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Developing a model of symptoms of nomophobia in students based on attachment style, media literacy and locus of control with the mediation of Internet addiction

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ABSTRACT

Background and Aim: Smartphones with internet access have replaced computers, become an integral part of life and make life easier. But along with these positive features, there are also various negative effects. Therefore, the use of smartphones can also be problematic. The present study was conducted with the aim of developing a model of symptoms of nomophobia in students based on attachment style, media literacy and locus of control with the mediation of Internet addiction. **Methods:** The method of this study was correlational. The statistical population of this study was the male students of the first public high school in Qom city. 306 people were selected using cluster random sampling method. The data collection tools were Yildirim and Correa's Nomophobia Questionnaire (2015), Hazan and Shaver's Adult Attachment Questionnaire (1987), Falsafi Media Literacy Questionnaire (2013), Rutter's Locus of Control Questionnaire (1966) and Young's Internet Addiction Questionnaire (1999). Data analysis was done using structural equation modeling method and Lisrel software. **Results:** The results showed that the model of symptoms of nomophobia in students based on attachment style, media literacy and locus of control with the mediation of Internet addiction fits experimental data ($P<0.05$). **Conclusion:** It is recommended to design and implement intervention programs in schools for adolescents in the most vulnerable populations who face the adverse effects of using smartphones, especially nomophobic behavior.

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Introduction

The expansion of the use of new technologies and virtual space, including smartphones and tablets, has caused major changes in people's behaviour and habits (King et al., 2013). The revolution of information and communication technology has not only changed the methods of communication and access to information so that now it is possible to get information about anything through the Internet (Parsakia et al., 2023), but it has also led to the emergence of new phobias and psychological problems. Nomophobia has been considered a problematic use of mobile phones; Therefore, it is placed as a situational fear in the subcategory of phobias in the fifth Diagnostic and Statistical Manual of Mental Disorders (Boguero, Ponte, & Bragazzi, 2022). It has caused the formation of many clinical symptoms, including depression and loneliness, social anxiety disorder, obsessive-compulsive disorder, and the formation of other mental disorders. (Yusal et al., 2016; King et al., 2017; Gazgin et al., 2018; Khan et al., 2021).

Nomophobia is probably associated with Internet addiction. Young (1996) defined Internet addiction as a pathological gambling pattern and an impulse control disorder. Young (1999) points out that an Internet addict spends at least 38 hours a week or 8 hours a day on the Internet. Internet addiction is associated with negative emotional, psychological, and social consequences (Shao et al., 2018) and damages students' psychological, communicative, social, and emotional processes (Chen, Poon, & Cheng, 2017). Previous results indicate that students who are extremely dependent on the Internet feel lonely in terms of mental health, do not have the necessary skills in social relationships, and suffer from high vulnerability and low mental health. (quoted by Kafinia and Farhadi, 2020). The results of other research have also shown that Internet addiction in learners has caused the coldness of interpersonal, family, friendly and social relationships and has also caused a change in their personal and social identity (cited by Yousens and Ozer, 2018). Shirafken, Nasralhi, and Hassanzadeh (2020), Dastghib Shirazi et al. (2021), Yin et al. (2019), Eberst et al. (2017), Yildiz Durak (2019) and Zweiling (2022) showed: Cyberspace addiction is related to nomophobia. Gazgin, Chaker, and Yildirim (2018) showed in their study that the higher the level of internet addiction among students, the more homophobic behaviours they exhibit. In another study by Gazgin (2017), the level of nomophobia was higher among students who checked their smartphones more during the day. In Baktot, Kim and Kim's (2020) research, nomophobia and smartphone addiction were positively correlated. Askari, Delavar and Farhani (2017) showed that there is a relationship between the mobile phone consumption pattern and the feeling of mobile phobia.

It seems that one of the effective factors in reducing the harms of using electronic tools and the Internet is media literacy. Media literacy is a collection of views and skills about the audience's control over themselves when facing the media. In other words, media literacy is a person's conscious interpretation of the concepts of media messages (Falsafi, 2014). Studies have shown that media literacy reduces the harmful effects of media and increases the ability of students to process media messages (Forghani & Khodamoradi, 2019). Media literacy training reduces information anxiety (Imanzadeh, Karimi, and Farajpour-Banab, 2019) and reduces the consequences of cyberspace addiction and nomophobia (Shirafken et al., 2020). In a study, Khosravi et al. (2021) found that providing web-based health-oriented education by considering the audience's needs can positively affect reducing nomophobia in students. In the study of Dasghib Shirazi et al. (2021), the existence of a relationship between media literacy and the phenomenon of mobile phone phobia was confirmed.

