Original Article

The psychometric properties of cellular phone dependency questionnaire in students of Isfahan: A pilot study

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ABSTRACT

Background: A number of diagnostic scales or questionnaires have been developed in recent years, to assess mobile phone dependency. A valid and reliable assessment instrument for correspondence of Iranian culture is essential. The aim of our study is to validate the Iranian version of the Cell Phone Dependency Questionnaire (CPDQ). **Materials and Methods:** In this cross-sectional study, data were collected from 784 students, who were studying in four main Isfahan Universities. The participants completed the demographic questionnaire, CPDQ, anonymously. To analyze the data we used concurrent validity, factor analysis, internal consistency, split-half, and test–retest. **Results:** We extracted three factors including Salience, Overusing of the cell phone, compulsive use of SMS. Cronbach's alpha of the CPDQ was. 88 (Cronbach's alpha of the factors were 0.85, 0.70, and 0.76,, respectively). **Conclusion:** The CPDQ proved to be a reliable questionnaire to assess the extent of problems caused by the 'misuse' of the cell phone in Iranian society.

Key words: Cell phone dependency, students, validation

INTRODUCTION

The 'communication era' is a chosen title for the modern world by some experts, who are talking through the mass media. Short Message Services (SMS) transport a message between people within a few seconds via mobile phones.[1]

Over the last decade the usage of mobile phones has dramatically increased, and therefore, the cell phone has become an important part of human life.[2-4] However, we should not overlook its unpleasant and destructive consequences, especially in the social and cultural fields.[5]

Long-term usage of a cell phone may reduce visual field attention, there is a possibility of growth of brain tumor,[6] increased behavioral impairment, and psychological problems;[7-9] moreover, it may cause depression, anxiety, and low self-esteem.[10] It is also associated with elevated traits of extraversion and neuroticism.[11]

Researches on the addictive spread of cell phones have shown that girls' addiction is more than boys and they suffer from a high level of anxiety and insomnia.[12,13]

Billieux *et al.* (2008), validated a new questionnaire called the Problematic Mobile Phone Use Questionnaire (PMPUQ) to assess mobile phone dependency. It measured four various aspects of cell phone addiction including, prohibited use, dangerous use, dependence, and financial problems. This questionnaire had 30 items and its internal reliability was illustrated by Cronbach's alpha, which varied from 0.85 to 0.90.[14]

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Some other questionnaires have been designed to measure mobile phone dependency such as Mobile Phone Use Survey (MPS),[15] Problematic Cellular Phone Use Questionnaire (PCPU-Q),[4] and Cellular Phone Dependency Questionnaire (CPDQ),[16] These measure this phenomenon according to various definitions of behavioral addiction or cell phone dependency.

The MPS questionnaire had been designed by Bianchi and Phillips (2005). It has 27 items that measure symptoms such as cell phone dependency, withdrawal symptoms, negatives effect on health, and the negative effects of cell phone on the social, financial, and vocational status. Reliability has been reported to be equal to 0.91, using Cronbach's alpha.[15]

The Problematic Cellular Phone Use Questionnaire (PCPU-Q) is a self-administered questionnaire. It has been designed by Yen *et al.* (2009), and has 12 items. PCPU-Q was designed to determine the occurrence of symptoms of problematic cell phone use based on the Diagnostic and Statistical Manual of Mental Disorders (DSM)-IV-TR. Internal consistency, using Cronbach's alpha for the seven symptoms of problematic CPU, was 0.854.[4]

The CPDQ questionnaire has been created by Toda *et al.* (2004), which has 20 items. Cronbach's alpha of the questionnaire varied from 0.80 to 0.93.[16]

On account of the few researches that have been done in the field of cell phone use, a valid and reliable questionnaire based on Iranian culture, is needed, to differentiate the normal users of cell phones from the dependent users, based on psychological effects. Kawasaki *et al.* (2006), indicated the psychometric properties of the Cellular Phone Dependency Questionnaire; some studies have been done using inappropriate methods.[17] Toda *et al.* conducted a study on the psychometric properties of the CPDQ, involving only female university students, with several limitations.[18]

We found neither study to support the contents nor psychometric aspects of the CPDQ in Iran. The aim of this research was to validate the psychometric properties of CPDQ.

