Original Article

Psychometric Properties of Mobile Phone Abuse (MPA): Exploratory and Confirmatory Factor Analysis in Student Mobile Users

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Abstract

Objective: Smartphone is an important technology device in our lifestyle. It has an important part of our daily lives, but it also has a negative effect, such as cell phone dependency. This research aimed to evaluate the psychometric properties of mobile phone abuse (MPA) in the Iranian population.

Method: In this study, data were chosen from 1100 participants who were studying in Tehran universities. The principal version of the scale was translated into Persian using the back translation method. All attendees completed Demographic Questionnaire, MPA Questionnaire, and Mobile Phone Problematic Use Scale (MPPUS). Eventually, a clinical interview (based on the fifth version of DSM) was done for all the participants. For data analysis, internal and external consistency, factor analysis, construct validity and confirmatory factor analysis (CFA) were used. Statistically, less than 0.05 were considered to be significant.

Results: According to expert judgments, content validity index was satisfactory. Furthermore, the reliability of the questionnaire was confirmed with Cronbach's α of 0.90 and test-retest reliability of 0.56 after 3 weeks. The best cutoff point for this questionnaire (MPA) was 46. Also, 4 factors were extracted by principal components method and varimax rotation: "excessive use of cell phone," "addictive use of social networks," "mood modification," and "preoccupation" for both male and female students.

Conclusion: MPA could be used in studies on the evaluation of mobile phone addiction. This can be a stepping stone towards the identification of problems and improvement of students' mobile phone abuse.

Key words: *Cell Phone; Psychological Test; Students*

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A cell phone (also known as a hand phone, mobile phone, and smart phone) has made our communication easier by making and receiving calls over a radio link to the farthest places of the world irrespective of our presence at those places (1).

During the last decade, the utilization of cell phones has dramatically increased, therefore, cell phones have become an important part of life (2); about 2.5 billion people use a cell phone every day (3) and it is expected to increase by 2.87 billion in 2020 (4). Cell phone use in Iran has been expanded to all areas of occupational, social, educational and family life.

Mobile phone dependency is the main issue affecting youngsters' psychological and physical health. Some specialists show that more than 25% of youngsters have got dependent on smart mobile phones (5).

It is necessary to mention that cell phone dependency refers to an obsession with multiple behaviors with cell phones as mass media or strong and continuous eagerness for and dependency on cell phone usage, which greatly damages psychological functions (6). Some researchers also describe cell phone addiction as a behavioral addiction caused by human-cell phone interactions. (7, 8).

To measure cell phone addiction, several instruments have been designed to appraise mobile addiction, each of which are based on the diagnostic criteria of behavioral or substance addiction. Some of these questionnaires are as follow: Cellular Phone Dependency Questionnaire (PDQ), Mobile Phone Problematic Use Scale (MPPUS), and Mobile Phone Addiction Tendency Scale (MPATS) Toda Mobile Phone Dependency (TMD). These questionnaires were designed based on different definitions of smartphone dependency.

One of the first tools to measure mobile phone addiction is cell phone dependence questionnaire (CPDQ), which was designed by Toda and his colleagues (9). It consists of twenty items, and it is scored on a 4 point Likert scale, ranging from zero (hardly any) to three (always), with the total scores ranging from zero to eighty, with a high score displaying high degree of addiction to cell phones. The CPDQ is widely applied and it proved to have good reliability (2). For example, Alavi et al (2014) reported that internal consistency of the CPDQ was .88 (Cronbach's α of the factors were 0.85 for salience, 0.70 for overusing the cell phone, and 0.76 for compulsive use of SMS, respectively, in students (2).

Mobile Phone Problematic Use Scale (MPPUS): The MPPUS was designed by Bianchi and Phillips (2005) and many of researchers stated that MPPUS is as a basic measuring questionnaire for deeper research. It evaluates many symptoms such as cell phone dependency, withdrawal symptoms and destructive effects on health, social, economic, and occupational status. Internal consistency (Cronbach's α) of this scale was 0.91; Cronbach's α of the factors was 0.87 (preoccupation), 0.70 (withdrawal symptoms) and 0.82 (overuse of

mobile phones), respectively. The external consistency (test-retest) of the MPPUS was 0.56 (10).

