

Validity and reliability of the Persian version of mobile phone addiction scale

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Background: With regard to large number of mobile users especially among college students in Iran, addiction to mobile phone is attracting increasing concern. There is an urgent need for reliable and valid instrument to measure this phenomenon. This study examines validity and reliability of the Persian version of mobile phone addiction scale (MPAIS) in college students. **Materials and Methods:** this methodological study was down in Isfahan University of Medical Sciences. One thousand one hundred and eighty students were selected by convenience sampling. The English version of the MPAI questionnaire was translated into Persian with the approach of Jones *et al.* (Challenges in language, culture, and modality: Translating English measures into American Sign Language. *Nurs Res* 2006; 55: 75-81). Its reliability was tested by Cronbach's alpha and its dimensionality validity was evaluated using Pearson correlation coefficients with other measures of mobile phone use and IAT. Construct validity was evaluated using Exploratory subscale analysis. **Results:** Cronbach's alpha of 0.86 was obtained for total PMPAS, for subscale1 (eight items) was 0.84, for subscale 2 (five items) was 0.81 and for subscale 3 (two items) was 0.77. There were significantly positive correlations between the score of PMPAS and IAT ($r = 0.453$, $P < 0.001$) and other measures of mobile phone use. Principal component subscale analysis yielded a three-subscale structure including: inability to control craving; feeling anxious and lost; mood improvement accounted for 60.57% of total variance. The results of discriminate validity showed that all the item's correlations with related subscale were greater than 0.5 and correlations with unrelated subscale were less than 0.5. **Conclusion:** Considering lack of a valid and reliable questionnaire for measuring addiction to the mobile phone, PMPAS could be a suitable instrument for measuring mobile phone addiction in future research.

Key words: Exploratory subscale analysis, mobile phone addiction, reliability, validity

How to cite this article: Amidi Mazaheri M, Karbasi M. Validity and reliability of the Persian version of mobile phone addiction scale. *J Res Med Sci* 2014;19:139-44.

INTRODUCTION

Throughout the two past decades, there has been a rapid expansion in the use of communication technology such as the Internet and mobile phones. Mobile phones are one of the greatest inventions of communication technology today's world and has become extremely popular and widely used all over the world. Because of its ease, the majority of people in developed as well as developing countries use mobile phones. In 2008, the number of mobile users around the world was around 2 billion^[1] and reached up to 4.6 billion subscribers by the end of 2009.^[2]

According to the IT News in 2011; the number of mobile phone users in Iran was 73 million people (www.mobna.net). Studies have demonstrated young people are more likely than any other demographic group to use mobile phones and mobile phones have become highly prevalent with youth, in particular, young people are adopting mobile phones as an integral part of their daily lives.^[3]

Despite the fact that mobile phones are tremendously attractive as a device for communication and interpersonal contact in young people, there is increased risk about its inappropriate usage.

The adverse effects associated with the problematic use of mobile phones have investigated in various studies for instance; prior studies demonstrated that long-term use of mobile phones may lead to brain tumors.^[4]

Mobile phone radiation can lead to the change of genetic regulation^[5] and make worse oxidative stress in corneal and lens tissues.^[6]

Long-term use of mobile phones can lead to neck, shoulder, and lower back pain^[7] and hearing and vision harms.^[8]

Studies have been also demonstrated that problematic use of mobile phones to be associated with adolescent alcohol drinking^[9] and increased body mass index.^[10]

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Received: 26-01-2013; **Revised:** 11-07-2013; **Accepted:** 10-11-2013

Association between problematic use of mobile phones and depression was proved by Yen *et al.* among 10,191 adolescent students in Southern Taiwan.^[2]

Another emerging phenomenon associated with the use of mobile phones is addiction or dependence that has recently attracted the attention of researchers.

