Psychometric properties of the Internet Addiction Test in Turkish

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Background and aims: In this study, the Internet Addiction Test (IAT) was adapted to Turkish language, which was originally developed by Young (1998) in English to measure the presence and severity of the Internet dependency. The main purpose was to ensure that the psychometric features and the factor structure of the test were suitable for Turkish university students. *Method:* The study was conducted in two sequent phases. Participants were 990 undergraduate students from several public universities in Turkey. *Results:* In the first phase, an exploratory factor analysis (EFA) was applied to figure out the factor structure of the Turkish version of the IAT. The EFA revealed four factors, which explained 46.02% of the total variance. In the following phase, a confirmatory factor analysis (CFA) was conducted with a different sample, to verify the factor structure that was found in the initial EFA. The CFA resulted four-factor model was satisfactory for the Turkish version of the IAT. These four factors were named as Mood, Relationship, Responsibilities, and Duration. *Conclusions:* Based on the findings, the administration of Turkish version of the IAT provided acceptable results on undergraduate students.

INTRODUCTION

The Internet Addiction Test (IAT) was developed by Young (1998) to measure the presence and severity of the Internet dependency, in a North American population sample. The IAT measures self-reported compulsive use of the Internet and assesses symptoms of Internet addiction in a variety of settings. The test includes 20 items; each was drawn from earlier research and clinical studies on compulsive online users and their characteristics. These 20 items measure characteristics and behaviors associated with compulsive use of the Internet that includes compulsivity, escapism, and dependency. Questions also assess problems related to addictive use in personal, occupational, and social functioning (Young, 2010). Questions are randomized and each statement is weighted along a Likert-scale continuum that ranges from 0 = less extreme behavior to 5 = most extreme behavior for each item.

The test can be administered either individually or within a group sample. It can be administered in two ways: self-administered and oral administration, in case someone needs assistance in completing the test. It takes 5 to 10 minutes to complete when it is self-administered (Young, 2010).

Each item on the test is rated on a 5-point scale ranging from 0 to 5, with the maximum score thus being 100. The higher score represents the higher level of severity of the Internet compulsivity and addiction. The total score that ranges from 0 to 30 is considered to reflect a normal level of Internet usage, total scores between 31 and 49 show the presence of a mild level addiction, 50 to 79 represent the presence of a moderate level, and sores of 80 to 100 indicate a severe dependence upon the Internet (Young, 2010).

Psychometric properties of IAT

The psychometric properties of the original IAT (1998) were evaluated in university students and adults. The earlier studies demonstrated strong internal reliability estimates of IAT; however, there was an inconsistency among the reported factor structures of IAT. Widyanto and McMurran (2004) conducted a study among adults in the U.K. and an exploratory factor analysis (EFA) revealed six factors that were salience, excessive use, neglect of work, anticipation, lack of control, and neglect of social life. Then, another study with college students in the U.K conducted by Widyanto, Griffiths and Brunsden (2011) resulted in a 3-factor solution, which included psychological/emotional conflict, time management problems, and mood modification. In another recent study (Jelenchick, Becker & Moreno, 2012), a two-factor structure of the IAT was reported among U.S. college students. These factors were dependent use and excessive use.

The test has been adopted into different languages and cultures including French (Khazaal et al., 2008), Italian (Ferraro, Caci, D'Amico & Blasi, 2007), Finnish (Korkeila, Kaarlas, Jaaskeleinen, Vahlberg & Taiminen, 2010), Korean (Kim, 2000), Malay (Guan, Isa, Hashim, Pillai & Singh, 2015), and Chinese (Chang & Man Law, 2008) among college students and adults. In the Italian version, six-factor structure (compromised social quality of life, compromised individual quality of life, compensatory usage of the Internet, compromised academic/working careers,

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compromised time control, and excitatory use) was found. A one-factor structure in the French and Finnish versions and five factors (lack of control, neglect of duty, problematic use, social relationship disruption, and email primacy) in the Malay version were revealed. These mixed findings on the psychometric validation of the IAT have indicated the inconsistencies on the factor structure of the original test. According to Lai et al. (2013), these inconsistencies are likely to stem from the differences in languages, demographics of the participants, and statistical methods being used. Previous studies also consistently reported high reliability estimates of the IAT, which is α > .80 (Bayraktar & Gün, 2007; Milani, Osualdella & Di Blasio, 2009; Wang et al., 2011).

