CYBERPSYCHOLOGY, BEHAVIOR, AND SOCIAL NETWORKING
Volume 16, Number 3, 2013

DOI: 10.1089/cyber.2012.0426

Arabic Validation of the Internet Addiction Test

Nazir S. Hawi, EdD

Abstract

Concern about Internet addiction, fuelled by the rapid increase in its usage across the globe, has spread to many parts of the world, including the Arab world. Concurrently, there has been a relentless quest for a valid tool for measuring Internet addiction. Thus far, two popular tools have been translated to Arabic: the Compulsive Internet Use Scale and the Internet addiction test (IAT). While the Arabic version of the former was proven valid by one study, the validity of the latter's Arabic version remains in question. Therefore, this study investigated the psychometric properties of the Arabic version of the IAT. An online Arabic version of the IAT was completed by 817 intermediate- and secondary-school students across Lebanon. The results showed that a one-factor model of the IAT has good psychometric properties and fits the data extremely well. This study presents evidence that the Arabic version of the IAT is valid for measuring Internet addiction among adolescents in Lebanon.

Introduction

While many studies have employed Young's Internet addiction test[1] (IAT) as a scale for assessing Internet addiction,[2,3] only a handful of researchers have investigated the English version's validity.[2,4,5] The situation with the IAT's other language versions was no better. Only one study validated a French version,[6] and one other validated an Italian version.[7] The purpose of this study was to validate an Arabic version of the IAT employed in Lebanon with adolescents.[8] It is worth mentioning that many Arab-speaking people are capable of speaking two or more languages, including French, English, and Italian. However, the lack of a validated Arabic tool to measure Internet addiction in a region where Arabic is the primary language and the medium of instruction has become a real concern.[6] As an Arabic version of the Compulsive Internet Use Scale has been validated,[9] it is now time to validate an Arabic version of the IAT, thereby providing people who study Internet addiction in the Arab world with the option of using either one of these tools.

Literature Review

Widyanto and McMurran conducted a factor analysis on the IAT. There were 86 (29 males and 57 females) valid responses from participants via the Internet. The participants' ages ranged from 13 to 67 years. The researchers extracted six factors from the IAT: salience (5 items), excessive use (5 items), neglect work (3 items), anticipation (2 items), self-control (5 items), and neglect of social life (2 items). These factors explained 35.80 percent, 9.02 percent, 6.51 percent, 6.02 percent, 5.55 percent, and 5.21 percent of the variance, respectively. Despite the small sample size, Widyanto and McMurran concluded that the IAT has the potential to be a good basis for developing a valid instrument. Chang and Law's factor analysis on the IAT was done using a sample of 410 undergraduates from eight universities in Hong Kong (187 males and 223 females). The ages were not reported. The analysis led the researchers to remove Items 2, 11, and 7 (see Table 2). The researchers identified three factors: withdrawal and social problems (9 items), time management and performance (5 items), and reality substitution (3 items). These factors explained 24.19 percent, 20.80 percent, and 10.64 percent of the variance, respectively. Widyanto et al. performed a factor analysis on the IAT using a sample of 225 Internet users (69 males and 156 females). The participants' ages ranged from 16 to 66 years. Three factors were identified: emotional/psychological conflict (9 items), time management issues (6 items), and mood modification (6 items). These factors explained 42.67 percent, 7.97 percent, and 5.61 percent of the variance, respectively. Jelenchick et al. performed a psychometric analysis of the IAT, using a sample of 215 U.S. college students (101 males and 114 females) recruited from two universities. The participants' ages ranged from 17 to 20 years. Two factors were identified, dependent use and excessive use, which accounted for 73 percent and 17 percent of the total variance, respectively. The researchers concluded that the IAT is a valid instrument for assessing Internet addiction in U.S. college students. Khazaal et al. investigated the psychometric properties of a French version of the IAT with 246 adults (81 males and 165 females), including undergraduate medical students (195) and volunteers from the community (51). The participants' ages ranged from 18 to 54

Department of Computer Science, Faculty of Natural and Applied Sciences, Notre Dame University—Louaize, Zouk Mosbeh, Lebanon.

years. Khazaal et al. reported that they extracted only one factor that had good psychometric properties and fit the data well.

The next sections describe the participants and instruments used in the present study, explain the exploratory and confirmatory factor analysis (CFA) used to establish the factor structure of the IAT, and present the conclusions.