Another variable that is related to the levels of homophobic behaviour is the locus of control (Yildiz Durak, 2018). Locus of control was proposed in line with Rutter's social learning theory (1966) and refers to the degree of control that people think they have over life events. People who have an internal locus of control are physically and mentally healthier, experience less anxiety and depression, cope better with stress, have more popularity and social skills, and have higher self-esteem (Churchill and Smith, 2022). Anderson (1977) reported that people with an internal locus of control engage in task-oriented behaviours more than those with an external locus of control. Since external and internal locuss of control can have positive and negative effects on a person's mental health,

the harmful effects of Internet addiction and nomophobia can be prevented by strengthening and growing the locus of internal control (Emetadi & Mastri Farahani, 2011). In this regard, the study of Yıldız Dorak (2018) showed that the locus of control can predict the symptoms of nomophobia. The result of Jadan's study (2021) also indicated that there is an inverse relationship between nomophobia and internal locus of control and a direct relationship between nomophobia and external locus of control.

On the other hand, mobile attachment and fear of loss predict nomophobia (Muench & Muench, 2020). According to Hazen and Shaver (1987), attachment is a stable personality trait that significantly eliminates negative relationships in later life; This means that one can infer a person's attachment style from his perception of his close relationships with important people in his life and place people in one of the three categories of secure, avoidant and ambivalent lifestyles. Attachment style is related to mobile phone addiction (Yuchang et al., 2017). The constant companionship of a smartphone with a person may lead to psychological attachment to the device and replace the attachment to human persons (Bradford, Cowan, and Sobota, 2017); Individuals with higher attachment anxiety are more likely to use the cell phone as a compensatory attachment target (Kunok et al., 2016). Research has shown that the current generation has a high dependence on technology (Parsakia et al., 2023). According to Arpasi et al. (2017), people who are more emotionally attached and want more closeness and attention in the relationship show higher levels of fear or distress when they do not have access to their cell phones. Kiefer et al.'s (2012) study showed that people with an anxious attachment style are very sensitive to signs of possible rejection or release, and they constantly consider others unreachable and unresponsive and show more dependence on objects and brands. Attachment style is also a predictor of nomophobia (Muench & Muench, 2020). Choi and Seo (2015) and Moo (2017) stated in their study that attachment styles are an important factor in problematic smartphone use. In Boyuk-Cholpan's (2019) study, avoidant and anxious attachment significantly and positively predicted nomophobia. Yelpaz's study (2020) also showed that self-control fully mediates the relationship between insecure attachment styles and problematic smartphone use.

As studies have shown, studies have been conducted on the relationship between different variables and nomophobia; However, so far, this relationship has not been investigated in the form of a codified model. On the other hand, the advancement of technology has led to the widespread use of communication devices such as mobile phones, which represent the anxiety symptoms of nomophobia. Studies have also shown that nomophobia positively correlates with the duration of mobile phone use (Yildiz Durak, 2019), the duration of using social networking sites and mobile internet (Yildiz Durak, 2018). On the other hand, this study intends to conceptualize the phenomenon of nomophobia in the form of structural equation modelling and consider the role of predictive and mediating factors. This necessity can be seen in previous research. Currently, limited research is found in terms of determining factors of nomophobia. Mental health is very important during adolescence. Maintaining academic, behavioural and emotional functions in this sensitive period of life is necessary. Therefore, in the present study, the question has been raised whether the model of symptoms of nomophobia in students based on attachment style, media literacy and locus of control has a good fit with the mediation of Internet addiction.

Method

The method of this study was correlational. The statistical population of this study was the male students of the first grade of high school in Qom city, who entered the sampling stage based on the criteria of 13 to 15 years of calendar age, having a smart phone and being familiar with working with it, and accessing the Internet through a smart phone. The sampling method was cluster random. In this way, from the four districts of Qom city, district four was randomly selected, and four schools were randomly selected from the 20 public boys' first secondary schools in this district. One class from each grade was randomly selected from each school, and a total of 3 classes were selected from each school. In this way, a total of 12 classes were selected from four schools, and the total number of students in these 12 classes was 324. The research questionnaires were distributed among them and finally, after collecting the questionnaires and the questionnaires related to 18 people being distorted, 306 samples were subjected to statistical analysis (n = 306).

Materials

1. Attachment style questionnaire: The adult attachment questionnaire was created by Hazen and Shaver (1987) and is set on the assumption that similarities of child-caregiver attachment styles can be found in adulthood as well. This tool consists of 15 sentences describing the person's feelings about comfort, closeness and intimacy in relationships. The scoring of this questionnaire is done on a five-point Likert scale, from very little = 1 to very much = 5. This questionnaire does not have a total score; Therefore, a high score in the subscales of avoidant and ambivalent attachment indicates unhealthy and insecure attachment. Also, a high score in the secure attachment subscale indicates a healthy attachment

style. Hazen and Shaver (1987) reported the psychometric properties of this instrument as satisfactory. The reliability of the test was obtained with the test-retest method equal to 0.4. In Iran, the content validity of this test has been obtained by the method of translation and re-translation and reviewing experts' opinions by Mazaheri (2000). Also, in Mazaheri's research (2000), the test-retest reliability of the categorical measurement of this test was calculated to be around 0.7. In the study of Pajohinia et al. (2014), the content validity of this questionnaire was investigated by measuring the correlation between the scores of four psychologists. Correlation coefficients were obtained from 0.73 to 0.76 for secure attachment style, 0.60 to 0.76 for avoidant attachment style, and 0.63 to 0.78 for ambivalent attachment style. Concurrent validity of Hazen and Shaver (1987) attachment questionnaire was investigated by comparing the results of Coopersmith's (1967) self-esteem test. Correlation coefficients between subjects' overall score in the self-esteem test with attachment style indicate: Positive correlation between secure attachment and general self-esteem (r=0.39), academic self-esteem (r=0.39), family self-esteem (r=0.39) and social self-esteem (r=0.41). In the present study, the reliability of this questionnaire was obtained by Cronbach's alpha method for the subscale of secure attachment 0.69, avoidant attachment 0.64 and ambivalent attachment 0.68.