MATERIALS AND METHODS

This study was a cross-sectional design and sampling from a target population (Isfahan University Students) and was based on a stratified random sample. A total of 780 participants completed the questionnaires from four main universities of Isfahan province, including Isfahan University of Medical Sciences, Isfahan University, Isfahan University of Technology, and Islamic Azad University Khorasgan (Isfahan).

This study included participants who had used the mobile phone at least once a day in the last year. Exclusion criteria were subjects who had had severe physical problems, apparent disability or were under treatment due to a specific psychiatric

disorder during the last year. To calculate the sample size, the confidence level and study power were determined, 95 and 80%, respectively.

The level of mobile phone dependency was measured using the CPDQ. The demographic section consisted of gender, age, year of study at the university, marital status, and time spent on mobile phone.

The CPDQ is a 20-item self-report. The items reflect typical behaviors of addiction. It was used the first time by Toda *et al.* (2004). The subjects responded to each item on a five-point Likert spectrum scale. A higher score indicated a stronger tendency toward cellular phone dependency. The 20-item instrument provided different dimensions of the mobile phone dependency phenomenon. Toda *et al.* reported that the internal consistency (Cronbach's alpha) of the CPDQ was. 86 and its test–retest reliability was also reported to be satisfactory.[17]

To perform this research, first the CPDQ was translated into Persian in parallel by two specialists, native Iranian psychologist translators, fluent in both English and Persian. After that, two translators compared the Persian version and original English version of the questionnaire. Another native, with English as his first foreign language, who did not have any knowledge of the original instrument, especially in the mobile field, then back-translated the questionnaire into English. During this time the back-translation and the original scale were compared and any differences were discussed and resolved. Some psychologists and psychiatrists confirmed the content validity of this questionnaire again.

To analyze the data we used factor analysis and to calculate the construct validity, internal consistency (Cronbach's α), and test–retest, we used the SPSS18 Software. Less than 0.05 was considered to be statistically significant.

RESULTS

According to the 780 analyzed questionnaires, 79.4% of the participants were females. The mean ± SD of age was 21.51 ± 4.1 years. More than half of the respondents were primarily junior students (51.3%), whereas, 43.8% were freshmen or sophomores. Almost a quarter of the participants (24%) were married. In this study all of the students filled out the questionnaire.

Analysis of internal consistency of the CPDQ: On the basis of the reliability analysis, it can be inferred that the Cronbach's α was between 0.68 and 0.85 for 18 items. First, we calculated the internal consistency for 20 items. As the second and third items had no appropriate intraclass correlation (ICC) with the other items (single measure was 0.32 and average measure was 0.894), they have been omitted from the reliability analysis. Following this, we recalculated the reliability of the questionnaire and the result showed a high level of internal consistency for 18 items and suggested that they were

homogenous and none of the 18 items had to be deleted to improve the Cronbach's α [Table 1].

The test–retest reliability of the questionnaire was checked using the Pearson correlation. A random sample of 33 university students participated in the study and filled out the questionnaire again after two weeks. The correlation between the test and retest was 0.56 (P < 0001).

To evaluate the concurrent validity of this questionnaire, the relationship with other measures of mobile phone use were tested using the Pearsons correlation coefficient. One measure addressed is the time per day spent on using a mobile phone. There was a significant and positive relationship between the total score of the questionnaire and the time spent (r = 0.51, P < 0.001).

Exploratory factor analysis with varimax rotation (Varimax rotation was used as it is the most widely used rotation in social sciences and this rotation can yield orthogonal factors)[19] was carried out for the 18 items, to check the robustness of Cell Phone Dependency.

