Vietnamese validation of the short version of Internet Addiction Test

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ABSTRACT

Background and aims: The main goal of the present study was to examine the psychometric properties of a Vietnamese version of the short-version of Internet Addiction Test (s-IAT) and to assess the relationship between s-IAT scores and demographics, health related qualify of life and perceived stress scores in young Vietnamese.
Methods: The Vietnamese version of s-IAT was administered to a sample of 589 participants. Exploratory factor and reliability analyses were performed. Regression analysis was used to identify the associated factors.
Results: The two-factor model of Vietnamese version of s-IAT demonstrated good psychometric properties. The internal consistency of Factor 1 (loss of control/time management) was high (Cronbach's alpha = 0.82) and Factor 2 (craving/social problems) was satisfactory (Cronbach's alpha = 0.75). Findings indicated that 20.9% youths were addicted to the Internet. Regression analysis revealed significant associations between Internet addiction and having problems in self-care, lower quality of life and high perceived stress scores.
Discussion and conclusions: The Vietnamese version of s-IAT is a valid and reliable instrument to assess IA in Vietnamese population. Due to the high prevalence of IA among Vietnamese youths, IA should be paid attention in future intervention programs. s-IAT can be a useful screening tool for IA to promptly inform and treat the IA among Vietnamese youths.

1. Introduction

Internet addiction (IA) is increasingly prevalent among young people worldwide (Lam, Peng, Mai, & Jing, 2009). IA is characterized by the core symptoms of Internet overuse and associated problems such as alcohol abuse, attention deficit and hyperactivity, depression and anxiety (Ho et al., 2014; Mak, Lai, Ko, et al., 2014), leading to negative health related quality of life (B. X. Tran et al., 2017). In 2012–2013, a total of 5366 adolescents aged 12–18 years were recruited from six Asian countries: China, Hong Kong, Japan, South Korea, Malaysia, and the Philippines (Mak, Lai, Watanabe, et al., 2014). The prevalence of IA was highest in the Philippines (21%). In Vietnam, a previous study indicated that 21.2% of young Vietnamese experienced IA (B. X. Tran et al., 2017). In evidence, mental health was an important factor to predict IA, that people experiencing psychological problems had a higher likelihood to suffer IA (Ni, Yan, Chen, & Liu, 2009; B. X. Tran et al., 2017; Wu et al., 2016). Moreover, people were more likely to

suffer from IA if they had online relationships, used Internet for social network or had poor social support (Cao, Sun, Wan, Hao, & Tao, 2011; Chaudhari, Menon, Saldanha, Tewari, & Bhattacharya, 2015; Krishnamurthy & Chetlapalli, 2015). In terms of socio-economic characteristics, male, having low household income, living in private accommodation and living in the city area (Chaudhari et al., 2015; Krishnamurthy & Chetlapalli, 2015; Wu et al., 2016) were associated with detecting IA. Therefore, estimating the prevalence of IA, and identifying factors associated with IA are crucial for clinicians and public health planners to develop tailored interventions to address IA in each population.

To measure IA, Young (1998) developed an Internet Addiction Test (IAT) by using DSM-IV criteria for diagnosing pathological gambling (Young, 1998). IAT mentions several issues related to excessive Internet utilization such as loss of control of using Internet leading to neglecting work and relationships, addictive symptoms (i.e. craving) when being offline etc. (Young, 1998). This tool consists of 20 questions, pertaining

