Original Research Article

Problematic internet use questionairre-short form-6 (PIUQ-SF 6): a validity and reliability study in Turkey

Saniye Göktaş*, Hatice Aygar, Sevil Akbulut Zencirci, Muhammed Fatih Önsüz, Melike Alaiye, Selma Metintaş

Department of Public Health, Eskişehir Osmangazi University Faculty of Medicine, Eskişehir, Turkey

*Correspondence:
Dr. Saniye Göktaş,
E-mail: doktorsaniye@gmail.com

ABSTRACT

Background: The study was a methodological type scale adaptation study in which the validity and reliability of the Turkish version of the Problematic Internet Use Questionairre-Short Form-6 (PIUQ-SF 6) was assessed and the cut-off score was determined.

Methods: The study group was consisted of 465 students studying in five different faculties of Eskisehir Osmangazi University. The questionnaire form consists of questions about the sociodemographic characteristics, internet usage characteristics of the individuals and PIUS, PIUQ-SF 6.

Results: The mean age of 465 who agreed to participate in the study was 21.1±2.1, with 256 males (55%) and 209 females (45%). In the study group, the instagram usage frequency was 80.4% and the facebook usage frequency was 78.7%. The content validity ındex value of PIUQ-SF 6 was calculated as 0.90. According to the exploratory factor analysis, 3 sub-dimensional structures consisting of 6 items explained 53.42 % of the total change in PIUQ-SF 6 scores and factor loads of the items in 3 sub-dimensions changed between 0.84-0.89. The Cronbach's alpha coefficient value of PIUQ-SF 6 was 0.82 and the test-retest reliability coefficient value was 0.82. There was a strong positive correlation between PIUS and PIUQ-SF 6. Students who spent more than 5 hours on the Internet were found to get high scores from all 3 sub-dimensions of PIUQ-SF 6. Confirmatory factor analysis values of PIUQ-SF 6 were found at acceptable intervals. As a result of K-Means clustering and ROC analysis, the cut-off score of PIUQ-SF 6 was calculated as 13.

Conclusions: As a result, it has been concluded that PIUQ-SF 6 is a valid and reliable measurement tool as well as researches to be carried out in larger and different groups would be useful.

Keywords: Problematic internet use, Problematic internet use scale-short form-6, PIUQ-SF 6, Reliability, Validity

INTRODUCTION

Nowadays one of the important applications that cause new diseases or behavior disorders in the health sector is internet.[1] In addition to the professional use of the internet, it is noteworthy that the aimlessly use of the internet has been increased in all age groups. The use of the internet, which started in a planned way, then turns into non-purposeful uses and therefore time losses. The important point in this case is that this loss of time, which is experienced without being realized, becomes an increasingly pleasurable situation and the use of problematic internet results in a further control decrease over time.[2] Problematic internet use or internet addiction has become a widespread area of research since its first day.[3] Problematic internet use is a multidimensional syndrome that occurs from cognitive and behavioral symptoms that lead to negative results in social, emotional, physical development areas as well as professional and financial areas.[4-9]

A number of recent research has focused on the development of measurement tools for assessing the problem.[3] Koronczai and colleagues, as a result of their research stated that, there should be six basic characteristics on the scale to assess the level of problematic internet use. These features; sophistication (handling all aspects of problematic internet usage), as short as possible (in terms of being able to be used in crowded groups and in time-sensitive research), different research methods (valid and reliable for online, self-administered or face-to-face) to different age groups (adolescents, adults), it is a cut-off score that is appropriate for different cultural societies and can be combined with clinical examination.[10]

Many measurement tools have been developed to measure problematic internet use. The problematic ınternet use questionairre-short form-6 (PIUQ-SF 6), which is one of these, assesses three basic directions of problematic use: obsession, neglect, and control disorder.[3] According to previous large international researches to measure the problematic internet usage level, it is reported that the brief scales with less number of questions are more appropriate in terms of the effect of survey fatigue and research results.[3] The long form of PIUQ-SF 6 which contains 18-items was developed in 2008 and the short form PIUQ-SF 6 was developed in 2016.[3,11]

As the Internet rapidly spread around the world and in Turkey. It's usage has increased day by day in all areas of life and continues to increase. Understanding the extent of internet usage in the dimension that affects health is important by which the problem can be controlled. In order to determine the level of problematic internet use, the measurement tool is limited in Turkish and the existing scales are more extensive than PIUQ-SF 6. It is thought that a short scale with a cut-off score is needed to determine the level of problematic internet use.

