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Research Article

The Role of Self-Esteem and Social Anxiety in Predicting Problematic Smartphone Use in School Students

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Abstract

Aim: The present research aimed to investigate the role of self-esteem and social anxiety in predicting problematic smartphone use (PSU) in middle school and high school students.

Methods: This research was of descriptive-correlational type. The research statistical population included all male and female secondary school students in the city of Kazerun in the academic year 2022-2023. The research sample consisted of 333 students selected and assessed using a cluster sampling method. The Cell-Phone Over-Use Scale (COS), the Social Anxiety Questionnaire (SAQ), and the Self-Esteem Scale (SES) were used to measure the research variables. Research data were analyzed by Pearson's correlation coefficient and multiple regression methods.

Results: The research results indicated that self-esteem and social anxiety symptoms were correlated with PSU ($P>0.05$). On the other hand, the multiple regression analysis results demonstrated that 55% of PSU was explained by self-esteem and social anxiety. Moreover, according to the data analysis results, self-esteem was negatively and inversely related to PSU in such a way that by decreasing the self-esteem score, the amount of PSU increased.

Conclusion: These findings denote that self-esteem and social anxiety play a substantial role in predicting PSU in students. Given that PSU is a serious problem that profoundly affects mental health, it is suggested that early intervention is essential in order to strengthen self-esteem and relieve social anxiety.

1. Introduction

Problematic smartphone use (PSU) is smartphone overuse associated with dysfunction, withdrawal problems, and other phenomena similar to drug addiction (Elhai et al., 2019). This term defines an intricate pattern of smartphone-related behaviors that characterize addictive symptoms (Lopez-Fernandez et al., 2017). Research has shown that long-term smartphone use can lead to academic and occupational delay and dysfunction. Furthermore, smartphone use is associated with anxiety and depression (Elhai et al., 2017). In previous studies, this construct has been similarly named "smartphone addiction" and "smartphone overuse" (Thomee, 2018). Adolescence is an individual development course in which the brain is susceptible to addiction and is behaviorally at risk of social media. Smartphones are today considered the companion and entertainment for adolescents and a place to show themselves. Social pressures enhance adolescent willingness to be socially accepted, and social acceptance subsequently activates reward processing (Guroglu et al., 2008). During adolescence, the motivational processing system supports risky decisions (Sherman et al., 2016). As a mechanism to cope with daily stresses (Kuss et al., 2018), repeated smartphone use culminates in mental health problems and addictive behaviors. Students have a strong reaction to positive social media feedback, which is linked to the intensity of social media use (Meshi et al., 2013). Thus, they are a vulnerable population for PSU and nomophobia. Some studies have demonstrated that problematic smartphone use is related to psychological pathologies, such as depression (Thomée et al., 2011), stress (Jeong et al., 2016), poor sleep quality (Woods & Scott, 2016), social anxiety (Reid & Reid, 2007) and low self-esteem (Woods & Scott, 2016; Hokrkon & Hafezi, 1999). Social anxiety refers to the fear or worry about the inability to create a positive impression, particularly when interacting with strangers in public or unfamiliar places, and the fear of humiliation or embarrassment in conditions that encompass others' functioning or precise assessment. The term "social anxiety disorder" has replaced the former "social phobia" (American Psychiatric Association, Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition (DSM-5) Task Force, 2013). Morahan-Martin & Schumacher (2003) stated that individuals with social anxiety need interaction, and online interaction brings them positive satisfaction. Accordingly, Reid & Reid (2007) found that socially anxious individuals prefer online interaction to face-to-face interactions or voice calls compared to less anxious individuals. According to the DSM-5, comorbidity happens with other anxiety disorders, depression, and substance abuse disorders. Other anxiety disorders can be accompanied by social anxiety, and social anxiety can result in depression due to loneliness, isolation, and the inability to establish social contacts. Individuals may resort to drugs, alcohol, or PSU to relieve their anxiety in social situations. According to Caplan (2006), social anxiety moderates the link between loneliness and problematic Internet use so that individuals with social anxiety tend to resort to the Internet. Self-esteem is characterized by self-respect for one's worth or capabilities (Rosenberg, 1965). Extreme PSU is associated with low self-esteem in university students (Ehrenberg et al., 2008) and in adolescents (Yang et al., 2010). Argumosa-Villar et al. (2017) reported the association between nomophobia and poor self-esteem in a 16-25-year-old sample. Greenberg et al. (1999) indicated that self-esteem had a buffering effect on anxiety, in such a way that higher self-esteem relieved anxiety. The compensatory Internet use theory (CIUT) (Kardefelt-Winther, 2014) and the