2. Internet Addiction Questionnaire: The Internet Addiction Questionnaire was first designed by Yang in 1994 with 8 questions and then its completed form with 20 questions was presented by him in 1999. This questionnaire was created to measure the duration of excessive use and obsession with the Internet and to measure the extent and severity of Internet addiction based on clinical experiences. This questionnaire is scored on a five-point Likert scale, ranging from rarely (score 1) to always (score 5). This questionnaire has a total score and the higher a person's score is, the more his dependence and addiction to the Internet will be. In the study of Young and Rogers (1998), the internal reliability of the questionnaire was mentioned above 0.92, and the reliability by the retest method was reported to be significant (cited by Alavi et al., 2010). In the research of Kalhor & Akhr (2016), the internet addiction questionnaire was first given to a number of expert professors who had sufficient experience in the field of the research topic to judge the questions of the questionnaire, then their opinions were collected and the questionnaire was implemented after modification. They also calculated the Cronbach's alpha coefficient of the questionnaire as 0.89. In the present study, the reliability of this questionnaire was obtained with Cronbach's alpha method of 0.84.

3. Nomophobia Questionnaire: The nomophobia questionnaire was created by Yildirim and Koria (2015) in order to evaluate the severity of nomophobia and identify its dimensions. This questionnaire consists of 20 items and four subscales of loss of communication, inability to communicate, lack of access to information, and loss of comfort. People respond to each item of this questionnaire based on a seven-point Likert scale (from 1 for completely disagree to 7 for completely agree). This questionnaire has a total score and higher scores in this questionnaire indicate greater severity of nomophobia. Yıldırım and Kuria (2015) verified the construct validity of this questionnaire using the factor analysis method. These researchers reported favorable concurrent validity of nomophobia questionnaire by obtaining a high correlation between this questionnaire and mobile phone involvement questionnaire. This questionnaire was translated in Iran by Azadmanesh et al. (2016). In the study of Alizadeh et al. (2021), Cronbach's alpha of this questionnaire for subscales was reported between 0.74 and 0.88. Concurrent validity was equal to 0.51 and retest reliability was equal to 0.81. The results of confirmatory factor analysis also showed that all four factors of the main questionnaire were confirmed in the Persian version (Alizadeh et al., 2021). In the current study, the reliability of this questionnaire was obtained by Cronbach's alpha method for the subscale of loss of communication 0.68, inability to communicate 0.72, lack of access to information 0.73, and loss of comfort and convenience 0.71.

4. Media literacy questionnaire: The media literacy questionnaire was designed by Falsafi in 2014. This tool has 20 items and includes five subscales of understanding the content of media messages, awareness of hidden goals of media messages, conscious selection of media messages, critical look at media messages and analysis of media messages. This questionnaire is scored using a five-point Likert scale (1=very low to 5=very high). This questionnaire has a total score and a higher score means more media literacy. Falsafi (2014) confirmed the validity of the tool with the opinion of professors and experts and obtained its reliability with Cronbach's alpha method as follows: Understanding the content of media messages 0.77, awareness of hidden goals of media messages 0.82, conscious selection of media messages 0.79, critical look at media messages 0.80 and analysis of media messages 0.75. In the research of Sheikhul Islami and Vahdat (2018), reliability was calculated using Cronbach's alpha method of 0.83. In the present study, the reliability of this questionnaire was calculated by Cronbach's alpha method as follows: Understanding the content of media messages was 0.82, awareness of the hidden goals of media messages was 0.80, conscious selection of media

messages was 0.74, critical look at media messages was 0.80, and analysis of media messages was 0.79.

5. Locus of control questionnaire: The locus of control questionnaire contains 29 items, which was compiled by Rutter in 1966. Rutter compiled 23 items of this questionnaire with a specific goal to clarify people's expectations about the locus of control. Scoring is based on the sum of the scores obtained from the number of crosses that the examinee specifies in front of the questions. In the 23 items that are determined for grading, questions (a) get one mark and questions (b) get zero marks. Because the total score of each individual indicates the type and degree of the person's locus of control, therefore only subjects who score 9 or more will have an external locus of control and those who score less will have an internal locus of control. This questionnaire does not have a total score. In Rutter et al.'s (1972) study, the primary reliability coefficient of the locus of control scale was 0.65 using the binomial method, 0.73 using the Kuder-Richardson method, and 0.72 using the retest method with a one-month interval. The differential validity of Rutter's locus of control scale was determined based on the correlation of its scores with Marlowe-Kravan's social satisfaction scale scores and was calculated in a diverse sample of subjects including university students and prisoners in the state of Ohio. The obtained correlation coefficients ranged from 0.16 to 0.41 (cited by Fedai, 2019). In Iran, the retest reliability is 0.75 and its Cronbach's alpha is 0.70. The differential validity of the locus of control scale based on the correlation with the students' academic average is equal to -0.22 and the concurrent validity of this scale with the Cooper-Smith self-esteem scale and Pierce-Harris self-concept scale has been obtained as 0.61 and 0.72, respectively. (cited in Fadaei, 2011). In the present study, the reliability of this questionnaire was obtained by Cronbach's alpha method for the subscale of internal locus of control 0.71 and external locus of control 0.69.