to problematic behavior regarding Internet use (Young, 1998). It has been published and validated in various languages such as English (Widyanto & McMurran, 2004), French (Khazaal et al., 2008), German (Barke, Nyenhuis, & Kroner-Herwig, 2012), Italian (Ferraro, Caci, D'Amico, & Di Blasi, 2007), Arabic (Hawi, 2013), Chinese (Lai et al., 2013), Korean (Lee et al., 2013), Malay (Lai et al., 2015) and Japanese (Lai et al., 2015). However, the psychometric properties of IAT are still under debate due to the variation in its factorial structures (Pawlikowski, Altstötter-Gleich, & Brand, 2013). Pawlikowski et al. (2013) identified the following problems in the 20-item IAT. First, it contains outdated questions on checking e-mails by computers because e-mails can be checked by other electronic communication methods (Pawlikowski et al., 2013). Second, there were several redundancies across some questions, which potentially led to an overestimation of the IAT score. Furthermore, a shorter version would enhance efficiency of data collection in large epidemiological survey. As a result, Pawlikowski et al. (2013) developed a short version of the IAT (s-IAT), that consists of 12 items and a two-factor model ("loss of control/time management" and "craving/social problems"), which has good psychometric properties. These results were also found in a study of Wery et al. in France (Wery, Burnay, Karila, & Billieux, 2016).

In Vietnam, there were approximately 49 million Internet users in 2016 and the Internet penetration rate was 52%, constituting 1.4% of world Internet users (Stats, 2017). However, these has been limited understanding about a validate and reliable approach to measure IA in Vietnam. A comprehensive scale to assess IA is urgently needed to further advance the development of assessment, treatment and prevention of IA. Therefore, the main objective of the present study was to investigate the psychometric properties of a Vietnamese version of the s-IAT and establish its factor structure using exploratory factor analysis. Moreover, the study also determined the association between IA and potential factors.

2. Methods

2.1. Participants and recruitment

The study design of this study was described elsewhere (B. X. Tran et al., 2017; Zhang et al., 2017). Briefly, we applied the respondent-driven sampling technique (RDS) to recruit participants. Four eligibility criteria for participants were the following: 1) between 15 and 25 years of age; 2) a resident in Vietnam and ability to understand Vietnamese; 3) agreement to participant in this study, 4) access to email or social media network and agreement to recruit other participants who fulfilled the eligibility criteria to participant in this study.

We designed questionnaire using Google form (available at https://docs.google.com/forms). Information about the study purposes, methods and information of investigators were included in Google form. A participant must answer at least 24 out of 40 questions (60%) in the survey in order for the survey to be considered valid and included in the analysis.

2.2. Measures and procedure

Demographic information such as age, gender, education, occupation, marital status, ethnicity and religion were collected.

Health-related quality of life (HRQOL) was measured by using EuroQol - five dimensions - five levels (EQ-5D-5L) instrument which comprises of five main domains (Mobility, self-care, usual activities, pain/discomfort and anxiety/depression) with five levels of response: no problems, slight problems, moderate problems, severe problems, and extreme problems. People who answered "No problems" were classified into "No problems" group, while others were classified into "Having problems" group (Bach Xuan Tran, Nguyen, Nong, & Nguyen, 2016; B. X. Tran, Nguyen, Nong, Nguyen, Phan, and Latkin, 2016).

The Short-form Perceived Stress Scale (PSS) was used to measure stress levels of participants in the last 30 days. This instrument consists of 4 items to be rated on a 5-point Likert scale ranging from 0 (never) to 4 (very often). Total scores range from 0 to 16 and higher scores indicate higher levels of stress (Karam et al., 2012).

We used the s-IAT that was validated by Pawlikowski et al. to assess IA. The s-IAT consists of 12 items to be rated on a 5-point Likert scale ranging from 1 (rarely) to 5 (always). The s-IAT has good psychometric properties and represents the key diagnostic criteria of IA (Pawlikowski et al., 2013). Total score of the s- IAT ranges from 12 to 60 and represents an individual's tendency to or the degree of IA (Pawlikowski et al., 2013). We used the cut-off point of 36 to classify a participant as suffering from IA (Meerkerk, 2007; Zhang et al., 2017). This questionnaire was translated into Vietnamese based on the guidelines of WHO in translation and adaptation of research instrument (WHO). Two experts who are bilingual in English and Vietnamese from medicine and psychology disciplines translated this questionnaire. Based on the WHO guidelines, forward-translation, expert panel discussion and back-translation were performed (organization). The Cronbach's alpha of the Vietnamese version of s-IAT was 0.87. The translation process of this tool was described in the previous study (B. X. Tran et al., 2017).