uses and gratification theory (UGT) (Wolniewicz et al., 2018) set the scene for the present work. The UGT is an old theory of mass communication, suggesting that people have various needs, and are inclined to meet these needs through the use of different types of media. The UGT believes that motivations for using media involve demographic and psychological characteristics. As a concrete example, a lonely individual may resort to social media in order to meet his/her need for social relationships. Moreover, if the lonely person is angry too, he/she may turn to Twitter to troll other users. In the same regard, the UGT states that anxiety can lead individuals to use or overuse Internet technology, such as smartphones, in order to satisfy or relieve their anxiety. Numerous studies have indeed used the UGT to conceptualize anxiety symptoms as a trigger for PSU (Weiss et al., 2017; Van Deursen et al., 2015). The CIUT (Kardefelt-Winther, 2014) assumes that after experiencing stressful life events, many individuals try to relieve the negative emotions stemming from engaging in Internet overuse (such as PSU). Therefore, unlike the UGT, the CIUT focuses primarily on psychopathology in explaining Internet communication overuse. Individuals may resort to other means to relieve their negative emotions, whether adaptive methods such as exercise and social support or maladaptive methods such as non-stop sexual relationships or substance abuse. However, as explained above, the smartphone is permanently within our reach, and therefore it may be the first and most obvious thing (or process) that may be used by many individuals to regulate or relieve their negative emotions. Since the CIUT includes psychopathology in its framework, which is more outstanding than the UGT, we believe that the CIUT is more relevant in understanding the relationship between anxiety and PSU. However, excessive engagement with a smartphone may create anxiety symptoms. For instance, individuals engaging in PSU may thus isolate themselves and neglect to engage in behavioral activities that are of importance for mental health (Dimidjian et al., 2011). As a result of such social isolation and decreased behavioral activity, individuals engaging in PSU may experience anxiety symptoms. In line with the UGT, individuals who report lower self-esteem and higher social anxiety symptoms experience an excessive need for social gratification and consequently report higher levels of PSU. According to the CIUT, the lack of self-esteem and increased anxiety may prevent adolescents from achieving this goal; therefore, they resort to media technologies (such as their smartphones) to meet these needs. In recent years, smartphone addiction has been growing among learners because of excessive dependence on technology. Therefore, it is necessary to conduct comprehensive research on PSU and its effects on their academic performance and personal lives so that a more profound viewpoint is gained regarding the impacts of smartphone addiction on learners' performance. Although numerous studies have been conducted on the factors affecting smartphone addiction, relatively limited research is accessible on its psychosocial impacts; on the other hand, this technology has been progressing over time, and its entry into individuals' various life aspects is also changing. Hence, the present research seeks to answer the question: Whether self-esteem and social anxiety have a significant role in predicting PSU in secondary school students?

2. Objectives

The present research aimed to investigate the role of self-esteem and social anxiety in predicting problematic smartphone use (PSU) in middle school and high school students.

3. Methods

3.1. Sample and Procedure

The present research is considered descriptive-correlational in terms of implementation. The statistical population consisted of all male and female secondary school students in the Jereh and Baladeh Districts in the city of Kazerun in the academic year 2022-2023. In this research, considering the schools' student population (n = 2500), 8 schools (4 female and 4 male schools) were randomly selected among male and female secondary schools using the cluster sampling method and Krejcie & Morgan's (1970) table, and finally, 333 people were regarded as the research sample. Questionnaires were implemented online, and the questionnaire link was provided to the schools' principals and teachers to be uploaded on the Student Educational Network (Shad) for the selected sample.

