

Confirmation of the Chinese Version of the Problematic Internet Use Questionnaire Short Form (PIUQ-SF)

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Although an increasing number of studies have focused on problematic Internet use, numerous measures exist with only modest investigation into their reliability and validity, both within and across different cultures (Király et al. 2015). The most frequently used questionnaire is the Internet Addiction Test (Young 1998). However, its factor structure appears to be unstable (e.g., Fernandez-Villa et al. 2015; Pontes et al. 2014). Koronczai et al. (2011) suggested that a suitable measure should fit six basic requirements. More specifically, it should be (i) *comprehensive*, that is examining more, possibly all, aspects of problematic Internet use; (ii) as *concise as possible*, in order to be able to assess the more impulsive population, and to use in time-limited surveys (or having different forms with different length). Such a measure should be (iii) reliable and valid for *different methods of data collection* (e.g. online, paper-and-pencil self-rating, face-to-face); as well as (iv) for *different age groups* (e.g. adolescents and

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adults), and (v) in different *cultural* settings. Finally, (vi) cut-off scores should be defined on the basis of clinical examination.

The Problematic Internet Use Questionnaire (PIUQ) (Demetrovics et al. 2008) fulfills several of the aforementioned criteria. The 18-item PIUQ is a *comprehensive* measure that assesses three basic aspects of problematic Internet use (i.e., obsession, neglect, and control disorder). The 18-item and the shorter 9-item versions of the PIUQ have a reliable structure, and are suitable for time-limited surveys and have proved to be valid across various methods of data collection (i.e., online as well as paper-pencil) and age groups (Demetrovics et al. 2008; Koronczi et al. 2011). However, its implementation has so far mostly taken place in Western individualistic cultures (Kelley and Gruber 2010, 2013; Koronczi et al. 2011; Zahodne et al. 2011). To date, the PIUQ has also been applied in a survey in Iran with good Cronbach's alpha coefficients and subscales (Mazhari 2012a, 2012b). Consequently, validation of the questionnaire in a culture that is significantly different from the Western culture is needed. Accordingly, the aim of the present study was the validation of the 9-item PIUQ among the Chinese population.

Materials and Methods

Participants and Procedure

Students from four universities located in Beijing participated in the survey. Students filled out the questionnaire before their lectures following a short verbal information session. Participation in the survey was voluntary, and no incentives for participation were provided. Informed consent was given to all participants prior of filling out the questionnaire. The survey was approved by the Institutional Review Board of the research team's university. In total, 807 students filled out the questionnaire. However, the data of 39 individuals were excluded from the analysis as more than 10% of the answers were not completed.

Measures

Time Spent on the Internet Based on the experiences gained from former studies, the length of time spent on the Internet either studying, working, and for other reasons were asked separately.

Problematic Internet Use Questionnaire Short Form (PIUQ-SF) (Demetrovics et al. 2008; Koronczi et al. 2011) The PIUQ-SF comprises three factors (i.e., Obsession, Neglect, Control disorder) with three items per each factor. The *Obsession* subscale relates to mental withdrawal symptoms caused by the lack of Internet use. The *Neglect* subscale relates to the neglect of everyday activities and essential needs. The *Control disorder* subscale contains items relating to difficulties in controlling Internet use. Participants use a five-point Likert scale to estimate how much each given statement is true for them. The scores for each subscale were calculated by summarizing the items belonging to the specific subscale.

Chinese Internet Addiction Inventory (CIAI) (Huang et al. 2007) The CIAI was used to assess concurrent validity. The questionnaire was developed using a Chinese university sample in Mandarin language. Therefore, applying this instrument to the present study setting

appeared warranted. The 31 items of the CIAI load on three factors, namely *Mood modification* (seven items, related to mood modification, and escaping coping style), *Dependence* (eight items, related to tolerance, preoccupation, and withdrawal symptoms), and *Conflicts* (sixteen items, related to negative consequences, salience, and relapse). Participants used a five-point Likert scale to estimate how often each specific statement was true for them. The scores for each subscale were calculated by summarizing the items belonging to the specific subscale. The internal consistency of subscales and the total scale was excellent (Cronbach-alpha was .91 for Conflicts, .79 for Mood Modification, .81 for Dependence, and .93 for the Total scale). SPSS 16.0 (SPSS Inc. 2007) and Mplus 6.0 (Muthén and Muthén 1998–2007) were used for statistical analyses.