Toda Mobile Phone Dependency (TMD): The items of TMD were constructed according to the criteria of DSM-IV-TR. The primary 101-items was reduced to forty six items after a pilot study. (11). Mohammadi et al (2015) reported that TMD has an acceptable reliability with adequate factor models to measure the problems caused by the "overuse" of the mobile phone in the Persian students (8).

To sum up, the use of cell phones has also increased at global level (11) and mobile addiction is prevalent in the adolescents, especially in students, which may cause many problems in occupational and educational performances and family relationships; thus, it seems necessary to survey cell phone addiction in this population (13, 14). The benefit of MPA to perform this study is mainly due to its factor analysis (compulsive behavior, functional impairment, withdrawal and tolerance) (15). The four aspects of the MPA constitute some of the DSM substance abuse diagnosis criteria (DSM-5). This condition makes Mobile Phone Abuse questionnaire especially interesting for the establishment of a parallelism between the addictive use of the cell phone and the addictive disorder by substances (15). We hypothesize that the Persian version of MPA will be a reliable and valid tool to measure the abuse for the smart mobile phone in the student population.

Also, to the best of our knowledge, no psychometric questionnaire is available in the Persian language for investigating mobile addiction based on DSM-5; therefore, we planned a translation and validating study of the MPA, which is an instrument developed by Olivencia-Carrión et al (2018). On account of the few studies that have been prformed in the field of mobile phone using, a reliable and valid tool based on our culture is needed to differentiate the normal users of mobile phones from the dependent users based on psychological effects. Therefore, the major aims of this study were to (a) develop a Persian version of the MPA using standard translation procedure and (b) evaluate various psychometric features of the Persian MPA.

Since assessments of mobile dependency are common in student population, this study was done at universities in Tehran, Iran.

Materials and Methods

This cross-sectional study was conducted in Tehran universities. After explaining the study objectives to the participants and reassuring them about the confidentiality of their information, their written informed consents were obtained. The participants aged between 18 and 25 years (mean = 20.12, SD = 3.05, 27.1% women and 72.9% men) who were selected from universities of Tehran using multistage cluster sampling method. Students were selected by investigatory during class breaks and were recruited by cluster sampling design. Eventually, all subjects of the cluster sample

were included in the final sampling. A total of 1100 participants were recruited between November 2018 to April 2019. To calculate the sample size, the CI (confidence interval) and power of study were estimated to be 95% and 80%, respectively.

$$n = \frac{Z^2 * p(1-p)}{d^2} = \frac{1.64^2 * 0.2(1-0.2)}{0.02^2} = 1076 \sim 1100.$$

Inclusion criteria were being a student (freshman, sophomore, or senior) at universities of Tehran during the study, having a cellular phone, willingness to participate. Exclusion criteria were as following: students with severe mental or physical problems and they who were not able to fill out the questionnaires. Evaluations were performed by MA, PhD, or PhD student of clinical psychology .

Also, screening interviews for cell phone addiction were done for each participant. Semi-structured interviews were performed by two specially trained clinical psychologists who held a PhD degree in psychology .

The mean age of students was 20.12 years (SD = 3.05). More than half of the respondents (76.1%) were primarily junior, freshmen, or sophomores and others held Bachelor, MA, or PhD degrees. Almost 2.5% of the participants were married.

Instrument

Demographic Characteristics: The first questionnaire including items to elicit information on the demographic profile of the students. The demographic data of the questionnaire included age, marital status, gender, major, and year in college, mobile facilities and reasons for using mobile phone.

MPA (Mobile Phone Abuse): This questionnaire was originally developed in Spanish but was published in English and it assesses mobile phone dependence, internet, and social networks. This instrument investigates different aspects of pathological smartphone use according to the DSM-5 diagnostic criteria for behavioral addiction(16). It consists of 25 items scored based on a 5-point Likert scale ranging from zero (strongly disagree) to four (strongly agree) resulting in a final score between 0-100. Olivencia-Carrion et al (2018) assessed the reliability of MPA using Cronbach's α coefficients (α = 0.91) for 4 factors, including craving factor (α = 0.74), the loss of control factor (α = 0.70), negative life consequences factor (α = 0.77), and withdrawal syndrome factor (α = 0.77).