The purpose of the study is to evaluate the validity and reliability of the Turkish version of PIUQ-SF 6, which is a scale for determining problematic internet usage level, and determining the cut-off score.

METHODS

Study group

The study was carried out in the students of five faculties (Medical, Science and Literature, Theology, Economics and Administrative Sciences, Engineering and Architecture faculties) of Eskişehir Osmangazi University during 2016-2017 education year. In order to evaluate the scale validity and reliability in the study, a methodological type research was planned.[12] Ethical committee approval and administrative permissions were taken for the study. The size of the study group was calculated as 15 times the number of items in the scale and 90 for each faculty, at least 450 people in total.[13]

Improbable sampling was used because each student in the studying area did not have equal chances of entering the study.[14] The inclusion criteria for study were to be over 18 years old, to be a university student and to agree to participate in the study.

Research design

Due to the adaptation of the scale from different languages and cultures, PIUQ-SF 6 was translated into Turkish by translation-back translation method and presented to the linguist by two independent foreign language experts for language and scope validity. For the assessment of the appropriateness and clarity of each scale item according to the Content Validity Index (CVI), the scale was presented to 10 experts. According to the percentage evaluation, the CVI value of PIUQ-SF 6 was found to be 0.90.

Outside of the sample, scale was applied to 55 students and clarity of the items was tested and feedback was obtained. The items were found to be understandable and no changes were made to the items. Retest was applied to these students after three weeks. Gender distributions of students participating in the test-retest were tested by chi-square analysis and found to be no different from the study group overall ($\chi^2 = 0.341$, p = 0.559).

Data collection tool

The first part of the questionnaire used in the research was questions about sociodemographic characteristics of the individuals and internet usage behavior, the second part was Problematic Internet Use Scale (PIUS) and the third part was PIUQ-SF 6.

PIUS was developed by Ceyhan et al. In 2007 to measure the problematic internet use of university students. The scale consists of 33 questions in quintet Likert type ranging from "completely appropriate" to "not at all appropriate" answers. The scores that can be taken from this non sub-dimention scale range from 33 to 165, and as the score from the scale increases, the level of problematic use of the internet increases.[15]

PIUQ-SF 6 was developed by Demetrovics et al. (2016), the answers are a measure of quintet likert type of 6 questions, ranging from "always/almost always" to "never". The "never" answer is 1 point, the "always/almost always" answer is 5 points worth. The score on the scale ranges from 6 to 30 and the problematic use of the internet increases as the score increases.

The scale has 3 subdomains, obsession (items 2 and 6, thoughtful thinking about the internet, and mental disturbances at times when the internet is not used), neglect (items 1 and 5, neglecting basic needs and daily activities because of internet usage) and control disorder (items 3 and 4; control disorder of internet usage).[3]

Collection of data

All students participating in the survey were informed about the study and verbal approvals were obtained. Students who did not agree to participate in the study and did not respond to more than 90% of the questions in the survey were not included in the study group.

Evaluation of data

IBM SPSS (Version 15.0) package program was used to analyze the data. The results were evaluated at 95% confidence interval, $p<0.05$ significance level. Exploratory Factor Analysis (EFA) was used to assess the structure validity of the scale. Varimax rotation was performed in determining of factor loads and dimensions. Confirmatory Factor Analysis (CFA) was performed using the Lisrel 9.3 (student) program to assess the fit of the factor structure of the scale.