Results

Sample Characteristics and Internet Use

The final sample comprised 768 students (542 females, 226 males). Mean age was 20.6 years ($SD = 1.56$). More than half of the participants (58%) used the Internet for a maximum of 2 h a day, and another 31.9% used it for 3–4 h for studying or working. Slightly more (67.5%) used the Internet for a maximum 2 h a day for purposes other than studying or working, and 26.4% for 3–4 h. A small minority (6.2%) used the Internet for 5 h or more per day for leisure purposes. The majority of participants used the Internet primarily for emailing, browsing, online communication and downloading. Less prevalent activities included buying things online, gaming, dating, visiting forums, and writing blogs.

Psychometric Properties and Concurrent Validity of the PIUQ-SF

Problematic Internet Use Questionnaire Short Form A confirmatory factor analysis (CFA) was applied to confirm the three-factor model of the PIUQ. The CFA was performed with maximum likelihood parameter estimates with standard errors and chi-square test statistics that were robust to the violations of normality (MLR) (Muthén and Muthén 1998–2007). This model provided an adequate fit to the data, after freeing the error covariance between items 6 and 9 ($\chi^2 = 118.5$ $df = 23$ $p < 0.001$; CFI = 0.946; TLI = 0.915; RMSEA = 0.074 [0.061–0.087]; SRMR = 0.060). Standardized estimates of factor loadings of the three-factor solution are presented in Table 1. All factor loadings were above .40. Cronbach's alpha for the whole scale was .84. The correlation between the subscales ranged between .49 and .65 (see Table 2).

Concurrent Validity Correlations between the PIUQ-SF subscales and the CIAI subscales ranged between .44 and .70 (see Table 2). Correlation between the two main scales was .82.

Gender Differences

A small but significant gender difference was found on the *Obsession* subscale of the PIUQ-SF where males had higher mean average scores than females (see Table 3). Additionally, slightly higher average scores were reported for males on the overall CIAI scale and the *Conflicts* and *Mood Modification* subscales.

Table 1 Standardized estimates of factor loadings of three-factor solution for each item of PIUQ-SF

Items	Obsession	Neglect	Control disorder
5. How often do you feel tense, irritated, or stressed if you cannot use the Internet for as long as you want to?	.72		
7. How often do you feel tense, irritated, or stressed if you cannot use the Internet for several days?	.74		
8. 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?	.81		
1. How often do you neglect household chores to spend more time online?		.54	
3. How often do you spend time online when you'd rather sleep?		.66	
9. How often do people in your life complain about you spending too much time online?		.55	
2. How often do you feel that you should decrease the amount of time spent online?			.72
4. How often does it happen to you that you wish to decrease the amount of time spent online but you do not succeed?			.83
6. How often do you try to conceal the amount of time spent online?			.49
Mean	5.27	6.38	6.99
Standard deviation	2.32	2.17	2.54
Cronbach's alpha	.80	.61	.70
Composite reliability	.80	.61	.73
Average variance explained	.57	.34	.48
Divergent validity coefficient	.76	.58	.70

Discussion

The aim of the present study was to test the reliability and validity of the 9-item version of the PIUQ among a Chinese student sample. Due to the considerable cultural differences it was possible that the three dimensions of problematic Internet use found on samples from the Western culture – (i) difficulties of controlling Internet use, (ii) obsessive cognitive preoccupations and psychological withdrawal symptoms, and (iii)

Table 2 Correlation of the PIUQ-SF and the CIAI factors

	(2)	(3)	(4)	(5)	(6)	(7)	(8)
(1) PIUQ Obsession	.52	.49	.80	.68	.44	.62	.69
(2) PIUQ Neglect		.65	.85	.70	.48	.61	.71
(3) PIUQ Control Disorder			.86	.66	.45	.60	.67
(4) <i>PIUQ Total</i>				.81	.55	.73	.82
(5) CIAI Conflicts					.49	.76	.93
(6) CIAI Mood Modification						.62	.74
(7) CIAI Dependence							.90
(8) <i>CIAI Total</i>							

All correlations are significant at $p < .01$ level

Table 3 Gender differences on the indicators of Internet use, the Problematic Internet Use Questionnaire Short Form and the Chinese Internet Addiction Inventory