MPPUS (Mobile Phone Pathological Use Scale): This scale was designed and validated by Bianchi and Phillips and it comprises of 27 items; it measures several symptoms such as smart mobile phone dependency, social, economic and occupational status, withdrawal symptoms and destructive effects on health. The reliabilty of this scale (Cronbach's α) was reported to be α = 0.91(17). The Persian version of this questionnaire has suitable psychometric properties. Internal consistency of the MPPUS was 0.91. The external reliability (test-retest) of the MPPUS was 0.56 (10).

The Interview to diagnose Mobile Phone Dependency: The content of this interview was according to the DSM criteria for behavioral addiction. In addition, their content was suitable; the test–retest reliability and Kappa coefficient were 0.4 and 0.55, respectively (18).

Ethical Considerations

The Proposal of the study was approved by the Psychiatry and Psychology Research Center (Grant Number: 39537). Also the Research Ethics Committee of the TUMS (IR.TUMS.VCR.REC.1397.469) was approved the study.

Data Analysis

For data analysis, we used factor analysis (to analyze construct validity), internal stability (Cronbach's'α), split half, and retest, respectively. P value less than 0.05 was considered to be statistically significant. Given the large sample size (n > 300), we calculated the normality of MPA score by measuring its skewness and kurtosis. Kim (2013) reported a non-normal distribution with skewness of >2 and kurtosis of >7 (19); hence, in the present study, the calculated skewness and kurtosis were <2 and<7, respectively, and thus the results generally followed a normal distribution.

Results

Content Validity

Translation and Cultural Adaptation: The MPA was translated and culturally adapted to the Persian language, and an expert psychologist translated the scale into Persian. To check the efficacy of translation, a bilingual back-translated it into English. The translated version was reviewed by the research team and the differences and cultural discrepancies were resolved through discussion with the translators. Subsequently, the preliminary version was examined in 10 students in Tehran University of Medical Sciences and was assessed for understandability and clarity of items .

Face validity: Face validity means whether test items are matched with the issue they are supposed to appraise. At this stage, the modified questionnaire regarding content validity was given to 40 students who were required to appraise the items regarding relativity, problems, ambiguity, proper terms, and structure of the sentences, and understandability using a five-point Likert scale ranging from zero (strongly disagree) to four (strongly agree). Then, all the scales were gathered and analyzed. Then, the impact score was computed for each item using the following formula, and scores > 1.5 were considered to be acceptable. Impact score = Frequency (%) × Importance.

The results of the first analysis revealed that all the students believed all the items of MPA were simple, clear, and related to the objectives. Moreover, the impact scores of all the items were above 1.5.

The specialists surveyed usefulness, appropriateness, and meaningfulness of each question to define how

accurately the measurement instrument taps into the different feature of the construct questions .

In the present study, 10 experts (clinical psychologists) who were familiar with psychometric properties of the questionnaire were available, but only 5 fulfilled the inclusion criteria of the study. These criteria included having at least having a PhD degree or being a PhD student, or having Msc in psychology, and having at least 2 years or more of working experience in research centers, and being familiar with instrumentation processes. The questionnaire was given to 2 persons with a PhD degree in clinical psychology and 2 psychologists who were required to appraise the items with respect to suitable grammar and wording, understandability, and relatedness to Persian culture and to mention their suggestions, if any, next to each item. Then, the questionnaires were gathered and the point of views considered. In the quantitative approach, on the other hand, the modified questionnaires were given back to the experts for assessment of Content Validity Ratio (CVR). They were also required to review the items with respect to being necessary, beneficial, or unnecessary. Then, the questionnaires were collected and CVR was counted for each item. Thereafter, the modified questionnaires were returned to 10 experts who were required to analyze the items concerning relativity. All of the 10 questionnaires were collected and Content Validity Index (CVI) was calculated for each item as well as for the whole questionnaire. In this study, CVI and CVR >0.7 were considered to be acceptable statistically (20).

$$CVI = \frac{\text{number of raters giving a rating of 3 or 4}}{\text{Total number of raters}} \qquad CVR = \frac{\left[n - \left(\frac{N}{2}\right)\right]}{\frac{N}{2}}$$

Concurrent Validity

To evaluate the concurrent validity of MPA, there was a positive and significant relationship between the total score of the questionnaire and MPPUS (r = 0.66). Also, there was a strong and significant correlation between the score of the MPA and the time spent on smartphones per day (r = 0.41).

