



## Psychometric properties of the short message service problem use diagnostic questionnaire among Iranian students

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### Abstract

The excessive use of short message services can lead to traumatic psychological, interpersonal and social consequences. The aim of the study was the psychometric properties of the Short Message Service Problem Use Diagnostic Questionnaire (SMS-PUDQ). The Participants consisted of 200 students of Tehran university of medical sciences who were selected through convenience sampling. The participants responded to SMS-PUDQ, the Addiction Potential Scale (APS) and General Health Questionnaire-28 (GHQ-28). The validity SMS-PUDQ was investigated by convergent, discriminative validity and exploratory factor analysis. Results from factor analysis of the SMS-PUDQ, using Varimax rotation method, composed of 2 factors explained 75.50% of the total variance. SMS-PUDQ inter-factor correlations were significant. Convergent validity which was assessed by computing a correlation coefficient between SMS-PUDQ, APS and GHQ-28 total scores, was 0.75 and -0.42. Alpha Cronbach coefficient of internal consistency for total score SMS-PUDQ was 0.91 and 0.95 using a split-half method. In general, findings of this research confirm the validity and reliability of the Persian version of SMS-PUDQ and show that this questionnaire can be a valid scale for diagnosis of SMS Problem use among Iranian population.

**Keywords:** Problem Use Diagnostic, Reliability, Validity, Student, Iran

### Introduction

Nowadays, technology plays a very important role in social communication and individual and community health and mobile phone is one of the most effective and easiest Communication Tools [1]. One of the facilities of the mobile phone in the social and behavioral communications is short message service (SMS), that it nowadays has a large spread, especially among teenagers and young adults and in some cases, it's using has found extreme and addictive form [2]. SMS, in both public and private environments provides more freedom for users [3]. so that

you do not have to communicate face to face, it is easily available and has low cost, but in addition to the advantages, also we are observing its disadvantages, for example some people depend pathologically and extremely on sending text message and in other words, they are addicted to the SMS that it is a subset of the broader term that called technological addiction [4]. Griffiths proposed concept of technology addiction as a subset of behavioral addictions that are comparable with diagnostic criteria of drug addictions. His model consists of six key factors that are present in all kinds

of addictions: salience, mood modification, tolerance, withdrawal symptoms, conflict and relapse [5] SMS dependency, that is compulsive behaviors related to SMS, creates psychological and behavioral syndromes and thus has negative social consequences [3].

One of the main reasons for the excessive use of SMS is interpersonal relationships with intimate friends especially in collectivist societies. Also, dependency may be due to the acute need for interpersonal communications [6]. Loramie (2007) in a study showed people who send SMS excessively, their loneliness and anxiety levels are higher than others [7]. Billieux, et al reported that there is a positive correlation between depression and anxiety with number of SMS in a day [8]. It has been observed that excessive use of SMS is higher among people who have not any emotional stability. Also, since the SMS provides more opportunity to control of social interactions, the neurotic extraverts who have low self-esteem prefer to spend more time messaging using SMS [9].

Choliz et al have reported diagnostic criteria for dependence on mobile phone under the DSM-IV-TR criteria that some of the most prominent of them are: a) excessive usage; that is reflected both in high economic cost and in numerous calls and messages. b) Problems, especially with people who related him/his about the excessive use of mobile phones. c) Interference with other personal work or social activities. d) Need to make calls or send text messages when they have spent time without using the mobile phone and emotional changes when they are deprived of the use of mobile phone [10].

According to what was said, can be said the addiction and problematic use of SMS, could be led to personal and social pathogenesis consequences in youth life. For this reason, research in this field for accessing to addictive behaviors and abnormal patterns, is useful, but for predisposition of such researches it is required to use of valid diagnostic scales. One of the measures in the study of incorrect behaviors related to SMS is SMS problem use diagnostic questionnaire (SMS-PUDQ) that has been designed to evaluate and diagnose

the problematic and addictive use of SMS. Regarding to the validity and usefulness of this questionnaire, the purpose of this study is to evaluate the psychometric properties of the SMS problem use diagnostic questionnaire in the Iranian population that could be helpful for further research in the use of this scale in the areas of diagnosis, prevention and treatment of these addictive dependencies.