	Total sample (<i>N</i> = 767)	Males (<i>n</i> = 225)	Females (<i>n</i> = 542)	χ^2/t	Cohen <i>d</i>
<i>Time spent on Internet in relation with studies or working</i>					
Less than 1 h a day n (%)	123 (16.0)	52 (23.1)	71 (13.1)	$\chi^2 = 12.73^*$	N/A
1–2 h a day n (%)	322 (42.0)	90 (40.0)	232 (42.8)		
3–4 h a day n (%)	245 (31.9)	62 (27.6)	183 (33.8)		
5–6 h a day n (%)	59 (7.7)	16 (7.1)	43 (7.9)		
7–8 h a day n (%)	10 (1.3)	3 (1.3)	7 (1.3)		
More than 8 h a day n (%)	8 (1.0)	2 (0.9)	6 (1.1)		
<i>Time spent on the recreational use of the Internet</i>					
Less than 1 h a day n (%)	112 (14.6)	38 (16.8)	74 (13.7)	$\chi^2 = 12.54^*$	N/A
1–2 h a day n (%)	406 (52.9)	98 (43.4)	308 (56.8)		
3–4 h a day n (%)	203 (26.4)	73 (32.3)	130 (24.0)		
5–6 h a day n (%)	36 (4.7)	14 (6.2)	22 (4.1)		
7–8 h a day n (%)	5 (0.7)	1 (0.4)	4 (0.7)		
More than 8 h a day n (%)	6 (0.8)	2 (0.9)	4 (0.7)		
PIUQ Obsession Mean (SD)	5.27 (2.32)	5.54 (2.57)	5.15 (2.20)	$t = 1.98^*$	0.16
PIUQ Neglect Mean (SD)	6.38 (2.17)	6.55 (2.31)	6.31 (2.11)	$t = 1.36$	0.11
PIUQ Control Disorder Mean (SD)	6.99 (2.54)	6.82 (2.62)	7.06 (2.51)	$t = 1.21$	0.09
PIUQ Total Mean (SD)	18.60 (5.89)	18.89 (6.47)	18.48 (5.64)	$t = 0.82$	0.07
CIAI Conflicts Mean (SD)	27.67 (9.65)	29.73(10.55)	26.83(9.14)	$t = 3.51^{***}$	0.29
CIAI Mood Modification Mean (SD)	17.61 (4.86)	18.32 (5.06)	17.32 (4.75)	$t = 2.54^*$	0.20
CIAI Dependence Mean (SD)	16.97 (5.62)	17.43 (5.18)	16.78 (5.54)	$t = 1.45$	0.12
CIAI Total Mean (SD)	61.97 (17.46)	65.18 (18.68)	60.71 (16.80)	$t = 2.96^{**}$	0.25

* $p < .05$; ** $p < .01$; *** $p < .001$

neglecting other important activities – appeared differently in the Chinese sample, therefore exploring and statistically testing this was important. Nevertheless, the results showed that the PIUQ-SF kept its original three-factor structure (Demetrovics et al. 2008; Koronczai et al. 2011) and its concurrent validity also appeared to be adequate. Recent studies from both Western cultures and China support the importance of these three dimensions of problematic Internet use. For instance, problematic Internet users are characterized by lower self-control and higher impulsivity (Yau et al. 2013). One recent systematic review (i.e., Lam 2014) also concluded that problematic Internet use is related to sleeping problems such as insomnia and poor sleep quality. Recent Chinese studies found that the negative physical and psychological symptoms caused by excessive Internet use were mediated by poor sleep quality (An et al. 2014). Higher self-control was found to be associated with a low level of problematic Internet use (Li et al. 2013).

No significant gender differences were found regarding the PIUQ total score either in the earlier Hungarian studies (Demetrovics et al. 2008; Koronczai et al. 2013) or in the present Chinese sample. On the other hand, while men scored higher on the *Neglect* scale and women

scored higher on the *Control disorder* scale in the Hungarian sample, men scored higher on the *Obsession* scale in the case of the Chinese student sample. These differences may be because of cultural differences. Exploring these remains the task of future studies. The main limitations of the present study were the opportunistic sample that limits the generalizability of the results and the self-reported nature of the data that may distort the results due to social desirability or memory recall bias.

Conclusion

It is concluded that the PIUQ-SF is a short and comprehensive measurement instrument that assesses problematic Internet use in a valid way in both Western and Chinese cultures. Therefore, it can be an adequate tool for cross-cultural studies that are highly important for such a global phenomenon as problematic Internet use.

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Compliance with Ethical Standards

Conflict of Interest Beatrix Koronczai, Gyöngyi Kökönyei, Róbert Urbán, Orsolya Király, Katalin Nagygyörgy, Katalin Felvinczi, Mark D. Griffiths, Zheng Huang and Zsolt Demetrovics declare that they do not have any interests which could constitute a real, potential or apparent conflict of interest with respect to his/her involvement in the publication.