Factor Analysis

In the analysis of the structure of this questionnaire, factor analysis was used to extract the factors from the analysis of the main components, and Varimax was used to perform the rotation (Varimax rotation was used because it is the most rotation in social sciences, and this rotation). Can cause orthogonal factors (21). This rotation technique was used because it was presumed that the factors were correlated with one another, as the aspects that constitute the component (mobile-phone dependency) are not independent of one another. Some researchers have suggested that if a factor explains 5% of the total variance, it is meaningful (19).

The range of factor loadings for the items as well as the Eigen values and variance are shown in Table 1. Eigen values of greater than 1.00 explained variance of 50.08%. Also, a scree plot curve indicated the factors that were above the eigenvalue>1.0 (Figure 1). The Kaiser–Meyer–Olkin (KMO) index was 0.92 for the adequacy of samples (Bartlett's test of sphericity was significant, df = 300, x2=9537.48, P < 0.0001) and thus it is permissible to reject H_0 (null hypothesis). The Kaiser–Meyer–Olkin (KMO) index indicates that the correlation matrix is appropriate for factorization. Factor 1 "excessive use of cell phone" was the strongest, describing the greatest percentage of variance (31.97%) and 6 items were loaded on this factor; 5 items reflected factor 2 "addictive use of social networks"; Eight items of the MPA were loaded on factor 3 "mood modification". The fourth factor, was named "preoccupation" and included 6 items. Moreover, the factor analysis supports the structural validity of this questionnaire.

Also, the results of independent t –test analysis showed that there are gender differences between females and males regarding 4 factors of MPA, which means that the 2 groups differed significantly in terms of mobile addiction and all its dimensions.

Confirmatory Factor Analysis (CFA)

The value of 0.92 of Kaiser–Meyer–Olkin (KMO) test of sampling sufficiency and a significance of Bartlett's test of sphericity (p < 0.0001) showed the suitability of CFA. The goodness-of-fit indexes for the confirmatory model were as follows: ($\frac{x2}{df}$ 269 = 1716; p < 0.0001; CFI = 0.92; TLI (Tucker-Lewis Index) = 0.94; RMSEA (root means square error of approximation) = 0.07, GFI (goodness-of-fit index) = 0.87), CR (Composite Reliability) = 0.88, HOELTER = 209. Therefore, all the items remained in the model. Therefore, CFI, TLI, and GFI were satisfactory (≥ 0.90) (Table 2). The Cronbach's alpha coefficient was 0.90 for the global questionnaire and 0.88, 0.79, 0.80, and 0.77 for each of the corresponding factors (excessive use of cell phone, addictive use of social networks, mood modification, and preoccupation) showing that the findings were very reliable. Figure 2 indicates a graphical representation of the confirmed model based on data.

Reliability
Analysis of Internal reliability of the MPA

Several statistical methods can be used to evaluate reliability according to the characteristics of the data (categorical or continuous) and the contexts of testing variables. Pre survey and post survey responses were coded and entered into SPSS$_{24}$ software for Intraclass correlation coefficient (ICC) and Cronbach's alpha internal coefficient. The Intraclass correlation coefficient (ICC) is commonly used to characterize the test reliability of continuous variables. Internal reliability of Likert-type scales was calculated using Cronbach's alpha (α) coefficient. intraclass correlation coefficient (ICC) shows temporal stability of the questionnaire. Correlation coefficients were calculated according to the following values: under 0.40 ±weak correlation ;

±0.4 - 0.6 moderate correlation; 0.61 - 0.80 ± suitable correlation; and 0.81 to 1.00 ± very good correlation.

The reliability of the questionnaire was assessed using internal consistency, which is an index indicating the homogeneity of the items of an instrument. In this method, Cronbach's alpha (α) coefficients > 0.7 represent acceptable reliability (22). The reliability of the MPA is presented in Table 3.

Analysis of External reliability of the MPA
The test–retest reliability of the MPA was administered on 50 students with a 3-week interval and showed a significant level of 0.001. Pearson correlation revealed a consistency of 0.56 between the 2 administrations. The time interval (3 weeks) between test-retest was according to literature suggestions (23). Also, the split-half reliability of the questionnaire was calculated with the relationship factor between Sets I and II. The relation was 0.61. Statistical significance was set at 0.05 levels.