3.2. Research Tools

3.2.1. Cell-Phone Over-Use Scale (COS)

This 23-question tool was designed by Jenaro et al. (2007) to measure PSU. This scale has been formulated based on ten DSM psychological indices. The Persian version of this scale has 21 questions grading from never (1) to always (6). The individual's higher score denotes his/her cell phone overuse. A score above 75 denotes a high user, a score of 26-75 denotes a normal user, and a score below 25 denotes a low user. Golmohamedian & Yasminejad (2011) also reported the content validity of the scale by 10 experts in psychology and educational sciences to be 0.91 and reliability by Cronbach's alpha method and test-retest to be 0.90 and 0.71, respectively. All items indicated their distinguish power in Hashemi et al. (2022) research at the level of 0.01, revealing the desirable validity of this scale. The reliability of this scale was also reported using Cronbach's alpha of 0.87.

3.2.2. Self-Esteem Scale (SES)

This scale developed by Rosenberg (1965) contains 10 items to measure general self-esteem. Multiple methods have been proposed to score this questionnaire, some of which some are based on a four-point Likert scale ("completely agree" to "completely disagree") and others based on a two-point scale ("agree" and "disagree"). Rosenberg's SES scoring is in this way: In questions 1 to 5, each positive response is assigned a score of +1, and each negative response is assigned a score of -1; in questions 6 to 10, each agree response is assigned a score of -1, and each negative response is assigned a score of +1. After obtaining each item's scores, the scores are added and divided by 10. In this scale, a score higher than zero denotes high self-esteem, and a score lower than zero denotes low self-esteem. Rosenberg (1965) has reported the reproducibility of the scale to be 0.9 and its scalability to be 0.7. Cronbach's alpha coefficients for this scale were 0.87 and 0.86 for male and female students in the first round and 0.88 and 0.87 for male and female students in the second round, respectively. They reported the reliability coefficient to be between 0.87 and 0.89 using Cronbach's alpha. The test-retest correlation ranges from 0.82 to 0.88, and the internal consistency coefficient, or Cronbach's alpha, ranges from 0.77 to 0.88, strongly correlated with the New York and Guttmann's National Questionnaire in measuring self-esteem. Therefore, its content validity is also confirmed. Mohammadi (2014) has obtained the concurrent validity coefficient of this scale using the Coopersmith Self-Esteem

Inventory as 0.61. Keramati et al. (2015) reported the Cronbach's alpha coefficient of this questionnaire to be 0.72.

3.2.3. Social Anxiety Questionnaire (SAQ)

This questionnaire, developed by Lina Jerabek in 1996 to measure social anxiety, has 25 five-option questions (almost always, often, sometimes, rarely, almost never). The scoring method in this instrument is in a direct manner in such a way that the "almost always" option gets a score of 5 and the "almost never" option gets a score of 1. Also, a high score on this scale denotes a lack of social anxiety. Using the factor analysis method, Jerabek (1996, cited in Yadollahi et al., 2013) has extracted 5 factors, including fear of strangers, fear of evaluation by others, fear of public speaking, fear of social isolation, and fear of manifestation of anxiety symptoms, explaining 47.23% of the total variance of the test. The reliability coefficient of this scale was calculated by Jerabek (1996, cited in Yadollahi et al., 2013) as 0.81. Convergent validity for the total scale in individuals with social anxiety disorder was obtained at 0.57–0.80 compared to the SAQ scores (Fardi, 2013). Sam Daliri (2002) reported the reliability coefficient using Cronbach's alpha to be 0.76.

3.3. Ethical Considerations

Questionnaires were implemented online and the questionnaire link was provided to the schools' principals and teachers to be uploaded on the Student Educational Network (Shad). In addition, a text was inserted at the beginning of the questionnaire to confirm the participants' informed consent and at the end of the mentioned text to inform the confidentiality of the information with the researchers.

3.4. Data Analysis

The data analysis was performed in a descriptive (to compare mean scores and the amount of scores' dispersion) and inferential (for correlation and prediction) manner. SPSS-25 software was used in descriptive (mean and standard deviation) and inferential (Pearson's coefficient and regression analysis) statistics methods.

4. Results

Demographic findings demonstrate that 148 (44.4%) students are in the first grade and 185 (55.6%) are in the second grade of secondary school (170 (51.1%)=female, 163 (48.9%)=male).

