making people's experiences of depression worse (ÖZDOĞAN, YALÇIN, HASPOLAT, & ÇELİK, 2023). Positive correlations between loneliness and depression were discovered in earlier studies, and it was found that changes in loneliness could influence depression (Lim et al., 2022). Because of its close relationship to depression, research on loneliness has been impeded. The two states typically coexist, and their respective metrics correlate strongly. It is challenging to separate the causative effects of loneliness and depression (Shemesh & Chen, 2023).

The mediating role of loneliness between Depression and Social Anxiety Disorder with Smartphone Addiction

After an extensive review, the possibility of loneliness as a mediator between depression and smartphone addiction has not been thoroughly investigated. In the relationship between loneliness, depression, and social anxiety disorder, various social media networking platforms and how much of them are used each have a varied role (Shi, Wang, & Zhu, 2023). Investigators also examined the direct connections between smartphone addiction, social anxiety disorder, depression, and loneliness. Smartphone Addiction can result in emotional and behavioral issues like stress, loneliness, anxiety disorder, and depression (Kayis, Satici, Deniz, Satici, & Griffiths, 2022).

Loneliness and Smartphone Addiction

Another factor that smartphone users may experience is loneliness. In the literature, the rapid advancement of technology and the large population of smartphone users are indicators of smartphone addiction and social isolation (Zwilling, 2022). People who experience psycho-social issues like social isolation and loneliness may get dependent on technology by abusing devices like smartphones (Alinejad et al., 2022). Smartphone addiction is a behavior linked to addiction and aggressiveness, and loneliness is seen when the components of hostility are looked at (Karaoglan Yilmaz, Avci, & Yilmaz, 2022). People may now stay in touch with friends and family and fight loneliness and isolation thanks to the internet and smartphones. Loneliness and disconnection rise as technology replaces face-to-face interactions (Ge et al., 2023).

Hypothesis

Hence, based on the discussed literature, we propose.

H1: Social anxiety disorder significantly and positively contributes to Smartphone addiction among students

H2: Depression significantly and positively contributes to Smartphone addiction among students.

H3: Social anxiety disorder significantly and positively contributes to loneliness among students.

H4: Depression significantly and positively contributes to loneliness among students

H5: Loneliness mediates the relationship between social anxiety disorder and smartphone addiction

H6: Loneliness mediates the relationship between depression and smartphone addiction

H7: Loneliness significantly and positively contributes to Smartphone addiction among students

Conceptual Framework

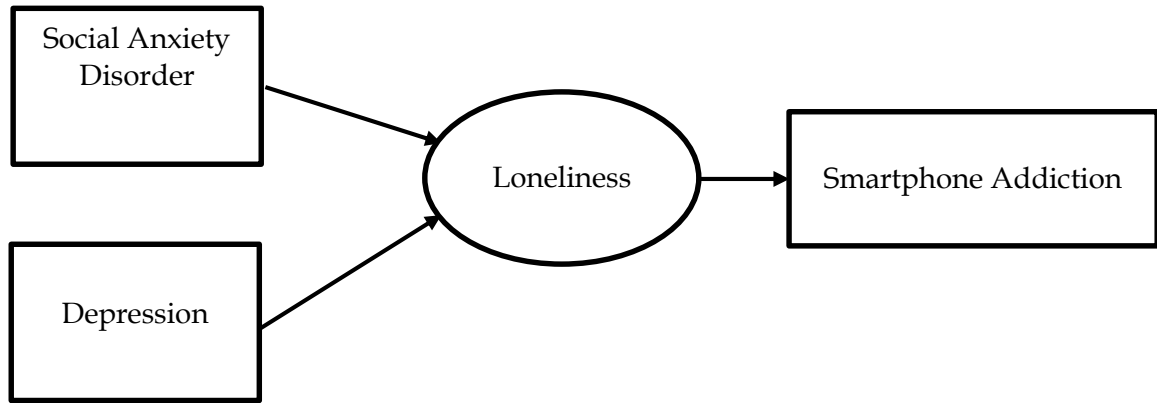


Figure 1: Conceptual Framework

Material and Methods

This study is quantitative, in which non-probability purposive sampling is used. The data is collected by an online questionnaire created on Google Docs. A total of 270 questionnaires were circulated via WhatsApp to university students, from which 251 usable responses were finalized during a month.

Measurements

All the variables used in the research are taken from a previously developed scale. Social Anxiety Disorder is measured with seven items adopted from (Iqbal, Asghar, Ashraf, & Rafiq, 2022). Depression is also measured with seven items adopted from (McBride, Bates, Elphinstone, & Whitehead, 2022). Loneliness consists of seven items adopted from (Conte, Ghiani, Nicotra, Bertucci, & Truzoli, 2022). Smartphone Addiction is measured through seven items adopted from (Zhang, Hao, Liu, Cui, & Yu, 2022). All the responses are ken on a 5-point Likert scale from strongly agree to disagree strongly.