Methods

Participants

A total of 817 completed online questionnaires were submitted by students from intermediate and secondary public (24.7 percent) and private (75.3 percent) schools during the 2010–2011 academic year. Overall, there were 127,323 (40.5 percent) and 187,048 (59.5 percent) students in the public and paid private education sectors, respectively. The sample characteristics were as follows: $M_{age} = 15$ years, $SD = 2.12$ years, and age range: 10–22 years.

Instruments

The IAT includes 20 items, each of which is rated on a six-point Likert scale: does not apply, rarely, occasionally, frequently, often, and always, scored 0, 1, 2, 3, 4, and 5, respectively. The number of items (20) requires at least 400 respondents. Therefore, the sample size was adequate; there were ~41 respondents per questionnaire item, surpassing the minimum requirement of 20.

Results

The exploratory factor analysis was executed using SPSS version 16, beginning with a reliability analysis. The Interitem Correlation Matrix contained no negative values, indicating that the items were measuring the same characteristic. The internal consistency of the IAT was measured using Cronbach's alpha, the most popular coefficient of reliability measure.[10] Theoretically, it varies from 0 to 1. Ideally, it should be above 0.700.[11] In the study, the data collected for the Arabic version of the IAT produced an internal consistency reliability ($\alpha = 0.921$) considered excellent because α is ≥ 0.900.[12] Additionally, α was not markedly high (0.950 or higher), indicating that the IAT does not include redundant items.[10,13]

Furthermore, the computed α (0.921) showed that the index of measurement error in the IAT is very small: 0.151.[10] The Corrected Item-Total Correlation values ranged from 0.461 (Item 4) to 0.668 (Item 20), indicating that all items measured the same construct as the scale. Cronbach's alpha did not improve when Item 4 was removed from the scale. Jelenchick et al. obtained 0.4 as a factor loading on Item 4 in their study. They explained that this low factor loading as an indication that Item 4 (see Appendix) does not represent any more of a symptom of problematic Internet use now as it did when the scale was created by Young.[1] Another possible explanation is that due to ongoing awareness campaigns, Internet users are now more cautious about forming new relationships with fellow users. The influence of cultural norms must also not be ignored. In addition, none of the values in the column headed "Alpha if Item Deleted" were higher than 0.921; the values ranged from 0.914 (Item 15) to 0.920 (Item 4), indicative of the IAT's homogeneity, and suggesting that no item should be removed from the IAT.

Next, the 20 items of the IAT were subjected to the principal component analysis (PCA) extraction method. The rotation method was Oblimin with Kaiser Normalization. Before performing PCA, the suitability of the data for factor analysis was assessed. Inspection of the correlation matrix revealed the presence of many (88.42 percent) coefficients of 0.300 and above. The Kaiser-Meyer-Olkin measure of sampling adequacy was 0.953, which exceeded the recommended value of 0.600,[14] and Bartlett's Test of Sphericity[15] reached statistical significance (chi-squared = 6416.163, df = 190, $p < 0.0001$), supporting the factorability of the correlation matrix. In fact, PCA revealed the presence of two components with eigenvalues exceeding 1, explaining 40.64 percent, and 6.18 percent of the variance, respectively. An inspection of the scree plot revealed a clear break after the first component. Using Catell's[16] scree test, it was decided that one component should be retained. This was further supported by the results of the parallel analysis, which showed only one component with an eigenvalue exceeding the corresponding criterion value for a randomly generated data matrix of the same size (20 variables × 817 respondents). Although the second component's eigenvalue (1.238) was slightly higher than the criterion value derived from parallel analysis (1.236), it was rejected to be cautious, because it fell within one standard deviation of the criterion value (1.237 + 0.021 = 1.258) (see Table 1). Additionally, from the lower limit, the eigenvalue barely exceeded 1 (1.237 – 0.021 = 1.216). This process was repeated several times with a different number of replications. Each execution generated a criterion value and a standard deviation that led to the same conclusion.

In addition, Velicer's minimum average partial (MAP) test was implemented on the correlation matrix using the principal component extraction method. MAP suggested a one-factor solution. The factor loadings are depicted in Table 2 under the MAP column. There were slight variations in the individual factor loadings between PCA and MAP. The loadings' criteria were the following: >0.70–excellent; >0.63–very good; >0.55–good; >0.45–fair; and >0.32–poor.[17] All items loaded above 0.45. Therefore, none of the loadings were considered poor.