The important assumption of regression is the lack of effect of collinearity between predictor variables. The variance tolerance factor (VTF) and variance inflation factor (VIF) check these assumptions. The VTF value is between zero and one. If the value of this factor is close to one, it means that this variable has no linear effect on other independent variables, and if it is close to zero, it denotes the reverse. Moreover, the VIF confirms the lack of effect of collinearity between the independent variables if it takes a value less than 2. Another assumption that is taken into account in regression is the independence of errors (the difference between the actual values and the values predicted by the regression model). If the independence of errors assumption is rejected and errors are correlated with each other, it is not possible to use regression. Durbin-Watson test is used to assess this

assumption. If the Durbin-Watson statistic is between 1.5 and 2.5, there is no need to worry because the regression model statistic of the current research (Table 1) ranges from 1.5 to 2.5.

Table 1. Descriptive statistics for each personality facet and reaction to trust

Multicollinearity Indices			
Predictor Variables	**VTF**	**VIF**	**Durbin-Watson Test**
Self-esteem	0.775	1.290	2.392
Fear of strangers	0.792	1.263	
Fear of evaluation by others	0.775	1.290	
Fear of public speaking	0.739	1.353	
Fear of social isolation	0.763	1.310	
Fear of manifestation of anxiety symptoms	0.702	1.426	

VTF: Variance tolerance factor, VIF: Variance inflation factor

As seen, all numbers indicate the lack of a strong effect of collinearity between predictor variables.

The descriptive findings of the research variables are provided in Table 2.

Table 2. Means, standard deviations, and correlation coefficients of research variables

No	Variables	M	SD	1	2	3	4	5	6	7
1	PSU	54.64	18.15	1						
2	Self-esteem	6.22	1.60	-0.451**	1					
3	Fear of strangers	24.41	6.96	-0.462**	0.345**	1				
4	Fear of evaluation by others	11.80	3.59	-0.477**	0.270**	0.337**	1			
5	Fear of public speaking	14.26	3.65	-0.495**	0.114*	0.162**	0.291**	1		
6	Fear of social isolation	15.09	4.03	-0.499**	0.309**	0.311**	0.345**	0.308**	1	
7	Fear of manifestation of anxiety symptoms	14.12	3.77	-0.447**	0.331**	0.234**	0.282**	0.451**	0.304**	1

M: Mean, SD: Standard deviation, PSU: Problematic smartphone use
**P <0.01

The table results indicate that the means and standard deviations related to PSU (54.64 and 18.15), self-esteem (6.22 and 1.60), fear of strangers (24.41 and 6.96), fear of evaluation by others (11.80 and 3.59), fear of social isolation (15.09 and 4.03), and fear of manifestation of anxiety symptoms (14.12 and 3.77). Furthermore, there is a significant relationship between self-esteem and PSU ($r=-0.451$, $P < 0.01$). The results of Table 1 also indicate that PSU is inversely correlated with fear of strangers ($r=-0.462$, $P < 0.01$), fear of evaluation by others ($r=-0.477$, $P < 0.01$), fear of public speaking ($r=-0.495$, $P < 0.01$), fear of social isolation ($r=-0.499$, $P < 0.01$), and fear of manifestation of anxiety symptoms ($r=-0.462$, $P < 0.01$), meaning that by increasing the scores of social anxiety components (a high score denotes no social anxiety), the PSU amount decreases and vice versa.

The results of stepwise multivariate regression analysis to predict the problematic smartphone use based on self-esteem and social anxiety and its components are shown in Table 3.

Table 3. The results of stepwise multivariate regression analysis to predict the problematic smartphone use based on self-esteem and social anxiety and its components

Model	Sum of Squares	df	Mean Square	F	P	R	R^2	ARS
Regression	60391.41	6	10065.32	66.97	0.001	0.743	0.552	0.554
Residual	48994.48	326	150.29					
Total	109385.89	332						

The stepwise regression analysis was used to answer this assumption. As shown in Table 3, the observed F-value is significant ($P < 0.01$) and 552% of the variance related to PSU is explained by self-esteem and social anxiety and its components (fear of strangers, fear of evaluation by others, fear of public speaking, fear of social isolation, and fear of manifestation of anxiety symptoms) ($R^2 = 0.552$). The F-ratio also shows that the regression of PSU is significant on self-esteem and social anxiety, meaning that the relationship between PSU and a linear combination based on the least squares of self-esteem and social anxiety and its components may not be accidental. The results of coefficients related to stepwise multivariate regression analysis are shown in Table 4.