Results and Discussion

Table 1
Respondent Profile

Demographic Variable	Categories	Frequency	Percentage
Gender	Male	174	69.3
	Female	77	30.7
Age	Below 18	22	6.6
	19-30	216	86.1
	31and above	13	5.2
Qualification	Intermediate	51	20.0
	Bachelor	75	30.0

Master	85	34.0
MPhil or above	40	16.0
Total N= 251		

A total of 270 students from the university were approached to be recruited into this study as participants. The total number of final responses included in the analysis was 251. From the respondent profile data, Table 1 shows that male students represent 30.7% (77 students) of the sample, while female students represent 69.3% (174). With regards to age, 86.1% (216 students) are below 20 years, 9 students (3.6%) are of 19 to 30 years, and 5.2% (13 students) are of age 31 and above. Finally, in the case of qualification, 51 out of 251 have completed their intermediate, followed by 75 with bachelor's, 85 with master's degree, and 40 students have M.Phil and above qualification.

Empirical Findings

This study tests all of the variables, and the correlations between them suggested in our model using analysis on the Smart-PLS 3.0 software. Considered a cutting-edge measurement tool, PLS-SEM employs multivariate methods to assess both the "measurement model simultaneously" and the "structural model"). The PLS-SEM is incredibly adaptable, using the bare minimum regarding normative data and sample size while offering superior predicting powers. Measurement and structural model evaluations were employed in the two-step approach to analyze the investigation. The measurement model tests the truthfulness and dependability of the study's constructs, while the structural model assessment was employed to examine the theorized link. The self-starting procedure in PLS-SEM uses the distinctive technique of typically examining the significance of connections in the route coefficient.

Measurement Model Assessment

In this part, we action "confirmatory factor analysis" by determining the convergent and discriminant validity. The convergent validity is investigated using factor loading, Cronbach's alpha, composite reliability, and average variance extracted to see whether the constructs are highly connected. The acceptable ranges for factor loadings, Cronbach's alpha, CR, and AVE are set at > 0.5 for factor loadings, > 0.7 for CR, and > 0.50 for AVE. Table 2 shows acceptable results based on the threshold value for convergent validity. The convergent validity results in our data are shown in Figure 2. All factor loadings and the majority of factor loadings in our data are significant. The convergent validity results in our data are shown in Table 2. Cronbach's alpha is more than 0.70 and varies from 0.85 to 0.90. CR measures the internal consistency of the scale item, and our data's observed CR varies from 0.856 to 0.90 and meets the advised threshold of 0.70. AVE is regarded as a reliable indicator of internal consistency since it captures the variation of a construct relating to the variance of measurement error. Our data's AVE is higher than the suggested threshold of >0.5

Common Method Bias (CMB)

Because there was a potential that the data set would contain common method bias, the study's data were gathered from students at the University of Narowal. As a result, earlier research suggested assessing multicollinearity to validate the presence of the CMB in the data). A collinearity test was run in light of the information above, and the findings supported a VIF value that included five and essential. Data is said to work with CMB without any problems.

Table 2
Convergent Validity

Constructs	items	Loadings	Alpha	CR	AVE
Depression	DEP1	0.724	0.88	0.879	0.511
	DEP2	0.763			
	DEP3	0.685			
	DEP4	0.691			
	DEP5	0.669			
	DEP6	0.709			
	DEP7	0.755			
Loneliness	LON1	0.656	0.866	0.865	0.581
	LON2	0.704			
	LON3	0.595			
	LON4	0.655			
	LON5	0.756			
	LON6	0.770			
	LON7	0.700			
Social anxiety disorder	SAD1	0.743	0.89	0.89	0.541
	SAD2	0.844			
	SAD3	0.815			
	SAD4	0.740			
	SAD5	0.550			
	SAD6	0.692			
	SAD7	0.705			
Smartphone addiction	SPA1	0.859	0.888	0.889	0.537
	SPA2	0.796			
	SPA3	0.812			
	SPA4	0.681			
	SPA5	0.798			
	SPA6	0.552			
	SPA7	0.596			

The Fornell-Larcker and Heterotrait-Monotrait ratio (HTMT) Norms were applied to assess the discriminant validity of the measurement variables.

Table 3
HTMT Ratio

	DEP	LON	SPA	SAD
DEP				
LON	0.814			
SPA	0.702	0.915		
SAD	0.78	0.627	0.822	

The HTMT ratio ratings for each latent variable are shown in Table 3. The HTMT cut-off value should be less than 0.92 and correspondingly less than 0.85. All of the results in Table 3 are within the acceptable range.

Table 4
Fornell-Larcker

	DEP	LON	SPA	SAD
DEP	0.815			
LON	0.714	0.793		
SPA	0.696	0.622	0.736	
SAD	0.778	0.632	0.523	0.833

According to Table 4's results, all variable diagonal values meet the Larcker criteria (Fornell & Larcker, 1981).