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References

- An, J., Sun, Y., Wan, Y., Chen, J., Wang, X., & Tao, F. (2014). Associations between problematic internet use and adolescents' physical and psychological symptoms: possible role of sleep quality. *Journal of Addiction Medicine, 8*(4), 282–287. doi:10.1097/adm.0000000000000026.
- Demetrovics, Z., Szeredi, B., & Rózsa, S. (2008). The three-factor model of internet addiction: the development of the problematic internet use questionnaire. *Behavior Research Methods, 40*(2), 563–574. doi:10.3758/BRM.40.2.563.
- Fernandez-Villa, T., Molina, A. J., Garcia-Martin, M., Llorca, J., Delgado-Rodriguez, M., & Martin, V. (2015). Validation and psychometric analysis of the internet addiction test in Spanish among college students. *BMC Public Health, 15*, 953. doi:10.1186/s12889-015-2281-5.
- Huang, Z., Wang, M., Qian, M., Zhong, J., & Tao, R. (2007). Chinese internet addiction inventory: developing a measure of problematic internet use for Chinese college students. *Cyberpsychology & Behavior, 10*(6), 805–811. doi:10.1089/cpb.2007.9950.
- Kelley, K. J., & Gruber, E. M. (2010). Psychometric properties of the problematic internet use questionnaire. *Computers in Human Behavior, 26*(6), 1838–1845. doi:10.1016/j.chb.2010.07.018.
- Kelley, K. J., & Gruber, E. M. (2013). Problematic internet use and physical health. *Journal of Behavioral Addictions, 2*(2), 108–112. doi:10.1556/JBA.1.2012.016.

- Király, O., Nagygyörgy, K., Koronczai, B., Griffiths, M. D., & Demetrovics, Z. (2015). Assessment of problematic internet use and online video gaming. In E. Aboujaoude & V. Starcevic (Eds.), *Mental Health in the Digital Age: Grave Dangers, Great Promise* (pp. 46–68). Oxford: Oxford University Press.
- Koronczai, B., Urbán, R., Kökönyei, G., Paksi, B., Papp, K., Kun, B., et al. (2011). Confirmation of the three-factor model of problematic internet use on off-line adolescent and adult samples. *Cyberpsychology, Behavior, and Social Networking*, *14*, 657–664. doi:10.1089/cyber.2010.0345.
- Koronczai, B., Kökönyei, G., Urbán, R., Kun, B., Pápay, O., Nagygyörgy, K., et al. (2013). The mediating effect of self-esteem, depression and anxiety between satisfaction with body appearance and problematic internet use. *American Journal of Drug and Alcohol Abuse*, *39*(4), 259–265. doi:10.3109/00952990.2013.803111.
- Lam, L. T. (2014). Internet gaming addiction, problematic use of the internet, and sleep problems: a systematic review. *Current Psychiatry Reports*, *16*(4), 444. doi:10.1007/s11920-014-0444-1.
- Li, X., Li, D., & Newman, J. (2013). Parental behavioral and psychological control and problematic internet use among Chinese adolescents: the mediating role of self-control. *Cyberpsychology, Behavior, and Social Networking*, *16*(6), 442–447. doi:10.1089/cyber.2012.0293.
- Mazhari, S. (2012a). Association between problematic internet use and impulse control disorders among Iranian university students. *Cyberpsychology, Behavior, and Social Networking*, *15*(5), 270–273. doi:10.1089/cyber.2011.0548.
- Mazhari, S. (2012b). The prevalence of problematic internet use and the related factors in medical students, Kerman, Iran. *Addiction & Health*, *4*(3–4), 87–94.
- Muthén, L. K., & Muthén, B. O. (1998-2007). *Mplus User's Guide. Fifth Edition*. Los Angeles, CA: Muthén & Muthén.
- Pontes, H. M., Patrão, I. M., & Griffiths, M. D. (2014). Portuguese validation of the internet addiction test: an empirical study. *Journal of Behavioral Addictions*, *3*(2), 107–114.
- SPSS Inc (2007). *SPSS for Windows, Version 16.0*. Chicago: SPSS Inc..
- Yau, Y. H., Potenza, M. N., & White, M. A. (2013). Problematic internet use, mental health and impulse control in an online survey of adults. *Journal of Behavioral Addictions*, *2*(2), 72–81. doi:10.1556/jba.1.2012.015.
- Young, K. S. (1998). *Caught in the Net: How to recognize the signs of Internet addiction and a winning strategy for recovery*. New York: Wiley.
- Zahodne, L. B., Susatia, F., Bowers, D., Ong, T. L., Jacobson, C. E. T., Okun, M. S., et al. (2011). Binge eating in Parkinson's disease: prevalence, correlates and the contribution of deep brain stimulation. *Journal of Neuropsychiatry and Clinical Neurosciences*, *23*(1), 56–62. doi:10.1176/appi.neuropsych.23.1.56.