Walsh conducted a qualitative research to explore the behavioral patterns of young mobile users in Australia. He proposed that young people are too much attached to their mobile phones that they demonstrate the symptoms of behavioral addiction.^[11]

In contrast, some studies have been proven excessive usage of mobile phone just as an abuse or a necessity of the time. For instance Carbonell proclaimed that excessive usage of mobile phones does not lead to the fast emotional changes so it can be considered abuse but not addiction.^[12]

However, abuse or addiction to mobile phones or problematic use of mobile phones can probably cause physiological and psychological complications. Besides physical and psychological complications caused by problematic use of mobile phones, the destructive effects on academic performance should not be neglected.

However, recently, research on Internet and mobile phone addiction and the development of psychometric instruments for their evaluation has increased considerably; studies on appropriate psychometric instruments are also scarce. Research performed in this field can be pointed to Chóliz among Spanish adolescents.^[13] Chóliz developed a questionnaire to evaluate mobile-phone dependence in adolescents. The items included in this tool were developed based on criteria contained in the Diagnostic and Statistical Manual for Mental Disorders, Fourth Edition, Text Revision for dependence disorder. The questionnaires were administered to a total of 2 486 adolescents aged 12-18 years of age, and subscale analyses were then performed.^[13]

While numerous studies have been conducted on problematic use of mobile phones among college students in developing countries,^[14-16] little is known about the use of mobile phones among college students in Iran.

Considering the large number of mobile users especially among college students in Iran, addiction to mobile phone has grown as a serious health issue and is attracting increasing concern; in this situation, there is an urgent need for reliable and valid instrument to measure addiction to mobile phones among college students in Iran.

This study was aimed to examine validity and reliability of the Persian version of mobile phone addiction index (MPAI) in college students.

MATERIALS AND METHODS

This methodological study to evaluate the psychometric Persian version of mobile phone addiction scale (MPAI) in Persian in Isfahan University of Medical Sciences was conducted in 2012. This study was conducted in two stages. The first step was the preparation the instrument. The second stage was aimed to confirm the validity and reliability of obtained instrument.

Translating and cultural adapting of mobile phone addiction scale

First the original tool was translated into a process that will be described and its content validity using a panel of experts and a pilot study with 20 students was measured. The original tool was translated with the approach of Jones *et al.*^[17] Stages of the translation process were performed as follows.

In the first stage, two translators of professional psychology text, independently and with literal translation, translated the tool from English into Persian. In cases that literal translation undermines, translators were asked the conceptual translation of the toll to be done. In second stage, the tool translated into English by two fluent in English, who were unaware of the original text. Then a panel of experts consisting of four specialists in psychology, health education, community medicine, and translators match original copies in English, Persian, and Facsimile. This means detection discrepancies and errors were discussed and agreement was reached on the final translation. Finally obtained instrument was given to 20 students, and the sharpness and clarity of the questions, to be understood, the use of simple words was examined. In order to determine the validity of the final version of obtained above steps, along with demographic questions such as age, sex, marital status, average score last semester, residence, income, education, and occupation of parents, number of siblings, and information related to mobile phones includes: the average cost of a mobile phone per month, the average number of people who speak with him/her during the day, the average talk time on a mobile phone during the day and Persian version of Young Internet Addiction test (IAT) were distributed among the students.

Sample and sampling

The sampling method in this study was convenience sampling and the sample size of 1180 persons was considered. Since most students go to central restaurant of

university for lunch, in lunch time, on all days of 2 weeks, interviewers were stationed in central restaurants, and the questionnaires were distributed among students. Inclusion criteria were having a mobile phone and internet access and a willingness to participate in the study. Exclusion criteria were unwillingness or lack of opportunity to participate in the study, or had no access to the Internet and mobile phones. Central restaurant was chosen because in this location, confounding variables of samples such as sex, marital status, type of degree, year of entry into the university, school of education, etc. are completely randomly selected.