Structural Model Assessment

For the purpose of putting our conceptual model's study hypothesis to the test, we evaluated the structural model in SmartPLS. We need specific indices in PLS to determine whether these study hypotheses are accepted or rejected. When we use SmartPLS for bootstrapping, indices like R2 Path coefficients are generated for exogenous to endogenous relationships and used in regression analysis. The exceptional quality of these findings and their capacity to illuminate the accuracy and efficacy of the data make them highly recommended (Fornell & Larcker, 1981). Using the bootstrapping technique to obtain data from 251 respondents, we require route coefficients, T values, standard errors, and p values to evaluate our hypothesis.

Table 5
Direct Relationships

Hypothesis	Beta	SD	T values	P values	LL	UL	Decision
Depression -> Loneliness	0.626	0.06	10.454	000	0.501	0.739	Supported
Depression -> Smartphone addiction	0.511	0.055	9.286	000	0.401	0.618	Supported
Loneliness -> Smartphone addiction	0.816	0.025	32.464	000	0.765	0.864	Supported
Social anxiety disorder -> Loneliness	0.125	0.069	1.807	0.071	0.014	0.265	Supported
Social anxiety disorder -> Smartphone addiction	0.102	0.057	1.798	0.072	-0.011	-0.216	Supported

Table 5 shows the outcome of our proposed hypothesis. The path coefficients, t-values, confidence interval, and p-values provided indisputable proof of the hypothesis' acceptance or rejection.

The results of the relationship between DEP and LON are as follows: ($\beta = 0.626$, $t = 10.454$, $p = 000$, $LL = 0.501$, $UL = 0.739$), DEP and SPA ($\beta = 0.511$, $t = 9.286$, $p = 000$, $LL = 0.401$, $UL = 0.618$), LON and SPA ($\beta = 0.816$, $t = 32.464$, $p = 000$, $LL = 0.765$, $UL = 0.864$), SAD and LON ($\beta = 0.125$, $t = 1.807$, $p = 0.071$, $LL = -0.014$, $UL = -0.265$), SAD and SPA ($\beta = 0.102$, $t = 1.798$, $p = 0.072$, $LL = -0.011$, $UL = -0.216$) proved as significant contributors and these hypothesis are accepted. Hypothesis H1, H2, H3, H4, and H5 are significant and supported, according to this empirical investigation.

Table 6
Mediation Analysis (Indirect Effect)

Hypothesis	Beta	SD	T values	P values	LL	UL	Decision
Social anxiety disorder -> Loneliness -> Smartphone addiction	0.102	0.057	1.798	0.042	0.011	0.216	Supported
Depression -> Loneliness -> Smartphone addiction	0.511	0.055	9.286	000	0.401	0.618	Supported

The study's second objective is to investigate the mediation role of LON and how it modifies different components of SPA to improve SAD results. With the help of SmartPLS, a multivariate analysis tool, we can evaluate complex models and generate insightful results for indirect effect and mediation research. The outcome of LON's position as a mediator between SPA and SAD leads to the following conclusions ($\beta = 0.102$, $t = 1.798$, $p = 0.042$, $LL = 0.011$, $UL = 0.216$). Contrasted with the mediation effect between DEP and SPA ($\beta = 0.511$, $t = 9.286$, $p = 0.000$, $LL = 0.401$, $UL = 0.618$), both hypotheses have a significant mediation effect and are supported.

Conclusion

This research has attempted to increase the existing knowledge on the contribution of social anxiety disorder and depression to smartphone addiction. The results of this research support previous studies. Students primarily use smartphones to cope with social anxiety, loneliness, and depression, along with several other incentives. It has been found that using smartphones provides immediate gratification and satisfaction to users. There is a strong connection and favorable association between variables. It has been found that both social anxiety disorder and depression positively and significantly contribute to Smartphone Addiction with the mediating effects of loneliness. Social anxiety disorder, however, contributes more than depression to smartphone addiction among students. It has also been found that besides these three variables, other factors are responsible for smartphone addiction among students. However, it is also plausible to say that it is a cyclic process, i.e., the psychological issues leading to smartphone overuse or problematic usage, which in turn causes more psychological issues among individuals. Despite its limits, this research may advance our understanding of various topics, including how smartphones affect people's daily lives. This information should assist users in making the most of a smartphone's ability to improve their lives while avoiding its drawbacks.

Recommendations

Smartphone addiction is a controversial topic, as there are different schools of thought on this particular topic about whether it should be considered an addiction type or not. However, in this research, it has been significantly considered as an addiction, so it would be pretty reasonable to offer some recommendations to control its usage that has become an addiction. First, university students exhibiting higher depression levels, loneliness, and social anxiety should be appropriately observed. More longitudinal studies are required in the future because our cross-sectional study has limitations when analyzing causal correlations between variables. Future studies should consider additional personality qualities that may influence the development of compulsive behavior related to smartphone use, including ideas of impulse control and pleasure. The consequences of obsessive smartphone use on mental and physical health should be clarified in future research. Other elements that can be considered independent variables include psychological and behavioral risk elements that should be discussed in future studies because it is unclear how smartphone addiction, social isolation, and academic anxiety affect adolescents with various abilities.

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