### Method

The present study population consisted of all dormitory students of Tehran university of medical sciences were enrolled in 2013-14. Sampling was convenience sampling method. Regarding to the nature of research and with use of Morgan table [11], 300 forms of the questionnaire were distributed in student dormitories who would like to participate in this study and complete the relevant scales. Eighty questionnaires were returned blank or not returned and 20 questionnaires were incomplete that were excluded from the analysis and finally 200 questionnaires were analyzed. The evaluated participant was composed of 100 women and 100 men with a mean and standard deviation, respectively, 21.72 (2.75) and 22.41 (2.07) and the age range 19 to 37 years. Among the study participants, 181 (%90) undergraduate students, 16 (%8) graduate student, and 3 (%2) doctoral students cooperated. Due to ethical principles and ensuring participants, all collected information was kept in a confidential way. Data for this study were obtained from the implementation of the three tests simultaneously. Research scales include:

*SMS Problem Use Diagnostic Questionnaire (SMS-PUDQ)*: This is an 8-item questionnaire developed by Rutland, Sheets & Young in 2007 to investigate the obsessing and addictive use of SMS, its 5 items measures pathological use (items 3, 4, 6, 7, 8) and its three items measure problematic use (items 1, 2, 5). For grading of this scale was used from Likert spectrum ranging from 1 (completely false) to 5 (completely true) [2]. Since this Scale was not used in Iran until so far. First, the main

version of SMS-PUDQ was translated to Persian language and again translated to English then final version was approved by two clinicians.

**Addiction Potential Scale (APS):** The questionnaire with 39 items from long-form Minnesota Multiphase Personality Inventory (MMPI -2) was used to assess the personality traits and lifestyle patterns related to drug abuse [12]. Test-retest reliability of Addiction Potential Scale with a participant of 28 students with an interval of two weeks has been 0.87 [13]. In the Persian version of APS, the Cronbach's alpha for 135 students has been 0.88 that is indicator of good internal consistency test [14]. Also the Cronbach's alpha of mentioned questionnaire in current study was obtained 0.89.

**General Health Questionnaire-28 (GHQ-28):** 28-item General Health Questionnaire has been designed by Goldenberg and Hiller in 1979 for detecting and identifying mental disorders and assessment of mental health [15]. The questionnaire is formed from 4 sub-scales that consist of physical status, social functioning, anxiety and depression which each scale has 7 items that has been scored in form of four options from "much less than ever" to "more than ever". The validity and reliability of this scale is adequate [16] and the Cronbach's alpha for this scale in this study was obtained 0.90 that is represented of acceptable internal consistency

of the questionnaire.

To check the validity of the questionnaire was used from exploratory factor analysis, concurrent validity (calculating correlation of above questionnaire with Measures of GHQ-28 and Addiction Potential scale) and convergent validity (correlation analysis among factors together) were used and for calculating the reliability of this questionnaire the split half methods (bisection) and internal consistency (Cronbach's alpha) were used. All the analysis was done using of SPSS 21 and LISREL 8.7 software products.

**Results**

For calculating the reliability of this questionnaire from factor analysis, concurrent validity and convergent validity were used, and for factors analyses of SMS-PUDQ exploratory factor analysis methods, Varimax rotated principal components and Scree test method were used. Citing with significant results (P<0.001) Kaiser-Meyer-Olkin (KMO=0.89) and Bartlett's test (Bts=346.6), two factors obtained that their special values were 4.81, and 1.22 respectively. In factor analysis, the minimal load factor has been used.

Table 1 shows that the SMS Problem Use Diagnostic Questionnaire (SMS-PUDQ) has been composed of two major factors. The

**Table 1** The psychometric characteristics for SMS-PUDQ

Factor	Value	Subscription rate	% of Explained variance	% of Variance	Item number
1	4.81	0.56	60.20	60.20	5
2	1.22	0.21	10.17	75.50	3

Extraction Method: Principal Component Analysis

Rotation Method: Varimax with Kaiser Normalization

results showed that the amount of explained variance for each of the factors has been estimated 60/20 and 10/17 respectively that explains 75/50 of the total variance.

Items 3, 4, 6, 7, 8 in the first factor and items 1, 2, 5 in the second factor have been loaded. Exploratory factor analysis of the items included 8 items in two factors that loading on each item for each factor has been showed Table 2.

The fitness of mentioned analysis checked out using of LISREL-8.8 software and AGFI,

GFI, CFI, NFI and RMSEA indicators were 0.91, 0.95, 0.93, 0.95 and 0.05 respectively that means the two-factor model has optimal fitness.

Concurrent validity: For calculation of concurrent validity of SMS-PUDQ Addiction Potential scale and GHQ-28 were used. The results in Table 3 show that SMS-PUDQ has a significant negative relationship with General Health and significant positive relationship with Addiction Potential Scale (P>0.01). These

results indicate the existence of concurrent validity in SMS-PUDQ.