Implementation

Among the ethical considerations in the present study were the following: 1) The objectives of the research were explained to the students. 2) The students entered the study with personal consent and the consent of one of the parents. 3) Students and their parents had the right to know the results of the questionnaires. 4) Students had the right to skip answering questionnaires and research tests if they did not want to. Data analysis was done with the structural equation modeling method and with Lisrel software. In this study, using confirmatory factor analysis, the general structure of research questionnaires was subject to content validity. The standard factor load of confirmatory factor analysis to measure the strength of the relationship between each factor (hidden variable) and its observable variables (questionnaire items) in all instruments of the present study was greater than 0.3. Therefore, the factorial structure of each questionnaire was confirmed. The questionnaires were examined by expert professors and the face validity of the questionnaires was confirmed.

Results

Descriptive findings related to 306 male students of the first secondary level of public schools in Qom city in the academic year 2021-2022, indicated that 111-year-old students (36.27%) had the largest sample size. 15-year-old students, 90 people (29.42%) had the smallest sample size. Eighth grade students numbered 112 people (36.60%) included the largest sample size and ninth grade students numbered 87 people (28.43%) included the smallest sample size. First-born students numbered 140 (45.75%) included the largest sample size and third-born students numbered 41 (13.40%) included the smallest sample size. Table 1 shows the descriptive characteristics of the research variables.

Table 1. Descriptive characteristics of research variables

Variable	Mean	SD	Variance	Skewness	Kurtosis
Internal control source	7/28	2/31	5/34	-0/511	-0/161
External control source	15/45	2/11	4/45	-0/415	-0/178
Locus of Control	20/38	3/38	11/42	-0/522	-0/261
Symptoms of nomophobia	78/94	5/42	28/38	-0/620	0/209
addiction to Internet	78/24	3/01	9/06	-0/336	-0/401
media literacy	79/21	3/13	9/80	-0/500	-0/171
Avoidant attachment style	20/54	3/16	9/954	-0/512	-0/352
Ambivalent or anxious attachment style	19/76	3/005	9/033	-0/375	0/158
Secure attachment style	19/04	3/09	9/552	-0/317	0/043
attachment style	59/06	3/29	10/82	-0/450	0/306

The data in Table 1 shows that the highest mean is related to media literacy with a value of 79.21 and the lowest mean is related to secure attachment style with a value of 19.04. Considering that the skewness and elongation statistics of the research variables are all between -2 and +2, the data has a normal distribution. Before analyzing the data using the structural equation modeling method, the assumptions of multivariate normality, multivariate outliers and multivariate normality were confirmed. To check the normality of the data, skewness and kurtosis tests were used (Table 1). Considering that the skewness and elongation statistics of the research variables were all between -2 and +2, the assumption of normality of the data was confirmed. According to the assumptions, the suitability of the proposed model was evaluated based on suitability criteria. The research hypothesis model is presented in figures 1 and 2.