In the Confirmatory Factor Analysis, the most commonly used fit indices Goodness of Fit Index (GFI), Adjusted Goodness of Fit Index (AGFI), Comparative Fit Index (CFI), Root Mean Square Error of Approximation (RMSEA) and Standardized Root Mean Square Residual (SRMR) indices were calculated. Values of acceptability of the Fit indices were accepted as $\chi^2/df<5$, $GFI>0.90$, $CFI<1.00$ and $AGFI>0.90$, $RMSEA>0.10$ and 0-1 for SRMR close to 0.[16]

Internal Consistency (Cronbach alpha) and test-retest correlation were used to assess the reliability of the scale. The Wilcoxon test was used to compare test-retest scores. Content Validity Index used for content validity and Spearman Correlation Analysis was used for concurrent criterion (PIUS) validity and test-retest correlation analysis. PIUQ-SF 6 was evaluated for its normal distribution suitability with the Kolmogorov-Smirnov test (Lilliefors modification).

Because the normal distribution was not appropriate, the logarithm of the scale score was taken and multiple linear regression analysis was used to test the validity between the groups. Mann Whitney U analysis was used to calculate the discriminant validity of the scale. The relationship between the groups was tested by multivariate regression analysis.

Points taken from the scale to determine the cut-off score of PIUQ-SF 6 were transferred to the Minitab program. A DUMMY variant with a mean distribution of 0.0001 and a standard deviation of 0.00001 was derived from the data. Using this variable, the individuals were separated into two clusters by K-Means clustering analysis according to the score they received.

ROC analysis was then performed on Med-Calc program with scale scores and clustering data of the study group.[17] The highest sensitivity and specificity score in the ROC analysis was accepted as the cut-off score.

RESULTS

Of the 465 people who agreed to participate in the study, 256 were male (55%), 209 were female (45%) and the average age was 21.1 ± 2.1. Of the study group 34.8% live in dormitory and 84.7 % stated that they are in the middle income level. The sociodemographic characteristics of the students are shown in Table 1.

Table 1: Distribution of the study group according to sociodemographic characteristics.

Variables		N (%)
Gender	Male	256 (55.1)
	Female	209 (44.9)
Age groups	18-20	207 (44.5)
	21 and over	258 (55.5)
Living place	With family	105 (22.6)
	Home (with friends)	78 (16.7)
	Home (alone)	120 (25.9)
	Dormitory	162 (34.8)
Income	Low	24 (5.2)
	Medium	394 (84.7)
	High	47 (10.1)

Of the students 52.3 % stated that they use Twitter, 78.7 % use Facebook, 80.4 % use Instagram and 96.1 % use Whatsapp. The percentage of the study group using social media tools is given in Figure 1.
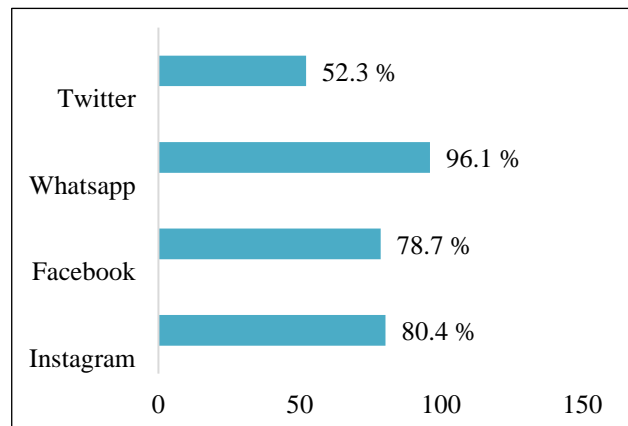

Figure 1: The percentage of using social media tools.

Validity and reliability analysis of PIUQ-SF 6

The sample size, the magnitude of the observed correlation coefficients, and the partial correlation coefficients were found to be in accordance with the Kaiser-Meyer-Olkin (KMO) measure (KMO = 0.85). According to the Bartlett test, the universe correlation matrix was not a unit matrix and the spherical measure was also provided (p<0.001).