Determination of the Cutoff Point

A total of 343 participants (31.2%) were identified as having mobile phone addiction based on the behavioral addiction criteria (which is presented in DSM-5) and were diagnosed as having behavioral addiction, especially smart cell phone dependency. In this study, the standard was the psychological interviews. All participants were further divided into screening positive (n = 343) and screening-negative groups (n=757).

Clinician-administered schedules based on DSM-5 are often considered as the gold standard in epidemiological researches. The ROC (Receiver Operating Characteristic) analysis for the MPA gave an area under the curve of 83%, indicating that the MPA had good diagnostic efficiency (CI =0.80-0.85). The cutoff point of 46 was best for discriminating cases of mobile addiction from normal users, with a high sensitivity (83%) and acceptable specificity (63%), showing that this was an optimal cutoff point to screen the possible cases of cell phone addiction (Table 4).

Table 1. Total Variance Explained of Mobile Phone Abuse (MPA)

Components	Initial Eigenvalues			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	7.993	31.971	31.971	4.504	18.017	18.01
2	2.017	8.069	40.040	2.834	11.334	29.35
3	1.419	5.677	45.717	2.744	10.975	40.32
4	1.092	4.370	50.087	2.440	9.761	50.08

Table 2. Goodness-of-Fit Indexes of Mobile Phone Abuse

The Goodness-of-fit indexes	X^2	$\frac{\chi^2}{df}$	RMSEA[1]	CFI[2]	TLI[3]	GFI[4]	CR[5]
Expected value	P< 0.05	Less than 3	Less than 0.1	More than 0.95	More than 0.90	More than 0.90	More than 0.50
Calculated value	0.0001	1716	0.07	0.92	0.94	0.87	0.78

1. Root mean square error of approximation
2. Comparative fit index
3. Tucker-Lewis Index
4. goodness-of-fit index
5. Composite Reliability

Table 3. Reliability Statistics of Mobile Phone Abuse (Cronbach's Alpha)

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	ICC	Cronbach's Alpha if Item Deleted
MPA.Item.1	41.94	287.54	0.50	0.89
MPA.Item.2	42.22	289.99	0.43	0.90
MPA.Item.3	42.08	292.60	0.40	0.90
MPA.Item.4	41.95	293.41	0.41	0.90
MPA.Item.5	42.27	289.08	0.48	0.90
MPA.Item.6	42.47	287.13	0.54	0.89
MPA.Item.7	42.43	287.20	0.56	0.90
MPA.Item.8	42.01	289.27	0.47	0.90
MPA.Item.9	41.92	288.71	0.50	0.90
MPA.Item.10	41.99	292.60	0.44	0.90

MPA.Item.11	42.20	291.87	0.43	0.90
MPA.Item.12	42.26	291.93	0.47	0.90
MPA.Item.13	41.99	289.22	0.50	0.90
MPA.Item.14	42.28	289.95	0.48	0.90
MPA.Item.15	42.34	289.71	0.53	0.90
MPA.Item.16	42.44	290.27	0.53	0.90
MPA.Item.17	42.62	292.91	0.46	0.90
MPA.Item.18	42.63	287.98	0.56	0.90
MPA.Item.19	42.65	284.05	0.62	0.90
MPA.Item.20	42.39	284.25	0.61	0.90
MPA.Item.21	42.41	285.49	0.60	0.90
MPA.Item.22	42.50	285.83	0.60	0.90
MPA.Item.23	42.35	286.80	0.60	0.90
MPA.Item.24	42.70	293.33	0.46	0.90
MPA.Item.25	42.8191	293.757	0.43	0.91