Young (1998) suggested six dimensions in the original form of the IAT: *Salience* (item 10, 12, 13, 15, and 19) related that "respondent most likely feels preoccupied with the Internet, hides the behavior from others, and may display a loss of interest in other activities and/or relationships only to prefer more solitary time online", *excessive use* (item 1, 2, 14, 18, and 20) related that "respondent engages in excessive online behavior and compulsive usage, and is intermittently unable to control time online that he or she hides from others", *neglect work* (item 6, 8, and 9) related that respondents' "performance and productivity are most likely compromised due to the amount of time spent online and the respondent may become defensive or secretive about the time spent online", *anticipation* (item 7 and 11) related that "respondent most likely thinks about being online when not at the computer and feels compelled to use the Internet when offline", *lack of control* (item 5, 16, and 17) related that "respondent has trouble managing his or her online time, frequently stays online longer than intended, and others may complain about the amount of time he or she spends online", and *neglect social life* (item 3 and 4) related that "respondent most likely utilizes online relationships to cope with situational problems and/or to reduce mental tension and stress".

METHODS

The current study was carried out in two phases. In the first phase, the original Internet Addiction Test (IAT) was translated from English to Turkish with all its requirements. Afterwards, the Turkish version was administered to a group of university students, and an EFA was conducted to explore the factorial structure of the Turkish version of the IAT. In the second phase, the Turkish version of the IAT was administered to another group of university students. Then, a CFA was performed to confirm the factor structure of the IAT in Turkish language.

Participants

Participants were undergraduate students from several public universities in Turkey. In the first phase of the study, the adapted Turkish form was administered to 433 university students, conveniently sampled from two different universities. In data analysis process, 26 students were eliminated due to missing data, and as a result 407 students were

included in the study. The participants were from 55 different academic majors. Specified academic majors varied from finance to literature, zoology to history, and different fields of engineering to different fields of teacher training. Among the 407 participants, 268 (65.8%) were female, 131 (32.2%) were male, and 8 (2%) did not specify their genders. The participants' age ranged from 17 to 27 ($M = 20.13$, $SD = 1.47$).

In the second phase, 510 university students were administered the IAT Turkish version. The students were conveniently sampled from eight different universities in Turkey. There were some missing values in 27 students' responses; therefore those forms were eliminated, and as a result 483 students were included in the data analysis of the second phase. The academic majors of students were also varied. The numbers of female and male students were 320 (66.3%) and 161 (33.3%), respectively. Two (.4%) students did not specify their genders. The participants' age ranged from 17 to 40 ($M = 19.52$, $SD = 1.69$).

Procedures

In the first phase of the study, the IAT was translated from English to Turkish independently by three different researchers who are bilingual and work in the Department of Education. They are expert in the content area as well as test development. Then, the Turkish version was back-translated into English and crosschecked by two bilingual professional people. In these processes, a rating form was used so that translated and back-translated versions can be evaluated by the experts. After each expert opinion was provided, some minor modifications, which mainly included different alternatives and synonymous words, were made. The final Turkish version was evaluated by two experts in terms of Turkish language and face validity.

Administration of the IAT

The IAT was administered to 433 university students in the first phase during Fall 2014–2015. The first author had visited two university campuses in Turkey and administered the Turkish version of the IAT in group base. Administration was completed in several sessions. Some groups were relatively small, which were about 40 students and they took the test in classrooms. Some other groups were relatively large, which were about 100 students and they took the test in conference rooms.

In the second phase of the study, the second author administered the test to 510 students in eight university campuses in Turkey during late Fall 2014–2015. After the administration of the test to 510 students, each response was screened and then entered into an excel spreadsheet.

Data analysis

The obtained data in the first phase was analyzed with the SPSS. Frequencies were calculated. Then, missing values were detected. Missing value analysis indicated that it was not possible to replace missing values in any way. Therefore, 26 students were eliminated due to their missing values. Afterwards, Cronbach Alfa coefficient and item-total

correlations were calculated for the reliability of the measurement. Accordingly, an EFA with 407 students was conducted to explore the factor structure of the Turkish version of the IAT.