Mobile phone addiction index

The 27-item Mobile Phone Problem Use Scale (MPPUS) developed by Bianchi & Phillips^[18] has been adapted to measure mobile phone addiction by Leung.^[19] According to the Leung, only seventeen items from MPPUS, which contained eight revised items from the Diagnostic and Statistical Manual of Mental Disorders (DSM-IV) for screening gambling problems, were used to make the fused mobile phone addiction index (MPAI).^[19]

A five-point Likert scale was used on the 17-item MPAI scale with 1 = not at all, 2 = rarely, 3 = occasionally, 4 = often, and 5 = always. In Leung study the reliability for the scale as indicated by Cronbach's alpha was remarkably high at .90.

Psychometric properties

The internal consistency of overall PMPAS and its subscales was examined using Cronbach's alpha value, with a value of 0.6 or higher considered acceptable.

Construct validity of PMPAS was evaluated using exploratory subscale analysis.

Dimensionality validity of PMPAS was evaluated using Pearson correlation coefficients.

To measure of internal consistency correlation of each item to the collection of items or total score was evaluated and correlation coefficients of each item with the related subscale were reported.

To measure of item discriminate validity, the correlation of each item with related and unrelated subscale was evaluated. To measure of convergent validity correlation of PMPAS with IAT (Internet Addiction test) and other measures of mobile phone use were examined using the Pearson's correlation coefficient.

RESULTS

Demographic characteristics

The study results show that among the 1180 university students, 65.5% of the respondents were female, 88% were single, 56.7% lived in dormitory, and 80.1% were unemployment, mean, and standard deviation of age were 20.96 ± 2.32 years, ages ranged from 18 to 39 years.

Mean scores of Mobile Phone Addiction and its subscales in relation to demographic variables are presented in Table 1. Cronbach's alpha of 0.86 was obtained for total PMPAS, for subscale 1 (eight items) was 0.84, for subscale 2 (five items) was 0.81, and for subscale 3 (two items) was 0.77, demonstrating a high level of internal consistency and suggesting that items are homogenous and related to the construct of mobile phone addiction.

To perform exploratory subscale analysis; the measure of sampling adequacy was carried out on PMPAS to ensure the suitability of data for subscale analysis. Bartlett's test of sphericity indicated a Chi-square value of 4.36, $P \leq .001$; with Kaiser-Meyer-Olkin measure of sampling adequacy value was 0.87.

A basic scree-test and Eigen value >1.0 criteria were used; three components were extracted from PMPAS. Only two

Table 1: Mean scores of mobile phone addiction and its subscales in relation to demographic variables

Variables	N	Total PMPAS score	Inability to control craving	Feeling anxious and lost	Mood improvement
Age					
≤20	505	32.19	13.95	13.65	4.61
20 thru 25	477	32.80	14.54	13.72	4.56
≥25	57	29.38	13.36	12.24	3.89
Gender					
Female	686	31.41	13.59	13.36	4.45
Male	361	33.82	15.22	13.97	4.60
Marital Status					
Single	917	32.24	14.11	13.61	4.51
Married	125	32.16	14.51	13.18	4.40
Accommodation					
Home	452	31.44	14.24	13.98	4.62
Dormitory	589	32.94	14.06	13.08	4.31

items loaded onto two subscales by excluding this one item, simple structure was achieved with three subscale solutions. These three subscales, which were rotated in 5 iterations, explain 60.57% the variance.

Subscale 1 (eight items) account for 18.70% of the variance and measures inability to control the use of mobile phones (for instance, you have tried to hide from others how much time you spend on your mobile phone). Five of these items resemble or are equivalent to the items of Young's Internet addiction diagnostic scale.

Subscale 2 (five items) accounts for 26.37% of the variance and measures feeling anxious and lost (for instance, when out of range for some time, you become preoccupied with the thought of missing a call). Two of these items resemble or are equivalent to the items of Young's Internet addiction diagnostic scale.

Subscale 3 (two items) accounts for 15.5% of the variance and measures mood improvement (for instance, you have used your mobile phone to make yourself feel better when you were feeling down). One of these items is equivalent to the items of Young's Internet addiction diagnostic scale. More results are presented in Table 2.

Corrected item total correlation in subscale 1 (Inability to Control Craving) ranged from 0.53 to 0.68. In subscale 2 (feeling anxious and lost) ranged from 0.51 to 0.72,

and in subscale 3 (mood improvement) were 0.62, that means that items in each subscale were as good as the other ones.