Table 4. The results of coefficients related to stepwise multivariate regression analysis

Model	Unstandardized Coefficients		Standardized Coefficients	T	P
	B	S.E	Beta		
Fear of social isolation	-0.875	0.191	-0.194	-4.583	0.001
Fear of public speaking	-1.418	0.214	-0.286	-6.624	0.001
Self-esteem	-2.377	0.476	-0.210	-4.993	0.001
Fear of strangers	-0.526	0.109	-0.202	-4.842	0.001
Fear of evaluation by others	-0.891	0.213	-0.176	-4.185	0.001
Fear of manifestation of anxiety symptoms	-0.447	0.213	-0.093	-2.098	0.003

Table 5. Means and standard deviations of the research variables in the experimental and control groups in the pre-test and post-test stages

Alexithymia	Mindfulness	Variables		Mean	SD
With	With training	Words with negative affect	Pre-test	9	2.10
			Post-test	3.90	1.66
		Words with positive affect	Pre-test	5.80	1.81
			Post-test	10.80	3.01
		Words with neutral affect	Pre-test	3.80	1.98
			Post-test	4	1.33
	Without training	Words with negative affect	Pre-test	8	1.76
			Post-test	9.30	2.90
		Words with positive affect	Pre-test	4.90	1.37
			Post-test	4.60	1.50
		Words with neutral affect	Pre-test	4.60	1.17
			Post-test	4.30	1.49
Without	With training	Words with negative affect	Pre-test	4.60	1.50
			Post-test	3.90	1.91
		Words with positive affect	Pre-test	11.70	2.45
			Post-test	11.70	3.26
		Words with neutral affect	Pre-test	5.70	1.05
			Post-test	4.20	1.13
	Without training	Words with negative affect	Pre-test	2.80	1.03
			Post-test	2.80	0.78
		Words with positive affect	Pre-test	10.50	3.80
		Words with neutral affect	Post-test	9.90	2.55

SD: Standard deviation

Stepwise multivariate regression analysis was used to determine the strongest PSU predictor through self-esteem and social anxiety and its components (fear of strangers, fear of evaluation by others, fear of public speaking, fear of social isolation, and fear of manifestation of anxiety symptoms). The results of Table 4 showed that fear of social isolation (Beta=-0.194), fear of public speaking (Beta=-0.286), self-esteem (Beta=-0.210), fear of strangers (Beta=-0.202), fear of evaluation by others (Beta=-0.176), and fear of manifestation of anxiety symptoms (Beta=-0.093) were the strongest variables for predicting PSU, respectively. The mean and standard deviation of the research variables in the experimental and control groups in the pre-test and post-test stages are shown in Table 5.

5. Discussion

The present research aimed to investigate the role of self-esteem and social anxiety in predicting PSU in middle school and high school students. The data analysis results revealed a negative and inverse relationship between self-esteem and PSU in such a way that by decreasing the self-esteem score, the amount of PSU increased. This finding is matched with the findings of Li et al. (2019) and Edwards et al. (2022). Twenty percent of the variance related to PSU is explained by self-esteem. Thus, according to the study results, it can be said that self-esteem negatively predicts PSU. It means that students with higher self-esteem will have less smartphone addiction or PSU. This finding is in line with the findings of Elhai et al. (2017), Li et al. (2019) and Firat et al. (2018). The reason for PSU is to some extent because of individuals' motivation to maintain and enhance social relationships and self-esteem. The lack of self-esteem leads an individual to a feeling of sadness. An individual who experiences emotional loneliness and lacks self-esteem resorts to online environments and smartphone overuse and PSU to fill his/her emotional void and gain emotional support in order to fill his/her loneliness. Due to excessive fear, individuals with low self-esteem avoid social behaviors during social activities (Wang & Lei, 2021). The higher the students' self-esteem is, the better their relationships with peers and the less their need for PSU will be. Psychosocial motivations, such as increasing self-esteem and the need to belong, influence individuals' behaviors concerning smartphones. As the smartphone is valuable for communicating with others, self-esteem also impacts smartphone use behavior (Walsh et al., 2009). Similarly, by increasing the scores of social anxiety components, the amount of PSU is also changed. This finding is consistent with the findings of Delavarpour et al. (2021), Shah Rajabian & Emadi Chashmi (2019), Soltani & Baghaie Fard (2020) and Edwards et al. (2022). Watson & Friend (1969) argue that individuals who experience negative events of discomfort, incompatibility, and stress in interpersonal interactions for a long time or even experience fear of negative evaluation may conduct behaviors that keep them away from social groups. In line with the findings of the current research, researchers' findings demonstrate that individuals with social anxiety are often scared of social activities and take part less in these activities. They are used to avoid social activities by their smartphone addiction and seek identity and belonging in the online world as a means to lessen pain, anxiety, and other negative feelings (Przepiorka et al., 2021). If smartphone use turns into a habit, the individual resorts to smartphone use to relieve anxiety and unpleasant feelings. One of the benefits of a smartphone is to communicate with others. Communication with others online is a trait of dependent behaviors. Students seem to become extremely dependent on smartphone use.