In the second phase, the SPSS Amos was used to analyze the data. After eliminating 27 students with missing data, a CFA with 483 students was performed to confirm the emerged factor structure of the IAT obtained in the EFA analysis in the first phase.

Ethics

All participants gave written informed consent prior to the investigation and the study was approved by Gaziosmanpasa University Ethics Committee.

RESULTS

Before conducting an EFA, Kaiser-Meyer-Olkin Measuring of Sampling Adequacy (KMO) and Barlett's Test of Sphericity (BTS) were conducted to ensure characteristics of the data set were appropriate for factor analysis. KMO analysis resulted an index of .920, and BTS yielded χ^2 ($df = 190$, $p < 0.001$) = 3160.44. Then, the exploratory factor analysis with 407 university students was conducted. Maximum likelihood extraction method and promax rotation method was used because these methods "allow for the computation of a wide range of indexes of the goodness of fit of the model [and] permits statistical significance testing of factor

loadings and correlations among factors and the computation of confidence intervals." (Fabrigar, Wegener, MacCallum & Strahan, 1999, p. 277). The EFA revealed four factors, eigenvalues greater than 1. These four factors along with corresponding items and factor loadings are indicated in Table 1.

The factor loads related to the 20 items on the scale ranged from 0.29 to 0.92. Thus, it was concluded these questions were qualified sufficiently to be included in the test. The items of 9, 12, 13, 14, 15, 18, 19, and 20 were in the first factor; the items of 2, 5, 6, and 8 were in the second factor; the items of 3, 4, 7, 10, and 11 were under the third factor; and the items 1, 16, and 17 were in the fourth factor. All four factors explained 46.02% of the total variance (see Table 2). This variance rate suggested this test might be evaluated as a test composed of four factors. These four factors were named as Mood, Relationship, Responsibilities, and Duration. In the *Mood* factor, questions are about bad feelings and behaviors that Internet users may have due to uncontrolled Internet use (Ko et al., 2009). In the *Relationship* factor, users are questioned about their online communication habits. In the *Responsibilities* factor, Internet users are asked how being online hinder them performing their duties. In the *Duration* factor, online users' time management behaviors are examined.

In the first phase of the study, Cronbach's alpha coefficient for the internal reliability score of the scale was calculated as 0.91. The internal consistency scores for each subscale was calculated and found as 0.84, 0.79, 0.75, and 0.68 for the first through fourth factor, respectively. Item-total correlations ranged from 0.34 to 0.61 for the 20 items.

Table 1. Factor loading resulted from EFA analysis

	Item	F1	F2	F3	F4
20	How often do you feel depressed, moody, or nervous when you are off-line, which goes away once you are back online?	**.766**	−.041	.059	−.033
19	How often do you choose to spend more time online over going out with others?	**.666**	.113	−.160	.056
15	How often do you feel preoccupied with the Internet when off-line, or fantasize about being online?	**.459**	−.044	.127	.220
13	How often do you snap, yell, or act annoyed if someone bothers you while you are online?	**.362**	.103	.324	−.118
18	How often do you try to hide how long you've been online?	**.361**	.253	−.010	.068
12	How often do you fear that life without the Internet would be boring, empty, and joyless?	**.358**	−.143	.269	.281
9	How often do you become defensive or secretive when anyone asks you what you do online?	**.327**	.245	.212	−.092
14	How often do you lose sleep due to being online?	**.306**	.224	.088	.224
8	How often does your job performance or productivity suffer because of the Internet?	.096	**.808**	−.065	−.114
6	How often do your grades or school work suffer because of the amount of time you spend online?	.150	**.797**	−.078	−.149
2	How often do you neglect household chores to spend more time online?	−.126	**.605**	−.041	.339
5	How often do others in your life complain to you about the amount of time you spend online?	.046	**.423**	.245	.049
3	How often do you prefer the excitement of the Internet to intimacy with your partner?	−.186	−.019	**.722**	.024
10	How often do you block out disturbing thoughts about your life with soothing thoughts of the Internet?	.207	−.022	**.558**	−.066
4	How often do you form new relationships with fellow online users?	.069	.044	**.527**	−.043
11	How often do you find yourself anticipating when you will go online again?	.135	−.120	**.447**	−.042
7	How often do you check your email before something else that you need to do?	.062	.086	**.291**	.219
16	How often do you find yourself saying "just a few more minutes" when online?	.076	−.186	−.012	**.919**
17	How often do you try to cut down the amount of time you spend online and fail?	.210	.219	−.215	**.611**
1	How often do you find that you stay online longer than you intended?	−.318	.354	.278	**.379**