The results of discriminate validity are presented in Table 3. The results of convergent validity showed that there were significantly positive correlations between the score of PMPAS and reported total duration of calls per day, $r = 0.315$, $P < 0.001$, reported average length of each call (in minutes), $r = 0.276$, $P < 0.001$, reported number of people talk regularly, $r = 0.149$, $P < 0.001$, reported expenditure for mobile phone use per month, $r = 0.276$, $P < 0.001$. Also there were significantly positive correlations between the score of PMPAS and score Persian version of Young Internet Addiction test (IAT), $r = 0.453$, $P < 0.001$. These finding support the construct validity of the PMPAS and afford evidence for the construct of mobile phone addiction. Correlations (Pearson's r) between the three subscales extracted from PMPAS and duration of calls per day, reported average length of each call (in minutes), reported number of people talk regularly; reported expenditure for mobile phone use per month are presented in Table 4.

DISCUSSION

However, mobile phone usage is a compulsive and addictive disorder that looks set to become one of the biggest nondrug addictions in the twenty-first century,^[20]

Table 2: Subscale analysis of mobile phone addiction

	Subscales		
	1	2	3
Inability to Control Craving			
Your friends and family complained about your use of the mobile phone	.63		
You have been told that you spend too much time on your mobile phone	.70		
You have tried to hide from others how much time you spend on your mobile phone *	.63		
You have received mobile phone bills you could not afford to pay	.66		
You find yourself engaged on the mobile phone for longer period of time than intended *	.69		
You have attempted to spend less time on your mobile phone but are unable to*	.68		
You can never spend enough time on your mobile phone*	.58		
You find yourself occupied on your mobile phone when you should be doing other things, and it causes problem *	.53		
Feeling anxious and lost			
When out of range for some time, you become preoccupied with the thought of missing a call*		.53	
You find it difficult to switch off your mobile phone		.80	
You feel anxious if you have not checked for messages or switched on your mobile phone for some time*		.81	
You feel lost without your mobile phone		.78	
If you do not have a mobile phone, your friends would find it hard to get in touch with you		.50	
Mood improvement			
You have used your mobile phone to talk to others when you were feeling lonely			.81
You have used your mobile phone to make yourself feel better when you were feeling down*			.84
Eigen value	3.43	4.8	2.84
Variance explained	18.70	26.37	15.5

Extraction method = Principal component analysis; Scale used: 1 = Not at all; 2 = Rarely; 3 = Occasionally; 4 = Often; 5 = Always; $N = 1180$; *Items marked with "*" are equivalent to the items of Young's Internet addiction diagnostic scale

Table 3: Pearson correlations between items and related and non related subscales of PMPAS

Items	Subscales		
	Inability to control craving	Feeling anxious and lost	Mood improvement
1	0.70	0.31	0.35
2	0.77	0.36	0.41
3	0.65	0.27	0.30
4	.064	0.18	0.25
5	0.76	0.41	0.46
6	0.70	0.28	0.38
7	0.54	0.11	0.20
8	0.53	0.37	0.38
9	0.46	0.52	0.33
10	0.40	0.76	0.37
11	0.43	0.82	0.39
12	0.38	0.82	0.43
13	0.21	0.66	0.34
14	0.34	0.58	0.62
15	0.33	0.55	0.85

All correlation is significant at the 0.01 level (2-tailed)

Table 4: Correlations between PMPAS subscales and duration of calls per day, reported average length of each call, number of people talk regularly, and reported expenditure for mobile phone

	Duration of calls per day	Average length of each call	Number of people talk regularly	Expenditure for mobile phone
Inability to control craving	0.24*	0.15*	0.19*	0.30*
Feeling anxious and lost	0.21*	0.13*	0.08	0.16*
Mood improvement	0.17*	0.18*	0.06	0.27*
Total PMPAS score	0.31*	0.19*	0.14*	0.27*

All correlation significant at the 0.05 level (two tailed)

there are few valid and reliable instrument to measure this phenomenon.