Table 4. Specificity, Sensitivity, and Cutoff Point According to ROC Curve

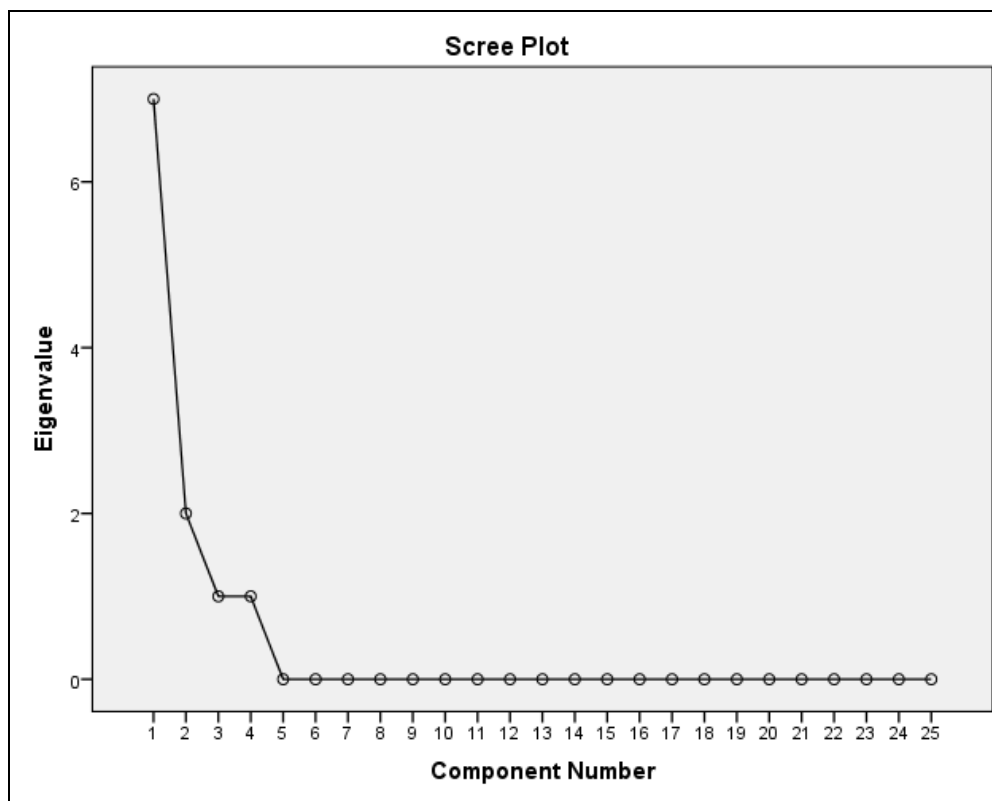| Cut off point	Sensitivity	1 - Specificity
45.00	0.84	0.39
46.00	0.83	0.37
47.00	0.78	0.34
48.00	0.75	0.33