Table 2. Variance explained by the factors

Factor	Variance	Variance %	Total Variance %
1	6.95	34.72	34.72
2	.92	4.58	39.30
3	.70	3.48	42.79
4	.65	3.23	46.02

In the second phase of the current study, a CFA was performed to confirm the IAT's factor structure emerged in the EFA. The CFA analysis was performed with a different sample. The first run of the CFA resulted χ^2 (df = 164, $p < .001$) = 537.86 and χ^2/df = 3.28. These values are sensitive to sample size, especially in models with large number estimated parameters. Other indexes calculated as follows: Comparative fit index (CFI) = .91, normed fit index (NFI) = .88, goodness of fit index (GFI) = .89, and root mean squared error of approximation (RMSEA) = .069. According to scholars (i.e., Bentler, 1992; Thompson, 2006), if the values of CFI, NFI, and GFI exceed .90, and the value of RMSEA is less than .08, then the construct is regarded to be acceptable. In the present model, NFI and GFI values did not exceed the value of .90; therefore, the

modification indices in the result of the CFA were checked if there was any proposed covariance. Then, separate co-variances between the errors 2-4, 6-8 and 11-12 were created, respectively. The CFA analysis was rerun, and χ^2 (df = 161, $p < .001$) = 459.14 and χ^2/df = 2.85 were observed. Other fit indexes, including CFI = .93, NFI = .90, GFI = .91, and RMSEA = .062 were reported to assess the model fit. The values of CFI, NFI, and GFI exceed .90, and the value of RMSEA is less than .08; therefore, the construct is regarded to be acceptable. In other words, the CFA result in the present study indicated that the model is coherent.

As indicated in Figure 1, the factor loadings of the items changed between .43 (item 4) and 0.77 (items 2, 8, and 16), and all loadings were statistically significant ($p < 0.05$). The inter-factors and factor-total point correlations are given in Table 3. All correlations were positive and statistically significant.