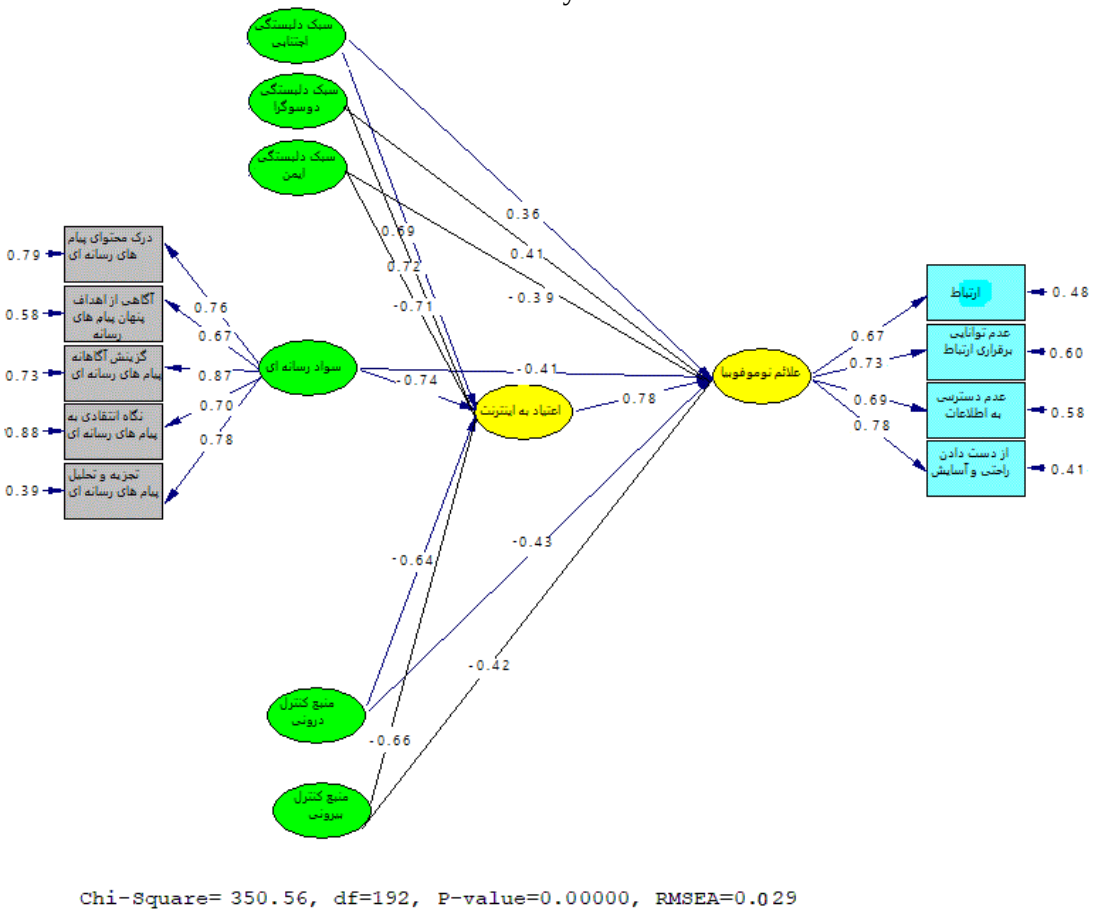

Figure 1. The results of structural equation model verification of the research hypothesis

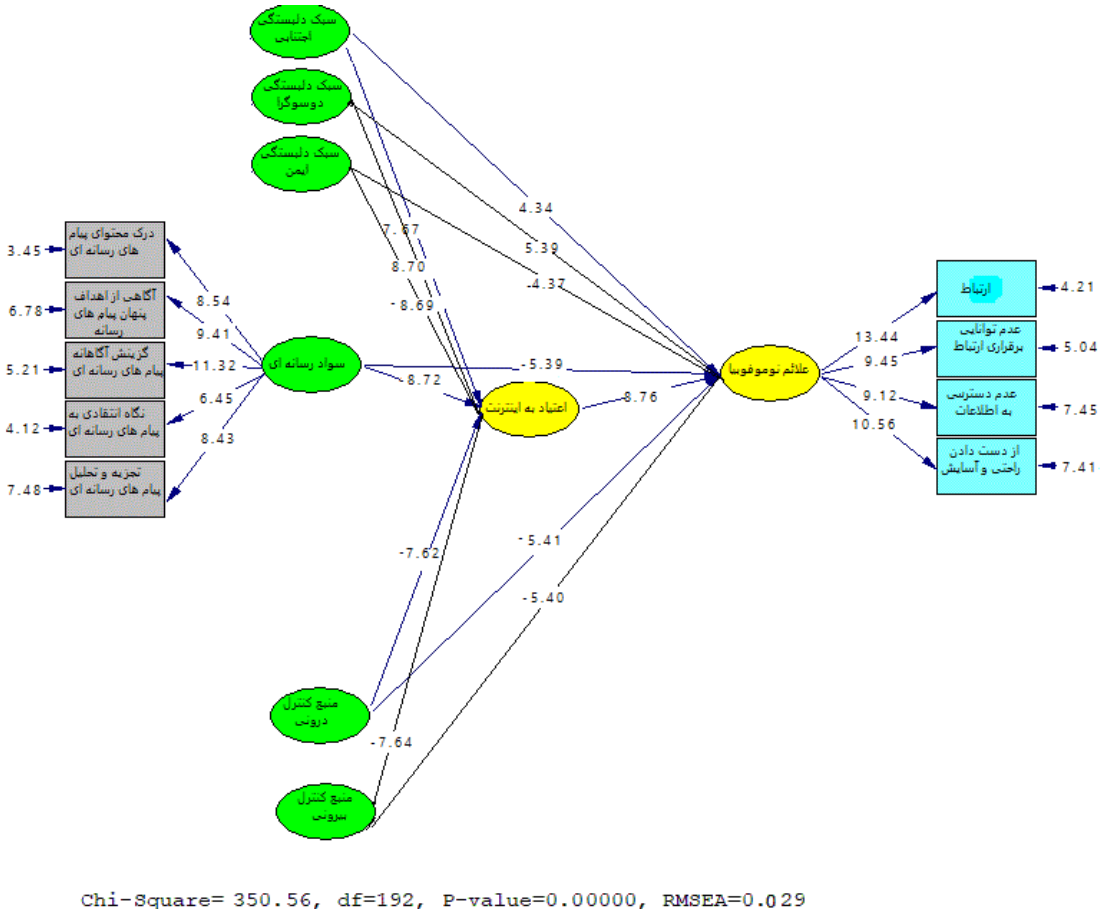

Figure 2. T-statistics of the results of structural equation model verification of the research hypothesis