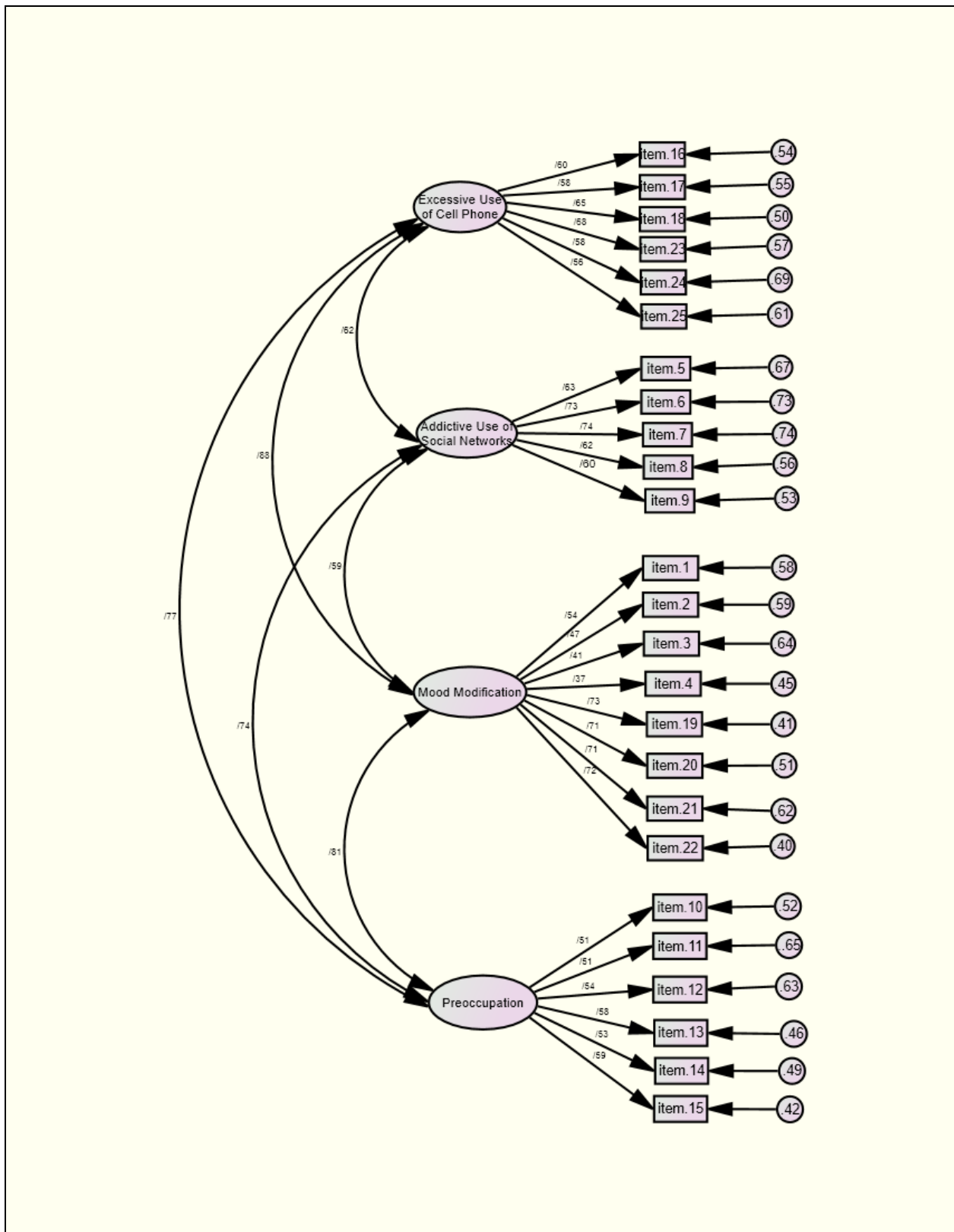**Figure 1. Factors That Are Extracted Via the Scree Plot of Mobile Phone Abuse**

Figure 2. Graphical Representation of the Confirmed Model Based on Results of Mobile Phone Abuse

Discussion

This study was the first attempt to appraise the psychometric features of the MPA in male and female students (age range between 18-25 years). In the present study, we create a valid and innovative scale to evaluate cell phone dependency according Persian culture. The MPA questionnaire comprises of 25 items covering behavioral addictive symptoms, based on the criteria of the DSM-5 (24). To achieve the study goals, first, the questionnaire was translated into Persian and then, its validity and reliability were measured. The results of content validity indicated that the items of the questionnaire were intelligible and related to Persian society. The reliability of the MPA was also estimated to be 90% and Cronbach's alpha coefficients were calculated; reliability of the 4 extracted factors from the MPA were evaluated as acceptable. Also, test-retest (after a during three weeks after) and split –half reliability were satisfactory, demonstrating an excellent internal and external consistency as seen elsewhere in similar studies in other countries (11). These reliability coefficients were higher than those gained in some previous studies (25), which confirmed the reliability of this questionnaire. Olivencia et al (2018) reported that the reliability of MPA was calculated using Cronbach's alpha and the findings were as follow: total score of reliability was 0.91; the reliability of factors was 0.74, 0.70, 0.77, and 0.77 respectively (15). Therefore, the reliability gained in the Persian language and original version may be advantageous. Consequently, internal and external reliability was appropriate for the questionnaire. Moreover, the calculated coefficients were higher than those obtained in some previous studies (25) and this indicates more internal consistency in our study in comparison with others.