While the one-factor model was consistent with the results of the study conducted on the French version of the IAT,[6] it mismatched others. For instance, while Jelenchick et al. identified a two-factor model for an English version in the United States, Widyanto and McMurran identified a six-factor model for the English version in the United Kingdom. Chang and Law and Widyanto et al. identified three factors. Discrepancies were most likely due to sampling methods and differences inherent in the studies' samples, be they demographic characteristics, cultural norms, or socioeconomic factors.

Table 1. Components' Actual Eigenvalues Versus Criterion from Parallel Analysis

Component number	*Actual eigenvalue from PCA*	*Criterion value from parallel analysis*	*Decision*
1	8.098	1.290 ± 0.027	Accept
2	1.238	1.237 ± 0.021	Reject

PCA, principal components analysis.

Table 2. Loadings of the Exploratory Factor Analysis

Item number	PCA		Minimum average partial	
	Loadings	Status	Loadings	Status
Item 1	0.584	Good	0.543	Fair
Item 2	0.642	Very good	0.604	Good
Item 3	0.586	Good	0.548	Fair
Item 4	0.511	Fair	0.452	Fair
Item 5	0.684	Very good	0.634	Very good
Item 6	0.642	Very good	0.583	Good
Item 7	0.598	Good	0.569	Good
Item 8	0.638	Very good	0.587	Good
Item 9	0.634	Very good	0.617	Good
Item 10	0.629	Good	0.572	Good
Item 11	0.660	Very good	0.614	Good
Item 12	0.635	Very good	0.603	Good
Item 13	0.679	Very good	0.632	Very good
Item 14	0.670	Very good	0.609	Good
Item 15	0.711	Excellent	0.650	Very good
Item 16	0.602	Good	0.567	Good
Item 17	0.602	Good	0.567	Good
Item 18	0.647	Very good	0.598	Good
Item 19	0.621	Good	0.563	Good
Item 20	0.719	Excellent	0.656	Very good

A CFA was executed in a structural equation modeling with IBM SPSS Amos Graphics 20.0 to test the structure underlying the set of 20 items forming the IAT. The latent construct was Internet addiction, which was not directly observed; it was considered the endogenous variable. The 20 items were considered the exogenous variables used to measure the adolescent's Internet addiction level.

The first measure of fit calculated for Model 1 was the χ^2 to df ratio, which yielded 5.600 with $p < 0.050$. In Amos Graphics, this ratio is equivalent to the minimum value of the discrepancy (CMIN)/degrees of freedom (DF). CMIN is the likelihood ratio χ^2. Carmines and McIver stated that a χ^2/df in the range of 2 to 1 or 3 to 1 indicates an acceptable fit between the model and the sample data. Consequently, this measure indicated that Model 1 did not adequately fit the data. Some studies do not use the χ^2 test as a measure of fit, because it is sensitive to sample size.[18] Next, other goodness-of-fit indices were analyzed. The root mean square error of approximation (RMSEA) for Model 1 was 0.075. According to Browne and Cudeck, because the RMSEA was < 0.080, Model 1 could be considered an adequate fit; however, because it was higher than 0.050, it could not be considered a close fit. Additionally, although all were very close to the desired value of 0.900, the normed fix index (NFI), the comparative fix index (CFI), the Tucker-Lewis index (TLI), and the goodness of fit index (GFI), which were 0.868, 0.889, 0.877, and 0.878, respectively, suggested a model that did not presently fit, but capable of improvement. The standardized root mean of the residual (SRMR), which was 0.052, indicated a possible fit, because it only marginally exceeded the upper limit of 0.050.