In Figure 1, the numbers on the paths are the beta weights. Among these coefficients, the highest coefficient (0.78) is related to the path of Internet addiction with symptoms of nomophobia, and the weakest coefficient (0.36) is related to the path of avoidant attachment style with symptoms of nomophobia. The results of the direct relationships of research variables in the proposed model show that all path coefficients were statistically significant. In the final model of the research, the relationship between the variables of the model of nomophobia symptoms in students based on attachment style (avoidant, ambivalent or anxious) and the source of control with the mediation of Internet addiction was positive and significant. In the final model of the research, the relationship between the variables of the model of nomophobia symptoms in students based on secure attachment style and media literacy with the mediation of Internet addiction was negative and significant. Referring to Table 2, you can see the standard coefficients of all routes in the proposed model.

Table 2. Standard coefficients of paths of the proposed model

Direction	Std error.	SD err.	Critical ratio	Sig.
Avoidant attachment style ----> symptoms of nomophobia	0/36	0/267	4/34	0/0005
Avoidant attachment style ----> Internet addiction	0/69	0/341	7/67	0/0005
Ambivalent attachment style ----> symptoms of nomophobia	0/41	0/456	5/39	0/0005
Ambivalent attachment style ----> Internet addiction	0/72	0/390	8/70	0/0005

Secure attachment style ----> symptoms of nomophobia	-0/39	0/231	-4/37	0/0005
Secure attachment style ----> Internet addiction	-0/71	0/245	-8/69	0/0005
Internet addiction----> symptoms of nomophobia	0/78	0/301	8/76	0/0005
Internal locus of control ----> symptoms of nomophobia	-0/43	0/245	-5/41	0/0005
Internal locus of control ----> Internet addiction	-0/64	0/148	-7/62	0/0005
External locus of control ----> symptoms of nomophobia	-0/42	0/187	-5/40	0/0005
External control source ----> Internet addiction	-0/66	0/166	-7/64	0/0005
Media literacy ----> symptoms of nomophobia	-0/41	0/117	-5/39	0/0005
Media literacy ----> Internet addiction	-0/74	0/211	-8/72	0/0005

Based on standard coefficients and critical values presented in Table 2, all direct paths are significant (P<0.05). In the proposed research model, there are five indirect or mediating paths. The bootstrap method was used to determine the significance of each of the mediating relationships and the indirect effect of the independent variable on the dependent variable through mediation. Bootstrap results for mediating paths of the proposed research model can be seen in Table 3. In this bias table, the expression of the difference between the data, the bootstrap and the standard error also shows the standard deviation of the indirect estimates in the bootstrap samples.

Table 3. Bootstrap results for the indirect paths of the research model

Direction	Data	Boot	Bias	Error	Lower bound	Higher bound	Sig.
Avoidant attachment style with symptoms of nomophobia with the mediating role of Internet addiction	0/538	0/413	0/004	0/279	0/127	0/379	0/005
Ambivalent or anxious attachment style with symptoms of nomophobia with the mediating role of Internet addiction	0/561	0/530	0/003	0/315	0/149	0/433	0/005
Secure attachment style with nomophobia symptoms with a mediating role of Internet addiction	0/510	0/501	0/002	0/218	0/121	0/445	0/005
Media literacy with symptoms of nomophobia with the mediating role of Internet addiction	0/577	0/531	0/001	0/247	0/139	0/469	0/005
Internal locus of control with nomophobia symptoms with a mediating role in Internet addiction	0/499	0/467	0/001	0/241	0/144	0/460	0/005

External locus of control with nomophobia symptoms with a mediating role in Internet addiction	0/514	0/501	0/001	0/214	0/121	0/471	0/005

In this section, to answer the proposed hypothesis, structural equation modelling was used in the form of path analysis based on the covariance method of Lisrel software, and the model parameters were estimated by the maximum likelihood method. Path analysis was used to test the proposed model. The fit of the proposed model with the data based on goodness of fit indices, including Chi-Square as an absolute goodness of fit index, is reported in Table 4. The higher the chi-square value, the lower the model's fit. A significant chi-square indicates a significant difference between the assumed and observed covariances. However, because the chi-square formula includes the sample size, its value is inflated for large samples and usually becomes statistically significant. For this reason, many researchers examine chi-square in relation to its degree of freedom (χ2/df). In the relative chi-square index, the values close to 2 and less are considered as a conventional criterion for the suitability of the model. To check model fit indices, several other indices, including parsimony fit index, comparative fit index, parsimony comparative fit index, incremental fit index, goodness of fit index, and mean square error of estimation, are used and reported in Table 4.