The regression coefficient results also indicated that 51.8% of the PSU-related variance was explained by social anxiety and its components (fear of strangers, fear of evaluation by

others, fear of public speaking, fear of social isolation, and fear of manifestation of anxiety symptoms) ($R^2 = 0.518$). This finding is matched with the findings of Elhai et al. (2017) and Firat et al. (2018). According to Ge et al. (2023), anxiety reduces the cognitive resources available to individuals for executive function, and executive dysfunction can culminate in individuals' inability to control their behaviors, consequently resulting in PSU. Higher levels of social anxiety mean that they are less able to experience pleasure in their daily lives (Wacks & Weinstein, 2021). Individuals with high social anxiety are inclined to rely on the online world on their cell phones for emotional support to fill the gap in real-life interpersonal interactions and the need to gain a sense of identity and belonging. Fear of missing out is linked to smartphone addiction (Sun et al., 2022; Zhang et al., 2023). Students with low self-esteem may be more willing to relieve social anxiety through smartphone use and therefore be more susceptible to smartphone addiction. Since smartphones and social networks have changed people's way of interacting with each other, they may also influence social anxiety. According to the findings of the present research, social anxiety is a predictor of smartphone addiction. In explaining this finding, it can be stated that individuals with social anxiety prefer online interactions to face-to-face relationships. The reason is that they are able to communicate in a safer environment and control their way of representation. It leads to less anxiety in socially anxious individuals because, instead of an immediate response, they will have more time to think about what they want to say. In addition, they need not be worried about others noticing their physical anxiety symptoms. It can enhance their self-confidence and allow them to feel better about personal interactions with others, culminating in avoiding face-to-face social situations and also severe anxiety and distress under some conditions. This issue indicates that smartphone addiction can increase the odds of developing social anxiety during face-to-face interactions.

6. Limitation and Recommendation

The current research had some limitations. The data collection in this research was performed only via a questionnaire, which is a self-report tool and personal perception and bias may be included in it. Also, since only secondary school male and female students in the city of Kazerun were investigated, the results should be generalized to other students or other communities with caution. It is suggested that the role of other affecting variables, such as personality traits and family functioning, be investigated concerning smartphone addiction. The use of qualitative research and interviews is also recommended in this regard. Furthermore, it is suggested that smartphone use in schools be considered, and researchers who work on Internet addiction take into account psychological training programs to lessen social anxiety and enhance self-esteem.

7. Conclusion

These findings denote that self-esteem and social anxiety play a substantial role in predicting PSU in students. Given that PSU is a serious problem that profoundly affects mental health, it is suggested that early intervention is essential in order to strengthen self-esteem and relieve social anxiety.

8. Author Contributions

Bahram Mohdzadeh, general framework planning, content editing and analyzing, submission, correction, and final review. *Hojatollah Derafsh*, collaboration in general framework planning,

selection of approaches. *Ramin Kazempour*; comparison of approaches, conclusions. All authors discussed the results, reviewed and approved the final version of the manuscript.

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10. Conflicts of Interest

There are no conflicts of interest.

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