According to Exploratroy Factor Analysis (EFA) conducted on the short form, 3 subdimensions consisting

of 6 items revealed 53.42% of the total change in PIUQ-SF 6 scores. According to exploratroy factor analysis, the factor loadings of 3 sub-dimension items ranged from 0.84 to 0.89. The mean ±standard deviation of the scoring sub-dimensions of the scale were 3.67±1.81 for the obsession sub-dimension, 4.47±1.81 for the neglect sub-dimension, and 3.89±1.75 for the control disorder sub-dimension. A moderate correlation was found between the 3 subdimensions of the scale.

The Cronbach alpha value was calculated as 0.76 for the obsessive sub-dimension, 0.59 for the neglect sub-dimension, 0.59 for the control disorder sub-dimension, and 0.82 for the whole scale.

Scale sub-dimensions factor loadings, averages, standard deviations and correlations between sub-dimensions are given in Table 2.

Table 2: Scale sub-dimensions factor loads with averages, standard deviations and correlation values between sub-dimensions.

Scale sub-dimensions factor	Obsession	Neglect	Control disorder
How often do you feel tense, irritated, or stressed if you cannot use the Internet for as long as you want to?	0.89		
How often does it happen to you that you feel depressed, moody, or nervous when you are not on the Internet and these feelings stop once you are back online?	0.89		
How often do you spend time online when you'd rather sleep?		0.84	
How often do people in your life complain about spending too much time online?		0.84	
How often does it happen to you that you wish to decrease the amount of time spent online but you do not succeed?			0.84
How often do you try to conceal the amount of time spent online?			0.84
Mean	3.67	4.47	3.89
Standard deviation	1.81	1.81	1.75
Obsession		0.53	0.63
Neglect			0.58
Control disorder			

Confirmatory factor analysis (CFA)

After identifying factors with EFA, confirmatory factor analysis was performed to test the appropriateness of the identified factor structures. The CFA analysis results of the scale are given in Table 3 for the determined compliance values.

Table 3: Compliance values of confirmatory factor analysis of PIUQ-SF 6.

Fit indices	PIUQ-SF 6
χ^2/p value	24.74 / p<0.001
df	6
χ^2 /df	24.74/6
RMSEA	0.08
SRMR	0.03
CFI	0.99
GFI	0.98
AGFI	0.94

Test-retest correlation

For the test-retest reliability of PIUQ-SF 6, 55 respondents answered PIUQ-SF 6 again after three weeks. The test-retest reliability coefficient was 0.82. For the students who were taken to the test-retest, the first assessment median score was calculated as 3, 4, 3 for the obsession, neglect and control disorder sub-dimensions and 3, 4, 3 as the second evaluation median score respectively, it was found that the median scores of the first and second applications were not different from each other in all three sub-dimensions (p>0.05). Positive correlations were found between PIUQ-SF 6 total scores in the first and second application (r = 0.348, p = 0.009). The scattering diagram of the scores from first and second application of PIUQ-SF 6 is given in Figure 2.

Criterion referenced validity

(Graph 3) The mean score from PIUS was 65.2 (22.3), median (min-max) 61 (33-165), mean score from PIUQ-SF 6 was 12.1 (4.5) and median was 11 (6-30). There was a strong positive correlation between scores from PIUS and PIUQ-SF 6 (r = 0.727, p <0.001). The scatter plot of scores from PIUS and PIUQ-SF 6 is given in Figure 3.