2.3. Statistical analysis

Data were analyzed by using STATA version 12.0. The construct validity of the s-IAT was examined by exploratory factor analysis (EFA). Factors were extracted through Principle component analysis. An eigenvalue of 0.90, which was detected via the scree test, was used to define a threshold. The cut-off point of 0.40 was used for factor loadings. Additionally, a cross-loading in one item was implemented and this item was assigned to the suitable domain based on the content of question and the overarching dimension. The internal consistency of scales and its subscales were assessed by computing the Cronbach's alpha value.

Chi-squared, and t-test were used to explore the differences between participants with and without IA. The total score of each subscale was calculated by summing scores of all items of each subscale. Because score of each subscale as well as total score of the whole scale were censored data, multivariate Tobit regression was utilized to identify factors associated with the total score of each subscale. Moreover, a logistic regression was used to identify the factors associated with IA. The potential associated factors included: age, gender, education attainment, current living location, having problems in self-care/usual activities/mobility, suffering pain/discomfort, EQ-5D index and perceived stress score. In this study, we applied a stepwise forward model strategy to select variables for the reduced models (Hosmer & Sturdivant, 2013). A value of 0.2 for p-value of log-likelihood ratio test was used to select variables into the final regression models in order to avoid removing significant factors.

2.4. Ethics

Proposal of this research was approved by IRB of the Vietnam Authority of HIV/AIDS Control. Participants were asked to give E-informed consent and were informed that they could withdraw at anytime. Their contact information was coded and ensured to be confidential.

3. Results

3.1. Exploratory factor analysis of the 12-item s-IAT

Of the 589 participants, 123 (20.9%) participants with s-IAT score > 36 were classified as cases of IA. The exploratory factor analysis was performed to assess construct validity of 12-item IAT (Table 1). The maximum loading of each item was > 0.40 and the factor analysis explained 64.6% of the total variance. Bartlett's test of

Table 1
Factor loadings of the exploratory factor analysis.

	% Always	Loadings for Factor 1 (loss of control/time management problem)	Loadings for Factor 2 (craving/social problem)
Short - IAT items			
(Q1) Do you feel that you access to the Internet more often than you expect?	8.3		0.684
(Q2) Find yourself saying "just a few more minutes" when online?	10.5	0.730	
(Q3) Neglect household chores to spend more time on-line	3.1	0.788	
(Q4) Try to cut down the amount of time you spend on-line and fail	3.7	0.698	
(Q5) Grades or school work suffers because of the amount of time you spend on-line?	2.7	0.804	
(Q6) Lose sleep due to late-night log-ins	4.1	0.598	
(Q7) Choose to spend more time on-line over going out with others	2.0	0.500	
(Q8) Try to hide how long you've been on-line?	4.9		0.596
(Q9) Snap, yell, or act annoyed if someone bothers you while you are on-line?	1.0		0.674
(Q10) Depressed, moody, or nervous when you are offline, which goes away once you are back online	1.5		0.635
(Q11) Feel preoccupied with the Internet when off-line, or fantasize about being on-line	2.0		0.760
(Q12) Become defensive or secretive when anyone asks you what you do on-line	4.2		0.662
Reliability			
Cronbach's alpha		0.8196	0.7538
IAT domains scores			
Mean		16.2	14.5
SD		4.7	4.1
Total variance explained	64.6%		

IAT: Internet Addiction Test.

sphericity reveals a chi-square value of 330.64, $p < 0.01$; and Kaiser-Meyer-Olkin shows a value of 0.600. Factor 1 (loss of control/time management problem) had significant loadings for 6 items (Q.2,3,4,5,6,7). Other 6 items (Q.1,8,9,10,11,12) loaded exclusively on Factor 2 (craving/social problem). Based on the two-factor model, the internal consistency of the two factors was then assessed. For Factor 1, the Cronbach's alpha was 0.82. For Factor 2, the Cronbach's alpha was 0.75.