Most of the aforementioned goodness-of-fit statistics supported a variant of Model 1. Consequently, Model 1 was amended by removing all standard residual covariances > 2. Khazaal et al. followed this strategy, but did so with other item associations. The new model (Model 2) included error covariances between some items, including between Item 1 and Items 2, 4, 6, and 19. The relationships between these variables seemed to highlight the effect of time management on life issues. The χ^2-to-df ratio of Model 2 was 2.472, a significant decrease from that of Model 1 (5.601). This new value (2.472) indicated that Model 2 was an adequate fit.[19] In addition, the RMSEA for Model 2 was 0.043, which indicated a good model fit, because it was < 0.050.[20] Because the computed p of close fit (PCLOSE) (0.990), which tests the null hypothesis that RMSEA is no greater than 0.050, was significantly > 0.050, there was no evidence to reject the null hypothesis. Additionally, the NFI, CFI, and TLI, which were 0.951, 0.970, and 0.961, respectively, suggested that the model fits very well. The SRMR was 0.032, indicating a very good fit, because it was < 0.050, and the GFI, which measures the proportion of the variance in the sample variance–covariance matrix accounted for by the model, was 0.956, indicating a good model fit because it was larger than 0.900. The calculated adjusted GFI (AGFI), which adapts the GFI for degrees of freedom, was 0.935, indicating a good fit, because it was larger than 0.900. For the modified model, the absolute values of all standardized residuals fell below the 1.942 limit,[21] a value very close to that of 1.960 obtained by Khazaal et al. All the measures shifted substantially in the right directions, indicating that Model 2 was an improvement over Model 1.

Further exploration showed that by excluding Item 6 from Model 2, the χ^2-to-df ratio, RMSEA, and SRMR decreased to

Table 3. Model-Fit Summary

Goodness-of-fit measure	Perfect fit	Range	Good fit	Model 1	Model 2	Model 3
CMIN				1064.282	395.544	277.196
DF				190	160	140
CMIN/DF	1		< 2 to 1	5.601	2.472	1.980
Root mean square error of approximation	0		< 0.05	0.075	0.043	0.035
PCLOSE				0.000	0.990	0.999
Normed fix index (Delta1)	1	0 to 1	> 0.95	0.868	0.951	0.963
Comparative fix index	1	0 to 1	> 0.95	0.889	0.970	0.981
Tucker-Lewis index	1	0 to 1	> 0.90	0.877	0.961	0.975
Root mean residual	0		Smaller is better	0.111	0.071	0.065
Standardized root mean of the residual	0			0.052	0.032	0.029
Goodness-of-fit index	1		> 0.90	0.878	0.956	0.973
Adjusted goodness-of-fit index	1			0.852	0.936	0.953

CMIN, the minimum value of the discrepancy; DF, degrees of freedom; PCLOSE, p of close fit.

1.980, 0.035, and 0.029, respectively, and the PCLOSE, NFI, CFI, TLI, GFI, and AGFI increased to 0.999, 0.963, 0.981, 0.975, 0.973, and 0.953, respectively. All the measures migrated toward a perfect fit. This suggested that Item 6 is likely irrelevant or too vague to students,[3] because it reads, "Does your work suffer because of…?," and Item 8 is about job performance and productivity. The goodness-of-fit summary of the three models, which is useful for immediate comparisons, is shown in Table 3. It is worth noting that, if the comparison is warranted, the RMSEA, SRMR, and CFI obtained here are much better than those reported by Khazaal et al., 0.056, 0.054, and 0.920, respectively, and by Chang and Law, 0.089, 0.053, and 0.973, respectively.

Conclusion

This study investigated the psychometric properties of the Arabic version of the IAT. First, the reliability analysis showed that its internal consistency was excellent. Second, the exploratory factor analysis showed that a one-factor model fits the data very well. While this result was consistent with the study on the French version, it mismatched others performed on the English version. Third, the CFA led to the modification of the original model, as was the case with other studies. It is worth noting that the two new models proved to be more robust than the original model and models obtained in other research. However, further studies and data should verify the hypothesized models. Finally, this study showed that the Arabic version of the IAT is a valid and reliable instrument for use in the Arab world.

Acknowledgments

I thank my wife and children for their patience and support.

Author Disclosure Statement

No competing financial interests exist.