The questionnaire profited from acceptable face and content validity for assessment of cell phone addiction, which is consistent with the results of other studies (15). According to findings from confirmatory factor lysis, the MPA represents a second-order factor and 4 first order factors consistent with behavioral addiction symptoms: excessive use of mobile phone, addictive use of social networks, mood modification and preoccupation. The extracted factors indicate considerable overlap with the symptoms of behavioral addiction which are proposed previously (7, 11, 26-28) and were developed according to the criteria for the diagnostic symptoms of addiction in the DSM-5(24); the latter more recently included preoccupation as a diagnostic criterion. Indeed, negative life consequence, mood modification, excessive use, loss of control, and preoccupation were already assumed as diagnostic criteria for addiction symptoms prior to DSM-5(16). Also, the correlation matrix in factor analysis indicated the sufficiency of sample size. It is reported that the KMO measure should be over 0.5, while over 0.9 is very good (29). It can be concluded that the inner relationship of these 4 factors of our study

can be implicated as construct validity. In this study, a factor was obtained called the addictive use of social networks, which was not gained in the original study. This can be due to differences between Iranian and other country samples. In some Asian countries (30) and especially in Iran, excessive use of mobile phones is due to the use of virtual environments. Moreover, in Iran, communication may be done using social networks such as Telegram, WhatsApp, Instagram, etc., and this was the most prominent factor in mobile phone abuse. The most commonly reported correlation coefficients in this study are same as in the original questionnaire these results indicate the simplicity and smoothness of the questionnaire expressions in both English and Persian. Also, the Persian version has ideally conformed to the Iranian culture.

Based on the results, participants with a score of 46 and higher are affected by mobile dependency and we proposed these cutoff point scores as a threshold for screening normal users from addicted users, but in research or diagnosis of mobile addiction, these results should be interpreted with caution to maintain the validity of the questionnaire. Khoury et al (2017) reported that in interpretation of cutoff point some considerations should be considered. Also, use of the cutoff point will depend on the aim of the questionnaire (to screen or to diagnose) and the prevalence of mobile phone dependency in the population in which the questionnaire will be applied. Moreover, no cutoff point has full accuracy, so diagnostic errors will occur (31).

The findings obtained with MPA showed that there are gender differences between females and males regarding 4 factors of MPA (P < 0.05). These results are consistent with previous findings showing that females send more and length fuller texts than males, and they talk for longer times with the phone and consider mobile phones as a social tool (32). Randler et al (2016) cited that gender is an important predictor for mobile phone dependency and that girls are more prone to become addicted, and according to their results, females had higher scores than males in smart phone addiction (33). Also, some studies indicate that women have higher rate of dependence and problematic use of mobile phone than males (25, 34).

The result of this study shows that MPA measures properties of the addiction on mobile phone in university students. This questionnaire may be used to guide the organization, clinic, or researchers who investigate the problems of cell phone addiction. Also, the present study indicates that the MPA is the first self-reported tool for cell phone addiction based on DSM-5 criteria and it may provide a diagnostic profile for researchers to appraise mobile phone dependency with regards to its psychometric properties and its contents. The MPA proves to be a useful assessment instrument to measure problems in connection with mobile phone use. However, as the adolescents represent one of the groups

that are in sensitive age and are vulnerable to both drug and non-substance addictions (35-38) and this affects their behaviors, social interactions and identities (39). Also, this age group is exposed to many other mental illnesses (40-42) that need to be planned to improve their quality of life.

The difference in results may be due to demographic variations in the 2 populations. However, in the present study because cell phone addiction is considered as reprehensible, to minimize false positives, a higher score was considered as the cutoff point.

Limitation

Tthe gender distribution in the current study was unequal with 75% males. This might affect the psychometric evaluation of the questionnaire.

Strengths

Despite the limitations, our study has several strengths. We used the gold standard to diagnose smart mobile phone dependency in this research. A validated standard to screen cell phone addiction may promote the accuracy of validity of the MPA because the content of interviews is very similar to the diagnostic criteria for addictions in ICD10 or DSM.

Another strength of the current study comes from sample size. This large sample allowed us to use up to date statistical methodology and special methods.

Conclusion

In conclusion, it is reasonable to assume that the Persian validation of the MPA was successful.

The MPA might be a helpful questionnaire for further studies on behavioral addiction and specially cell phone addiction. To summarize, our findings confirm that this version of MPA appears to be a valid and reliable instrument in sociocultural background of Iranian population. The evaluation of "addictive social use" and "craving for use" was a more important dimension in this questionnaire, as previously no proceeding existed that were proportionate with the DSM 5. In terms of clinical outcomes, MPA validation is an important step in the development of diagnostic and treatment methods and the design of prevention and intervention strategies to diagnose smart cell phone abuse.

Acknowledgment

Conflict of Interest

The authors notice that they have no conflict of interest

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