3.2. Differences between participants with and without IA

For demographic variables, participants with IA were significantly older than those without IA ($p < 0.01$) although the upper age limit for participants was 25 years. There were no significant differences between participants with and without IA in gender, education attainment and current living condition ($p > 0.05$). For health-related quality of life, participants with IA were significantly more likely to have lower ED-5Q index scores ($p < 0.01$) as compared to their counterparts. For perceived stress, participants with IA were significantly more likely to have higher total perceived stress score ($p < 0.01$) as compared to their counterparts (Table 2).

3.3. Association between s-IAT, demographics, health related quality of life and perceived stress

In Table 3, regression analysis revealed significant negative association between Factor 1 and studying at the vocational training/college level ($\beta = -2.09$; 95%CI = $-3.44, -0.86$), and EQ-5D index ($\beta = -2.65$; 95%CI = $-5.01--0.28$). Significant positive association was found between Factor 1 and perceived stress score ($\beta = 0.58$; 95%CI = 0.40, 0.76). In addition, there was significant negative association between Factor 2 and studying at the vocational training/college level; while significant positive association was found between Factor 2 and having problems with self-care ($\beta = 2.00$; 95%CI = 0.76–3.24) and perceived stress score ($\beta = 0.32$; 95%CI = 0.16, 0.49).

Table 3 also shows that Internet addiction test score was negatively

Table 2
Characteristics of study participants with and without Internet addiction.

Characteristics	Internet addiction				Total		p-Value
	Yes		No				
	n	%	n	%	N	%	
Total	123	20.9	466	79.1	589	100.0	
Age, mean (SD)	22.0 (1.8)		21.6 (1.7)		21.7 (1.7)		< 0.01
Gender							
Male	54	24.9	163	75.1	217	36.8	0.07
Female	69	18.6	303	81.5	372	63.2	
Education attainment							
≤ High school	4	14.3	24	85.7	28	4.9	0.06
Vocation training, college	4	7.6	49	92.5	53	9.3	
Undergraduate, University	103	22.4	357	77.6	460	80.7	
Postgraduate, University	5	17.2	24	82.8	29	5.1	
Current living location							
Homestay	59	21.4	217	78.6	276	47.4	0.41
Dormitory	22	26.2	62	73.8	84	14.4	
Living with family	34	21.0	128	79.0	162	27.8	
Living with relatives	6	11.8	45	88.2	51	8.8	
Others	2	22.2	7	77.8	9	1.6	
	Mean	SD	Mean	SD	Mean	SD	
EQ-5D index[a]	0.71	0.17	0.76	0.16	0.75	0.16	< 0.01
Perceived stress score	7.24	2.09	6.37	2.13	6.55	2.15	< 0.01

[a] EQ-5D: EuroQol-5 dimensions.

associated with studying at the vocational training/college level ($\beta = -3.37$; 95%CI = $-5.56--1.19$). People having higher perceived stress score also had higher score of Internet Addiction Test. Finally, IA was significantly associated perceived stress score (OR = 1.21; 95%CI = 1.09–1.34); while, studying at the vocational training/college level was significantly associated with lower risk of IA (OR = 0.22; 95%CI = 0.08–0.65) compared to those studying high school or lower.

Table 3
Factors associated with Factor 1, Factor 2, and Internet addiction test score and Internet addiction.