As for the reliability of the measurement, Cronbach's alpha coefficient was calculated. The internal reliability score of the scale was 0.92. The internal consistency scores for each subscale were calculated and found as 0.84 for the first factor, 0.84 for the second factor, 0.68 for the third factor, and 0.77 for the fourth factor. Item-total correlations ranged from 0.40 to 0.71 for the 20 items.
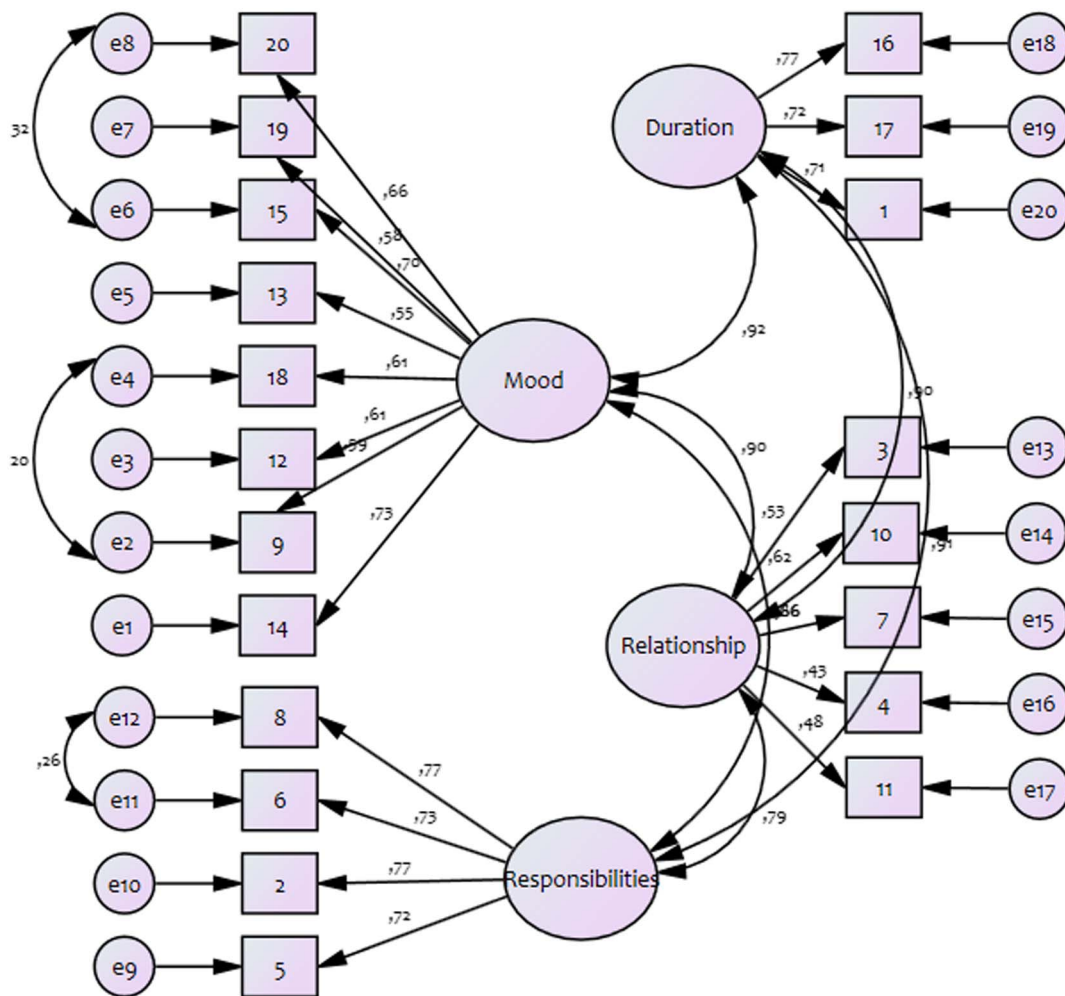

Figure 1. Factor structure of the IAT obtained from the CFA

Table 3. Pearson correlation coefficients among the IAT subscales

Factors	Pearson Coefficients			
	1	2	3	4
1		.573*	.586*	.539*
2			.582*	.669*
3				.624*
4				

*$*p < .001$

CONCLUSIONS

In this study, the IAT was adapted into the Turkish language, which was originally developed by Young (1998) in English and then adapted in several languages. The focus group in the current study was undergraduate students in Turkey. The main purpose was to ensure that the psychometric features and the factor structure of the test were suitable for Turkish university students. The study was conducted in two sequent phases. In the first phase an EFA was applied to figure out the factor structure of the Turkish version of the IAT. The EFA revealed four factors, which explained 46.02% of the total variance. In the following phase, CFA was conducted with a different sample to verify the factor structure that found in the EFA. The CFA resulted four-factor model was satisfactory for the Turkish version of the IAT.

It could be concluded that the administration of the Turkish version of the IAT provided acceptable results on undergraduate students. However, there are several limitations that need to be considered when interpreting the findings. For example, the sample consisted of only educated university students, and the number of female participants was higher than male students due to the female–male ratio in the university population. In addition, although the sample size was acceptable, students were from only 10 different universities, which may limit to represent all students in Turkey. Thus, future studies could be conducted to examine the IAT with other age and vocation groups with a broad participation. In addition, users' demographic features may be taken into account in order to investigate the level of Internet addiction among the intended group of users.

Authors' contributions: FK, ED, and KSY designed the study. FK and ED monitored data collection. ED wrote the introduction, FK and ED interpreted the results and wrote the conclusion. FK performed the statistical analyses. FK and ED structured the manuscript, KSY had advises during the study and reviewed the completed manuscript.

Conflict of interest: The authors declare no conflict of interest.

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