The purpose of this study was to examine validity and reliability of the Persian version of mobile phone addiction scale (PMPAS) in college students.

The results indicate that the PMPAS possesses acceptable internal consistency; to identify the underlying structure of mobile phone addiction, our data yield three clearly identifiable subscales: Inability to control craving; feeling anxious and lost; mood improvement. Principal components subscale analysis results appear to provide adequate construct validity of the PMPAS.

In Leung study principal components subscale analysis yielded a four-subscale mobile phone addiction structure including: inability to control craving, anxiety and

feeling lost, withdrawal and escape, and productivity loss.^[19]

There were two items related to productivity loss in Leung study; in this study one of these items (you find yourself occupied on your mobile phone when you should be doing other things and it causes problem) is loaded onto subscale 1, and another one (your productivity has decreased as a direct result of the time you spend on the mobile phone) received subscale loadings less than 0.5 and were excluded.

Three — subscale structure obtained in this study accounted for 60.57% of total variance, four — subscale structure obtained in Leung study accounted for 60.43%.

In this study, subscale 2: feeling anxious and lost, explained most of the variance whereas in Leung study subscale 1, inability to control craving explained most of the variance.

Addictive behavior was defined as any activity, substance, object, or behavior that has become the foremost focus of a person's life to the exclusion of other activities, or that has begun to harm the person or others physically, mentally, or socially.^[20]

According to model developed by O'Guinn and Faber^[21] addictive behavior including four main elements: 1) Sudden and spontaneous desire to act; 2) State of mental instability; 3) the start of internal psychological which represents conflict of thoughts; 4) ignoring or denying the consequences of the behavior.^[20, 21] These four elements have been used as criteria to study addictive behavior in other research as well as in our study.

The finding also demonstrated significantly positive correlations between total score of PMPAS and other measures of mobile phone use include reported total duration of calls per day, the number of people calling on a regular basis and the average monthly expenditure and significantly positive correlations between score of subscales of PMPAS and other measures of mobile phone use. These finding can be interoperated as an indicator of validity of PMPAS and were largely consistent with previous studies.^[17]

The strongest correlations were found between total PMPAS score and duration of calls per day and between inability to control craving and expenditure for mobile phone. It can be said that the duration of calls per day and expenditure for mobile phone could be used to predict probability of mobile phone addiction.

The finding also demonstrated significantly positive correlations between scores of PMPAS and IAT, which was consist with previous studies.^[22,23]

There are a few limitations to this study. First, the sample used in this study was relatively homogenous with regard to age. Second, the sample size was acceptable for the purposes of testing the psychometric properties of the short instrument developed here, but broader hypothesis testing must importune a larger and more diverse sample. In future research, the psychometric properties of the PMPAS should be tested with confirmatory subscale analysis in a greater sample size. Also, mobile phone addiction should be explored with regard to a variety of variables, such as demographic, personality, and clinical characteristics, to advance our understanding of human beings' interactions with technology as well as our understanding of the nature and causes of addiction associated with the use of technology. Third, in this study test-retest reliability was not used to measure the consistency of PMPAS further researches must use this kind of reliability to determine the consistency of the scale across time.

As a whole, despite the limitations of the study, three subscales of PMPAS were conceptually consistent with the theoretical origins described in the diagnostic criteria of pathological gambling in DSM-IV. The original DSM measure for pathological gambling was based on eight items; however, this study used 15 items. The result showed that Persian version of mobile phone addiction scale is valid and reliable. Considering lack of a valid and reliable questionnaire for measuring addiction to the mobile phone, PMPAS could be a suitable instrument for measuring mobile phone addiction in future research.

ACKNOWLEDGMENTS

This article resulted from a project in Isfahan University of Medical Sciences (project number 291140). We would like to acknowledge the students for their devotional corporation.

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Source of Support: This article resulted from a project in Isfahan University of Medical Sciences. Project number was 291140, **Conflict of Interest:** None declared.