Factors	Factor 1 lack of control/time management		Factor 2 craving/Social Problem		Internet addiction test score		Internet addiction	
	Coef.	95%CI	Coef.	95%CI	Coef.	95%CI	OR	95%CI
Age			0.15	− 0.05; 0.35			1.13*	0.99; 1.29
Gender (male vs female)	0.63	− 0.14; 1.41			1.06	− 0.26; 2.39	1.47*	0.95; 2.28
Living location (vs homestay)								
Living with relatives	− 1.12*	− 2.41; 0.18			− 1.66	− 3.86; 0.54		
Education (vs ≤ high school)								
College, vocational training	− 2.09***	− 3.37; − 0.80	− 1.23**	− 2.38; − 0.08	− 3.37***	− 5.56; − 1.19	0.22***	0.08; 0.65
Pain/discomfort (yes vs no)			0.58*	− 0.11; 1.28			1.38	0.89; 2.16
Having problem in self-care (yes vs no)			2.00***	0.76; 3.24	2.00	− 0.69; 4.70	1.88*	0.94; 3.76
EQ5D index	− 2.65**	− 5.01; − 0.28			− 4.30*	− 8.94; 0.35		
Perceived stress score	0.58***	0.40; 0.76	0.32***	0.16; 0.49	0.89***	0.58; 1.19	1.20***	1.08; 1.33

* $p < 0.1$.
** $p < 0.05$.
*** $p < 0.01$.

4. Discussion

This study developed a Vietnamese version of the 12-item s-IAT and tested its psychometric properties. The exploratory factor analysis showed that two factors exerted moderate to strong influences on measured variables and the two-factor model demonstrated good psychometric properties. This result was congruent with previous validation study in the German version of s-IAT (Pawlikowski et al., 2013) and the French version (Wery et al., 2016). The factor analysis explained 64.6% of total variance and the percentage was higher than previously reported (42–52.3%) (Barke et al., 2012; Pawlikowski et al., 2013). The reliability analysis showed that the internal consistency of Factor 1 (loss of control/time management) was high and Factor 2 (craving/social problems) was satisfactory.

Although previous studies indicated more than two factors for IAT (Barke et al., 2012; Ferraro et al., 2007; Hawi, 2013; Khazaal et al., 2008; Lai et al., 2013; Lai et al., 2015; Lee et al., 2013; Widyanto & McMurran, 2004), we decided to extract two factors due to several reasons. First, the prior studies used 20-item IAT instead of 12-item s-IAT as our study, therefore it is difficult to separate the whole scale into many subscales. Second, when comparing with previous studies, we found that the loads of our items were in line with the convergent results of those studies. For example, all items in subscale "loss of control/time management" could be found in subscale "loss of control" in a study of Korkeila et al. (Korkeila, Kaarlas, Jaaskelainen, Vahlberg, & Taiminen, 2010); or five out of six items could be found in "time management problems" in Widyanto et al.'s study (Widyanto, Griffiths, & Brunsden, 2011). Meanwhile, items in the subscale "craving/social problems" could be found in "salient" factor (Korkeila et al., 2010) and "social" factor (Chang & Man Law, 2008). Pawlikowski suggested that the overall score of s-IAT could be used to measure the degree of IA, while the score of subscales could be used to assess the IA-related psychological symptoms (Pawlikowski et al., 2013). In this study, with the similarity between our study and previous studies, we believe that our two-factor model could reflect the key components of the IA.

The prevalence of IA in Vietnamese young people was 20.9%. This figure is slightly lower than that in a previous study in Vietnam (21.2%) (B. X. Tran et al., 2017). It should be noted that this study had higher sample size than the prior surveys; therefore, despite the similar study design, the prevalence of IA was different. The rate of IA in current study was lower than that in Philippines (21.1%) but higher than other Asian countries including Hong Kong (16.4%), Malaysia (14.1%), South Korea (9.7%), China (9.6%) and Japan (6.2%) (Mak, Lai, Watanabe, et al., 2014). The difference may be due to the fact that in this study, we recruited participants by using online-RDS technique; thus, youths who did not access Internet frequently might not participate in this study.

Moreover, the age of our sample was ranged from 15 to 25 years, which age group had a high demand on interaction via Internet in the modern life (B. X. Tran et al., 2017). Moreover, differences in IA measures were a potential reason. However, we were in line with a previous study that IA should be paid more attention in order to reduce its consequences in the young population (B. X. Tran et al., 2017).