Differential validity of PIUQ-SF 6

The daily time spent on the internet was based on determining the differential validity of the scale. The

scores obtained from all three sub-dimensions of the scale and the total of scale were found to be higher in participants who spent daily on the internet 5 hours or more than who spent less than 5 hours (Total of scale, $p<0.001$ for each of the Obsessions and Neglect sub-dimensions, $p=0.004$ for the control disorder sub-dimension).
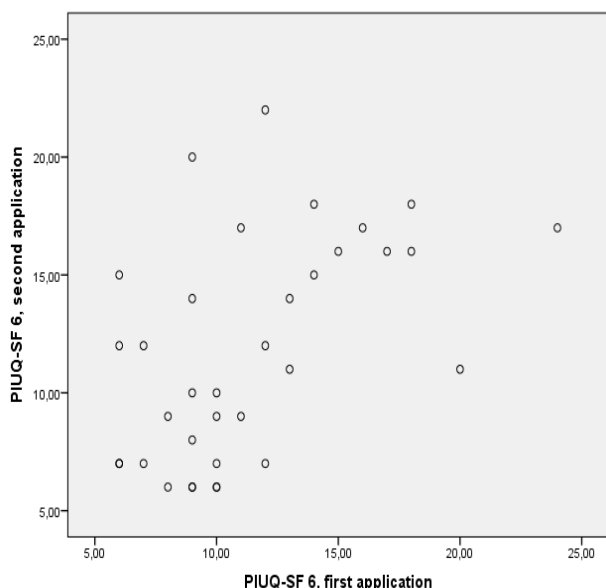

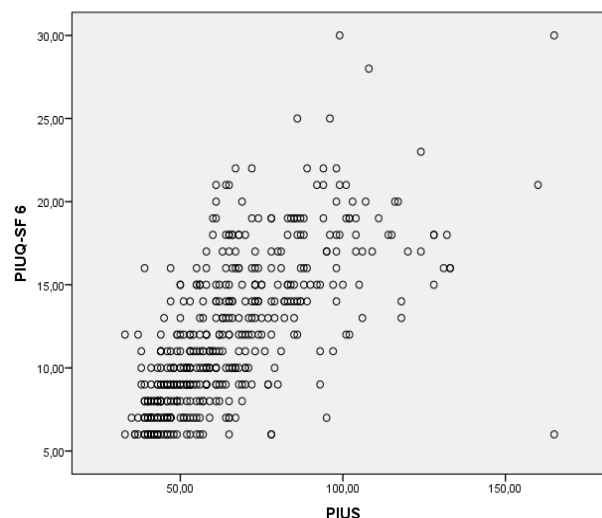**Figure 2: Scatter plot of scores from PIUQ-SF 6 scale in test-retest.**

Figure 3: Scatter plot of scores from PIUS and PIUQ-SF 6.

The validity of PIUQ-SF 6 between groups

Spending more time on the internet and not reading regular books increased scores of 3 subdimensions of PIUQ-SF 6. Using Twitter and Facebook, scores from neglect and control disorder sub-dimensions were found to be increasing. The obsession sub-dimension scores were found to be higher in women than in men. The distribution of the PIUQ-SF 6 sub-dimension scores according to some parameters is given in Table 4.

Table 4: Relationship between sub-dimensions of the PIUQ-SF 6 and variables.

Variables	Obsession β (95 % CI)	Neglect β (95 % CI)	Control disorder β (95 % CI)
Gender	-0.04(-0.07 ile -0.00)*	0.00(-0.03 ile 0.04)	-0.00(-0.04 ile 0.03)
Age	-0.00(-0.01 ile 0.00)	0.00(-0.01 ile 0.01)	-0.01(-0.02 ile 0.00)
Using Twitter	0.03(-0.01 ile 0.07)	0.05(0.01 ile 0.08)*	0.48(0.11 ile 0.85)*
Using Facebook	0.04(-0.00 ile 0.09)	0.04(0.00 ile 0.08)*	0.46(0.00 ile 0.91)*
Spending time on the internet (in one day)	0.02(0.01 ile 0.03)**	0.02(0.01 ile 0.02)**	0.01(0.00 ile 0.17)*
Reading regular book	-0.06(-0.09 ile -0.02)*	-0.05(-0.08 ile -0.02)*	-0.04(-0.08 ile -0.01)*