On the basis of factor analysis, we extracted three factors. Measures of sampling adequacy were carried out on the 18 items of CPDQ. Bartlett's test of sphericity indicated a Chi-square value of 4887.2, with a degree of freedom equal to 153 (P < 0.0001). The Kaiser–Meyer–Olkin (KMO) indicator had a value of 0.92.[19] These three factors, which were rotated to a position of maximum orthogonality, in ten iterations, explained 51.67% of the variance. Also the scree plot curve showed the factors that were above the eigenvalue > 1.0 [Figure 1]. The first factor with an

eigenvalue of 6.6 accounted for 20.77% of the variance; the second factor with an eigenvalue of 1.5 accounted for only 17.67% of the variance; and the remaining factor only accounted for 13.2% the variance. Factor 1 (included seven items) called salience. The second factor included six items measured as Overusing of the cell phone Overusing of the cell phone. Factor 3 (contained five items) was named the *compulsive use of SMS. (*The results of the three extracted factors have been shown in the Table 1)

In order to measure internal consistency within the items in each factor, Cronbach's alphas were calculated and all were moderately to highly reliable (0.68-0.85). In addition, the factor analysis provided support for the questionnaire construct validity [Table 2].

DISCUSSION AND CONCLUSION

The main objective of this study was to validate the Persian version of the cell phone dependency questionnaire (CPDQ) for the students of the Isfahan Universities.

Reliability was calculated using Cronbach's alpha (α = 0.89) and test–retest (r = 0.56), after a duration of two weeks, on 33 subjects. The results indicated desirable reliability of the test and are consistent with the previous studies, which confirmed the reliability of this questionnaire by Cronbach's alpha (α = 0.86).[16] Also the Cronbach's alpha for the three extracted factors were consistent with Toda *et al.*[17] Therefore, the Cronbach's alpha obtained in the Persian and original versions may be advantageous. Consequently, internal reliability was appropriate for the questionnaire.

Table 1: Cellular phone dependency questionnaire items statistics			
Items	Mean (SD)	Item-total correlation	Alpha if item deleted
I spend more on my cellular phone bill than I spend on clothing or food	1.91 (1.07)	0.5469	0.8746
I do not like to go to places with poor signal strength	2.71 (1.03)	0.4932	0.8764
I recharge my cellular phone every day	2.41 (1.09)	0.5347	0.8750
When I ride on a train or bus, I touch my cellular phone as a matter of course	2.41 (1.05)	0.5459	0.8747
I make or receive calls even when riding on a train	1.64 (0.94)	0.6377	0.8722
I talk on my cellular phone even when with others	1.99 (0.97)	0.6594	0.8714
I make calls on my cellular phone even late at night	1.85 (1.06)	0.7073	0.8692
I talk at least one hour per day on my cellular phone	2.04 (1.13)	0.5934	0.8729
I find it difficult to socialize with people who do not have cellular phones.	1.86 (0.97)	0.4711	0.8771
I unconsciously use my cellular phone to check if I have any calls or messages	3.09 (0.95)	0.4858	0.8767
I send text messages even during work or class	1.98 (1.06)	0.6281	0.8719
I send at least 10 messages per day	2.63 (1.16)	0.5537	0.8743
I feel happy when I receive a message	3.20 (0.85)	0.4609	0.8776
I sometimes send blank messages even though I have no reason to do so	1.44 (0.90)	0.5159	0.8759
I frequently use emoticons when I type text messages	2.29 (1.01)	0.4932	0.8764
I always reply to received messages	3.14 (0.86)	0.3027	0.8817
I frequently write long messages	2.36 (0.96)	0.5167	0.8758
I can say what I feel more easily through mail than on the phone or when speaking face-to-face	2.64 (1.08)	0.3553	0.8809

SD=Standard deviation

Table 2: Results of factor analysis with varimax rotation on cellular phone dependence tendency questionnaire			
Items	Salience	Overusing of the cell phone	Compulsive use of SMS
I spend more on my cellular phone bill than I spend on clothing or food	0.528		
I do not like to go to places with poor signal strength		0.526	
I recharge my cellular phone every day		0.533	
When I ride on a train or bus, I touch my cellular phone as a matter of course		0.603	
I make or receive calls even when riding on a train	0.744		
I talk on my cellular phone even when with others	0.605		
I make calls on my cellular phone even late at night	0.673		
I talk at least one hour per day on my cellular phone	0.572		
I find it difficult to socialize with people who do not have cellular phones	0.637		
I unconsciously use my cellular phone to check if I have any calls or messages		0.641	
I send text messages even during work or class		0.527	
I send at least 10 messages per day		0.633	
I feel happy when I receive a message			0.605
I sometimes send blank messages even though I have no reason to do so	0.731		
I frequently use emoticons when I type text messages			0.693
I always reply to received messages			0.620
I frequently write long messages			0.561
I can say what I feel more easily through mail than on the phone or when speaking face-to-face			0.558