Regression models found that people having vocational training/college degree had less score of IAT and were less likely to suffer IA compared to those having high school degree or less. This might be explained that people having higher education could learn to control themselves better than others in preventing excessive Internet use. However, we found that age, gender and living location were not associated with IA score (both subscales and whole scale) and diagnosing IA. These findings were different from previous studies, which suggested that males had considerable higher score than females, and age was negatively related with scores of both factors (Korkeila et al., 2010; Pawlikowski et al., 2013; Widyanto et al., 2011). The results suggested people with distinguished socio-demographic characteristics, particularly age and gender, were equally vulnerable to IA (B. X. Tran et al., 2017).

In this study, we found a significant association between IA and perceived stress in young Vietnamese. Specifically, people who had higher perceived stress score also had higher score in Factor 1, Factor 2, overall Internet Addiction Test score. Additionally, they were more likely to be Internet addicted compared to those having lower score of perceived stress. This finding is concordance with previous studies which found that young people with IA were more likely to suffer from psychiatric comorbidity (Goel, Subramanyam, & Kamath, 2013; Ho et al., 2014; Kim et al., 2006; Yen, Ko, Yen, Wu, & Yang, 2007). Psychiatric comorbidity such as social phobia is associated with avoidance of interaction with other people and increase the risk of IA (Puri, Hall, & Ho, 2013). Our findings open to further research opportunity to assess the relationship between psychiatric illness and IA in a longitudinal study.

For each factor, the multivariate models indicated that youths having higher overall EQ-5D score had lower score of Factor 1 (lack of control/time management). Connell et al. in their systematic review argued that feeling of being in control is an important component of good quality of life; or in other words, lack of control might result in poorer quality of life and vice versa (Connell, Brazier, O'Cathain, Lloyd-Jones, & Paisley, 2012). Meanwhile, people experiencing problems in self-care had higher score of Factor 2 (craving/social problem) than those did not. In literature, insufficient social support was a predictor of IA (Davis, 2001). People with limited capacities for self-care required more helps and advises from their network. Otherwise, they might feel more comfortable in online environment where they can confidently interact with other people (Casale, Lecchi, & Fioravanti, 2015). As a

result, if they did not use Internet, they might suffer a number of symptoms or social problems such as depression, nervous, becoming defensive or secretive, etc. that are contents of items of Factor 2.

The findings of current study suggested several implications. First, Vietnamese youths should be screened and assessed mental problems as well as IA regularly to identify who are at risk of IA and receive timely consultation and treatment to reduce the consequences of IA. Second, providing social skill trainings and support from family and friends in real life are vital for youths with IA to improve this condition. Third, further interventions should be implemented to address IA problems. These interventions should not be focused on separate populations but on the whole youths, especially in the modern life when the interpersonal influences are substantial due to the popularity of online social networks (Seo, Kang, & Yom, 2009; B. X. Tran et al., 2017).

This study has several limitations. First, the sampling of participants was based on online respondent driven sampling technique, which could not reach young Vietnamese who did not have frequent access to Internet. Second, self-report questionnaires might lead to recall bias. Third, the design of this study was cross-sectional study and could not establish cause and effect relationship between IA and associated factors.

5. Conclusions

In conclusion, the Vietnamese version of s-IAT is a valid and reliable instrument to assess IA in Vietnamese population, comparable to previously published versions in other languages. The s-IAT has a stable two-factor structure. IA was significantly associated with higher education, overall quality of life, having problems in self-care and high perceived stress scores in young Vietnamese. s-IAT can be a useful screening tool for IA and further validation studies in other populations are required.

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Authors' contribution

BXT, HTM, LHN, CTN, CAL, MWBZ, RCMH conceived of the study, and participated in its design and implementation and wrote the manuscript. BXT, HTM, LHN analyzed the data. All authors read and approved the final manuscript.

Conflict of interest

The authors declare no conflict of interest.

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