DISCUSSION

The rapid increase in the use of the internet in the computer environment and on smartphones necessitates increased research on the use of the Internet and interventions that will control the behavior of internet usage. For this reason, the measurement of problematic internet usage has become important. The aim of the study is to evaluate the validity and reliability of PIUQ-SF 6 in Turkish. The Cronbach alpha value was reported to be 0.87 in the study of the long form of the scale and 0.77 in the study of the short form.[3,11] In this study, the Cronbach alpha value of PIUQ-SF 6 was calculated to be

0.82. This value showed that PIUQ-SF 6 is acceptable as a reliable measurement tool in Turkish.

The EFA results for evaluating the validity of the scale showed that it produced a three sub-dimensions structure similar to the original study of scale. As a result of the analyzes made, it was found that the three sub-dimensions structure of the scale explained 53.42% of the total variance and the factor loads varied between 0.84-0.89. It has been reported that it is enough to explain the total variance at 30% or more in scale adaptation studies.[18] In the original study of the scale, factor loadings were reported between 0.54 and 0.86.[3]

When the fit indices of the model obtained by the CFA results are examined; the χ^2/df value is less than the acceptable level of 5, RMSEA, SRMR, CFI, GFI values were also found at acceptable intervals. As a result, these fit indices obtained showed that the model had a good fit.[16]

Compared with the test-retest results of PIUQ-SF 6, it showed moderate test-retest reliability (r=0.348, p=0.009). The results of the reliability analysis showed that PIUQ-SF 6 did not vary in scale and that it was reliable when applied at another time.

There was a high correlation between PIUS and PIUQ-SF 6 scores (r=0.727, p<0.001). In the literature, it is indicated that the scales with a synchronous validity coefficient of 0.30 and above are valid, and according to these results, it is seen that PIUQ-SF 6 is a valid measuring tool.[18]

In females, obsession sub-dimension scores were higher than males, while there was no difference in other sub-dimensions. It has been reported that there is no relationship between gender and obsession sub-dimension in studies where the original scale form and long form were developed.[3,11]

With the increase in the number of hours spent on the internet and no regular reading of the books, it was determined that scores from three sub-dimensions of PIUQ-SF 6 increased. Similarly, in the original study of scale, scores from 3 sub-dimension were reported to be higher in the users who more used the internet during the day.[3] Reading regular books can protect people from uncontrollable habits and provide more efficient times. In this context, useful activities such as reading a book can be offered to people in the risk group in terms of problematic internet use.

There was a relationship between the use of Twitter and Facebook, and the increase in scores from neglect and control disorder sub-dimensions. People nowadays are using social media accounts even when doing their daily business and are opposed to not doing their business without using social media. Therefore, the increase in Twitter and Facebook usage, which is among the most frequently used social media accounts, is expected to make people risky for problematic internet use. These results show that PIUQ-SF 6 is making the appropriate measurement for its purpose.

As a result of K-Means clustering and ROC analysis, the cut-off score of PIUQ-SF 6 was calculated as 13. According to this cut-off score, the frequency of problematic internet usage in the study group was found to be 40.9%. This frequency does not imply a clinical diagnosis but indicates that the student is in a risk group for problematic internet use. The cut-off score in the original study was reported as 15, higher than our study.[3]

With new investigations, it may be useful to check the cut-off score and compliance with the clinical evaluation.

It can be said that PIUQ-SF 6 is a valid and reliable measurement tool in the light of the analyzes made. It has a superiority over other Turkish scales in terms of having cut-off points and being short and easy to use and showing whether people are in risk group. The frequency of problematic internet usage in our study has been found to be quite high, and it seems that urgent intervention efforts are needed in this regard. It has been deemed appropriate to use PIUQ-SF 6 as a measurement tool in assessing the effectiveness of intervention work, which is short, understandable, quickly applicable, acceptable and reliable. There is a need to test PIUQ-SF 6 in wider and diverse groups and to support it with other community-based validity studies. According to the results of the screening studies to be done, it would be appropriate to have more detailed evaluation of the persons in the risk group in terms of problematic internet usage.

ACKNOWLEDGEMENTS

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