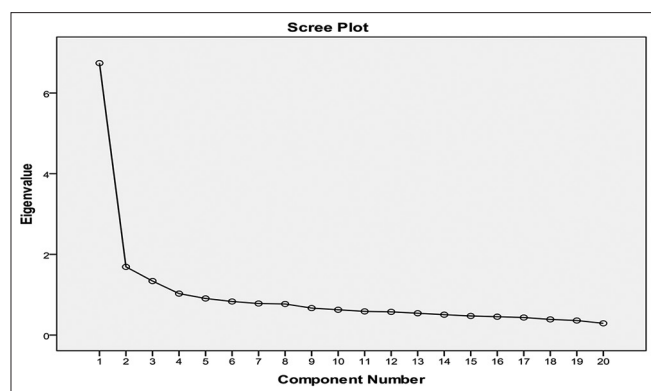SMS=Short message services

Figure 1: Factors that are extracted via scree plot

The results from the factor analyses show that the CPDQ can be characterized by exploring three factors of mobile dependency; salience, overusing of the cell phone, and compulsive use of SMS. The three factors that were extracted from this study are similar to the factors obtained by Toda *et al*. In their study five factors were extracted for male university students and six factors were extracted for female university students, for whom the cumulative correlation coefficients were 58.08 and 57.91%, respectively.[17] Besides the mentioned research, in another research the extracted factor for this questionnaire has reported six factors.[20]

The inner relationship of these three factors of our study can be implicated as construct validity. In this study, a factor was obtained called: Compulsive usage of SMS. It was not obtained in the original study. In some Asian countries,[21] and especially in Iran, overusing the cell phone could be due to virtual spaces. Moreover in Iran, relationship with each other

might be due to using SMS and this was the most prominent factor in cell phone dependency.

The most commonly reported correlation coefficients in this study are same as in the original questionnaire. This finding shows simple and fluent test phrases in both English and Persian languages. Also the Persian version has ideally conformed to the Iranian culture.

The result of this study shows that CPDQ measures features of the dependency on cell phone in university students. This scale may be used to guide the researches on the problems of dependency on cell phone. Also the present study demonstrates that the CPDQ is the first self-reported instrument for mobile dependency and it may provide a diagnostic profile for researchers to evaluate cell phone dependency with regard to its psychometric features and its contents. The CPDQ proves to be a useful assessment tool for measuring problems in connection with mobile use. The results of this study must be interpreted in the context of its limitations. First, the data in our study has been collected from Iranian students, and thus, the results may not be generalized to the mobile phone users from other groups and cultures. However, as the students represent one of the groups that are vulnerable to both substance and non-substance addictions,[22] they may be at high risk for developing problematic mobile use. Second, we recognize that the data used in this study is cross-sectional, with the level of mobile dependency being measured at one point rather than as it is emerging. The development of addictive behavior is an ongoing process, the proper delineation of which requires a time dimension. Finally, collecting the questionnaires directly from the students may affect the participants' disclosure of

some sensitive information, such as, demographic data and time spent on the mobile phone.

Future studies of a similar nature can be conducted using different groups of people so that the validity and the reliability of CPDQ can be assessed. Moreover, the reality-substitute effect of the mobile phone is an area worth investigating into.

Suggestions
1. Study of screen cell phone dependency and its cut-point is population-based
2. Study of validity and reliability of other questionnaires such as PMPUQ and MPS on dependency on cell phone and its comparison with CPDQ
3. Study on various ages and educational status of people who use cell phones.

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