Table 4. goodness of fit indices of the structural model of the research

Model fit indices	x^2	df	pvalu	CMIN/df	RMSEA	PNFI	CFC	PCCFI	IFI	GFI
Before modifying the model	771/66	192	0/187	4/01	0/068	0/099	0/097	0/091	0/095	0/093
After modifying the model	350/56	192	0/0005	1/82	0/029	0/092	0/095	0/093	0/094	0/094

In order to fit the structural model of the research, a number of goodness of fit indices have been used. One of the general indices to take into account the free parameters in the calculation of the fit indices is the normalized chi-square index, which is calculated by dividing the chi-square by the degree of freedom of the model. If this value is between 1 and 3, it is desirable. Since the root mean square index is approximately equal to 0.029, the model has a good fit. Other goodness of fit indices have also been accepted in the range, which is shown in Table 4.

Table 4 shows that the goodness of fit indices supported the good fit of the model with the collected data. All the values of the fit indices show the acceptable fit of the proposed model with the data. In the next step, in order to improve the fit of the proposed model, it was used by freeing a number of degrees of freedom by plotting the correlation between the independent variables of attachment style, media literacy, and source of control, and the fit indices of these models have been shown.

Attachment style (avoidant, ambivalent or anxious, secure), media literacy, locus of control and Internet addiction, R2 index shows the amount of explained variance of endogenous latent variables. The coefficient of determination of attachment style variable (avoidant, ambivalent or anxious, secure) is 0.56. It shows that all independent and mediating variables, i.e. attachment style (avoidant, ambivalent or anxious, secure), can predict 56% of the changes in nomophobia symptoms, which is a strong amount. It can be seen that the coefficient of determination of media literacy variable is 36% and the variable of control source is 42%, on average, the coefficient of determination of Internet addiction variable is 46% on average. According to the estimated indicators, it is

suitable to develop a model of symptoms of nomophobia in students based on attachment style, media literacy and locus of control with the mediation of Internet addiction.

Conclusion

The present study was conducted to compile a model of nomophobia symptoms in students based on attachment style, media literacy and source of control with the mediation of internet addiction. The findings of this study showed that avoidant attachment style has an effect on nomophobia symptoms. This finding is in line with the study of Yelpaz (2020), Buyukcholpan (2019) and Arpasi et al. (2017).

In explaining this finding, it can be stated that the attachment style, according to Bowlby (1973), is the attachment that occurs between the baby and the person who takes care of him (mostly the mother). Depending on the infant's need for continuous and adequate fulfillment, he tends to evaluate the world as a safe or unreliable place. If the infant is exposed to the caregiver's dismissive and indifferent attitude, it is expected to have an avoidant attachment style. People with avoidant attachment have a strong ego, but they do not form close relationships with other people because they do not trust others. Bowlby (1969) believes that since attachment is a strong bond that begins early in life and is created by the influence of the social environment, it has a significant impact on emotions, thoughts and behaviors in every period of life. Therefore, the lives of people with insecure attachment may be more problematic. Those unable to be securely attached tend to gravitate toward nonhuman targets such as objects that make them feel good. For this purpose, it is stated that people bring ROM to their smartphones when they need support. In this regard, Choi and Siu (2015) and Moo (2017) stated in their study that attachment styles are an important factor in problematic smartphone use. In addition, in the study of Boyukcholpan (2019), insecure attachment is known as an important determinant of nomophobia.

The findings of this study showed that anxious attachment style affects the symptoms of nomophobia. This finding is consistent with the study of Yuchang et al. (2017), Boyokcholpan (2019), Arpasi et al. (2017), and Konok et al. (2016).

According to Bowlby (1969) and Hazen and Shaver (1994), attachment to objects can be explained as a compensatory attachment strategy when primary attachment targets are unavailable (cited in Konok et al., 2016). Consistent with this hypothesis, attachment to objects has been reported primarily when important social relationships (primary attachment targets) are reduced, temporarily unavailable, or lost. The perceived lack of trust from primary attachment persons causes a general compensatory attachment to objects and to the mobile phone. Also, Keefer et al. (2012) showed in their study that participants who were aware of uncertainty about their relationships reported increased dependence on belongings, increased separation stress caused by the absence of their phone, and increased motivation to access it. Thus, the mobile phone may serve as a compensatory attachment goal providing a sense of security and a substitute for one's social connections. At the same time, it has a facilitating function in relation with which primary attachment relationships can be maintained and strengthened. Uncertainty about the availability of primary attachment images facilitates the use of compensatory attachment strategies (e.g. attachment to objects); Therefore, those who are constantly insecure about the responsiveness of close people are more prone to develop attachment to objects.

The findings of this study showed that secure attachment style has an effect on the symptoms of nomophobia. This finding is consistent with Yelpaz's (2020) study, which showed that all three attachment styles have an effect on problematic smartphone use. In explaining this finding, it can be said that according to Bowlby (1973), attachment occurs between the baby and the person who takes care of him (mostly the mother). The child tends to evaluate the world as a safe or untrustworthy place. As stated by Muench and Muench (2020), it is expected that people who are regularly and adequately socialized during infancy will develop secure attachment. People who have a secure attachment can better manage their emotions and desires; Because they consider themselves and the world to be reliable. They also successfully form close relationships, manage their stress and seek support. Due to the multi-functionality of smartphones, they can be described as excellent devices to meet the needs

of users. Smartphones can be called digital companions that are more than just technical equipment. The interaction of users with their phone can even go to the level of pseudo-human relationships, human relationships and psychological attachment compared to other social and human partners.