References

1. Young KS. Internet addiction: the emergence of a new clinical disorder. CyberPsychology and Behavior 1998; 1: 237–244.
2. Jelenchick LA, Becker T, Moreno MA. Assessing the psychometric properties of the Internet addiction test (IAT) in US college students. Psychiatry Research 2012; 196:296–301.
3. Widyanto L, Griffiths MD, Brunsden, VA. Psychometric comparison of the Internet addiction test, the Internet-related problem scale, and self-diagnosis. Cyberpsychology, Behavior, and Social Networking 2011; 14:141–149.
4. Chang MK, Law SPM. Factor structure for Young's Internet addiction test: a confirmatory study. Computers in Human Behavior 2008; 24:2597–2619.
5. Widyanto L, McMurran M. The psychometric properties of the Internet addiction test. CyberPsychology and Behavior 2004; 7:443–450.
6. Khazaal Y, Billieux J, Thorens G, et al. French validation of the Internet addiction test. CyberPsychology and Behavior 2008; 11:703–706.
7. Ferraro G, Caci B, D'Amico A, et al. Internet addiction disorder: an Italian study. CyberPsychology and Behavior 2007; 10:170–175.
8. Hawi NS. Internet addiction among adolescents in Lebanon. Computers in Human Behavior 2012; 28:1044–1053.
9. Khazaal Y, Chatton A, Atwi K, et al. Arabic validation of the compulsive Internet use scale (CIUS). Substance Abuse, Treatment, Prevention, and Policy 2011; 6:1–6.
10. Tavakol M, Dennick R. Making sense of Cronbach's alpha. International Journal of Medical Education 2011; 2:53–55.
11. DeVellis RF. (2003) *Scale development: theory and applications*, 2nd edition. Thousand Oaks, California: Sage.
12. George D, Mallery P. (2003) *SPSS for Windows step by step: a simple guide and reference 11.0 update*, 4th edition. Boston: Allyn & Bacon.
13. Streiner D. Starting at the beginning: an introduction to coefficient alpha and internal consistency. Journal of Personality Assessment 2003; 80:99–103.
14. Kaiser H. A second generation Little Jiffy. Psychometrika 1970; 35:401–415.
15. Bartlett MS. A note on multiplying factors for various chi square approximations. Journal of the Royal Statistical Society 1954; 16:296–298.
16. Catell RB. The scree test for number of factors. Multivariate Behavioral Research 1966; 1:245–276.
17. Comrey AL, Lee HB. (1992) *A first course in factor analysis*, 2nd edition. Hillsdale, NJ: Erlbaum.
18. Pratarelli ME, Browne BL. Confirmatory factor analysis of Internet use and addiction. CyberPsychology and Behavior 2002; 5:53–64.
19. Carmines EG, McIver JP. (1981) Analyzing models with unobserved variables: analysis of covariance structures. In: Bohrnstedt GW, Borgatta EF, eds. *Social measurement: current issues*. Thousand Oaks, CA: Sage, pp. 65–115.
20. Browne MW, Cudeck R. (1993) Alternative ways of assessing model fit. In: Bollen KA, Long JS, eds. *Testing structural equation models.* Newbury Park, CA: Sage, pp. 136–162.
21. Jöreskog KG, Sörbom D. (1984) *LISREL-VI user's guide*, 3rd edition. Mooresville, IN: Scientific Software.

Address correspondence to:
Dr. Nazir S. Hawi
Department of Computer Science
Faculty of Natural and Applied Sciences
Notre Dame University—Louaize
P.O. Box 72 Zouk Mikael
Zouk Mosbeh
Lebanon

E-mail: nazirhawi@hotmail.com

(*Appendix follows* →)

Appendix

Young's Internet Addiction Scale

Items	*Question: How often …*
Item 1	do you feel that you stay online longer than you intend?
Item 2	do you neglect household chores to spend more time online?
Item 3	do you prefer excitement of the internet to intimacy with your partner?
Item 4	do you form new relationships with fellow online users?
Item 5	do others in your life complain to you about the amount of time you spend online?
Item 6	does your work suffer because of the amount of time you spend online?
Item 7	do you check your e-mail before something else that you need to do?
Item 8	does your job performance or productivity suffer because of the internet?
Item 9	do you become defensive or secretive when someone asks what you do online?
Item 10	do you block disturbing thoughts about your life with soothing thoughts of the internet?
Item 11	do you find yourself anticipating when you go online again?
Item 12	do you feel that life without the Internet would be boring, empty and joyless?
Item 13	do you snap, yell, or act annoyed if someone bothers you while you are online?
Item 14	do you lose sleep due to late night log-ins?
Item 15	do you feel preoccupied with the Internet when off-line or fantasize about being online?
Item 16	do you find yourself saying "just a few more minutes" when online?
Item 17	do you try to cut down the amount of time you spend online and fail?
Item 18	do you try to hide how long you've been online?
Item 19	do you choose to spend more time online over going out with others?
Item 20	do you feel depressed, moody, or nervous when you are offline, which goes away once you are back online?