**Table 2** Factor analysis matrix for SMS-PUDQ

Item	Factors		Standard rate
	1	2	
3	0.88		0.76
4	0.91		0.84
6	0.87		0.55
7	0.84		0.69
8	0.81		0.72
1		0.87	0.86
2		0.73	0.71
5		0.85	0.69

Extraction Method: Principal Component Analysis  
Rotation Method: Varimax with Kaiser Normalization

**Table 3** Correlation of SMS-PUDQ with Addiction Potential scale and GHQ-28

Factor	Problem use of SMS
Physical health	-0.34**
Social function	-0.42**
Anxiety	-0.43**
Depression	-0.39**
Total score of GHQ	-0.43**
Total score of APS	0.75**

\*\* P<0.01

**Table 4** Inter-correlations between the factors and SMS-PUDQ total scale

Factor	1	2	Total score of scale
1- Pathological use	1		
2- Problem use of SMS	0.74**	1	
SMS-PUDQ total scale	0.96**	0.89**	1

\*\* P<0.01

Convergent validity: In order to calculate the Convergent validity of the questionnaire, the correlation coefficients among the factors together and with total score of the SMS-PUDQ were used. The results in table 4 clearly show that factors significantly have been correlated with each other (at P<0.01); that this relationship is indicator of high convergent validity of this scale.

Table 4 shows that there is a significant and desirable correlation among SMS-PUDQ factors and total score of scale. For calculating

the reliability of this questionnaire, split half (bisection) and internal consistency (Cronbach's alpha) methods were used.

Split half method: In study, using of the correlation coefficient of Spearman-Brown, split half reliability coefficient for the total scale was obtained 0.95, and for the first and second half was 0.84 and 0.96 respectively. The results indicate that total of 8 items in this tool are divided into two halves of the four items and the correlation coefficient of two halves of the questionnaire is estimated (Table 5).

**Table 5** The reliability of split half

Scale	Item number	Correlation coefficient
First half	4	0.84**
Second half	4	0.96**
Total	8	0.95**

\*\* P<0.01

Internal consistency: To estimate the internal consistency of the SMS-PUDQ, Cronbach's alpha index was used. These results have been showed in table 6. The study results have shown that total scale and both factors of this questionnaire have a significant and desirable consistency.

**Table 6** The internal consistency for each factor and total scale

Factor	Item	Cronbach's alpha
Pathological use	5	0.89**
Problem use of SMS	3	0.76**
Total score of scale	8	0.91**

\*\* P<0.01

## Discussion

The aim of the present study was to evaluate the psychometric properties of the SMS-PUDQ. Constant use of a mobile phone accompanies with stress, sleep disorders and depressive symptoms in young people [17]. Therefore, finding a reliable diagnostic tool for guiding future research is very important. The first findings of this research according to the results of the factor analysis and with documenting the obtained results in the field of convergent and concurrent validity of the questionnaire, suggest that the Persian version of this questionnaire

has a desirable validity. Results show there is a significant correlation between SMS-Problem Use Diagnostic, total score of GHQ, its components and Addiction Potential that presents concurrent validity of this questionnaire. These results are consistent with White, Buboltz, Igou [16]; Furber et al. [18]; Choliz [19]; Thomee, Harenstam, Hagberg [17]. Moreover, there was a significant correlation among the factors of SMS-PUDQ as concurrent validity of the questionnaire. In this study, assessment of the factor structure, construct validity of the questionnaire, exploratory and confirmatory factor analysis method confirmed Rutland et al model [2]. These results are consistent with Cockrell study [20]. According to his reports this scale is a very short and important. Factor analysis outcomes showed that the structure, number and arrangement of the Persian version of the above questionnaire are similar to the original version.

Other findings of this study indicated that the SMS-PUDQ has a good reliability. Split half reliability coefficient of the questionnaire is 0.95 and Cronbach's alpha for the total scale is 0.91. These coefficients are similar to the study results reported by Rutland, Sheets, Young [2] and Cockrell [20]. One can conclude that SMS-PUDQ is a valuable tool for research purposes. Among the limitations of the present study, the first one is that findings are limited to a group of medical students who limits the generalization of the research to the wider community. Another limitation is using self-descriptive research tools that may affect the results. It is recommended the tool be executed in other participants, different environments, at different ages and education levels to be used with more confidence in future researches. For more validation, it is suggested that researches in this type should be combined with clinical interviews.

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### **Contributions**

Study design: ZSH, KPT, ASMGH

Data collection and analysis: ZSH, KRT

Manuscript preparation: ASMGH, KRT, ZSH

### **Conflict of interest**

"The authors declare that they have no competing interests."

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