The findings of this study showed that media literacy has an effect on the symptoms of nomophobia. This finding is in line with the study of Khosravi et al. (2021) and Dastghib Shirazi et al. (2021). This finding can be explained in this way that Bandura, as the founder of the self-efficacy theory, believes that a person's assessment of his abilities in a specific situation has a strong influence on a person's decision-making in choosing an activity and insisting on it. Based on the cognitive-social theory, the choice of behavior, commitment and persistence in its implementation depends to a large extent on self-efficacy beliefs. Using effective and efficient trainings and having high self-efficacy increases adaptability in times of stress and mental pressures, as well as reducing dependence on mobile phones. Therefore, the application of self-efficacy theory among people with nomophobia can most likely lead to a change in their behavior in the optimal use of mobile phones; This is realized through media literacy training and increasing self-awareness and self-efficacy, because media literacy improves the level of awareness of people in the correct use of mobile phones.

The findings of this study showed that the internal locus of control has an effect on the symptoms of nomophobia. This finding is consistent with the study of Yildis Dorak (2018) and Jadan (2021). Locus of control is a predictor of one's own values, expectations, and characteristics, and as a concept, it shows how a person perceives their responsibility for various experiences. People with an internal locus of control believe that their lives are determined by their own actions. According to people with an internal locus of control, personal abilities and efforts, rather than luck and fate, determine the outcome of life events. Anderson (1977) reported that people with an internal locus of control engage in task-oriented behaviors more than those with an external locus of control. Those who have a strong tendency towards an internal locus of control define and accomplish their goals based on the belief that they have control over their achievements. When people with an internal locus of control perceive their smartphones as useful, they are more likely to believe that relying on their phones can help them successfully solve homework problems.

The findings of this study showed that the external source of control has an effect on the symptoms of nomophobia. This finding did not align the study; But it is inconsistent with the study of Ildiz Dorak (2018) and Jadan (2021). In his study, Yıldız Durak (2018) showed that locus of control has a positive correlation with levels of nomophobic behavior. In his study, Jadan (2021) concluded that there is a direct relationship between nomophobia and external locus of control. It was predicted that there would be a positive relationship between external locus of control and symptoms of nomophobia; However, the findings of the present study determined the negative relationship between these two variables. In fact, people with an external source of control have little autonomy, and low control in the use of smartphones probably leads to addiction to this technology. However, in explaining this disparity, Anderson (1977) reported that people with an internal locus of control engage in task-oriented behaviors more than those with an external locus of control. Those who have a strong tendency towards an internal locus of control define and accomplish their goals based on the belief that they have control over their achievements. When people with an internal locus of control perceive their smartphones as useful, they are more likely to believe that relying on their phones can help them successfully solve homework problems. On the other hand, people with an external locus of control may not have such a strong belief, which may lead to less smartphone use and a reduced likelihood of nomophobia symptoms. Therefore, excessive dependence of internal locus of control on smartphones in order to solve task-based problems increases the likelihood of smartphone addiction. Individuals with an internal locus of control orientation can be vulnerable to addiction when they are concerned about the utilitarian benefits of product use.

The findings of this study showed that internet addiction has an effect on the symptoms of nomophobia. This finding is consistent with the study of Shirafken et al. (2020), Ildiz Dorak (2018), Gazgin (2017), Yin et al. (2019), and

Gazgin, Chaker and Yildirim (2018). The explanation of this finding based on the theory of behaviorism and learning paradigm is that all behaviors are the result of conditioning that occur through interaction with the environment, and addiction behavior is one of its examples. Based on Skinner's operant conditioning theory, since learning occurs through reinforcements and punishments, people become addicted to smartphone technology and internet services due to pleasure and satisfaction. Gaining pleasure and satisfaction is the positive reinforcement of the individual to continue the behavior of using smart phone technology and internet service. The need for positive reinforcement increases over time and eventually an addictive behavior appears. On the other hand, the theory of rational emotional behavior, which is an approach based on the way of thinking, emotion and behavior, states that our cognition or thoughts are the determining factor for our emotions and behaviors. People experience negative emotion and then engage in certain maladaptive behavior due to false beliefs that conflict with reality.

In a general summary, the findings of this research showed that the model of symptoms of nomophobia in students based on attachment style, media literacy and locus of control with the mediation of Internet addiction is suitable with experimental data. However, since this research was conducted cross-sectionally, it raises limitations in the field of interpretations and documentation of the aetiology of the investigated variables, which should be considered. It is recommended that school-based intervention programs be designed and implemented for adolescents in the most vulnerable populations facing the adverse effects of smartphone use, especially nomophobic behavior.

Conflict of Interest

According to the authors, this article has no financial sponsor or conflict of interest.

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