Measuring Internet Gaming Disorder in Chinese International Students in the United Kingdom

Ricardo Tejeiro[1*], Anna Chen[2] and Jorge L. Gómez-Vallecillo[3]

[1]*School of Psychology, University of Liverpool, United Kingdom.*
[2]*Centre for Lifelong Learning, University of Liverpool, United Kingdom.*
[3]*Department of Psychology, University of Cadiz, Spain.*

Authors' contributions

This work was carried out in collaboration between all authors. Author RT designed the study, wrote the protocol, supervised the work, performed the statistical analysis and wrote the first draft. Author AC provided advice on the Chinese academic culture, translated and applied the questionnaires. Author JLGV managed the literature searches and edited the manuscript. All authors read and approved the final manuscript.

Original Research Article

ABSTRACT

Aims: The number of international students at higher education institutions has increased dramatically over the past decades, in parallel to the efforts to identify, measure and manage the special challenges they meet and their potentially negative responses. Internet gaming disorder (IGD) has been identified as a potential problem in this context, but its measurement in some specific populations is a challenging task because few adequate instruments exist. This paper presents the adaptation and validation on a sample of Chinese young adults of one of the most commonly used questionnaires in this area, the Problem Video Game Playing scale (PVP).
Study Design: Correlational study.
Place and Duration of Study: The University of Liverpool, United Kingdom, between October and December 2014.

_____

*Corresponding author: E-mail: R.Tejeiro@liverpool.ac.uk;

Methodology: The scale was completed—together with the Severity of Dependence Scale and other questions about the use of video games and its consequences—by 240 international Chinese students who followed diverse programmes at the University of Liverpool during the course 2014-15.
Results: We found high internal consistency at Cronbach's α = .84. The one-factorial solution in the original scale was replicated, with the first factor explaining 44.5% of the variance. Spearman's correlations were significant for the association between the scale score and all alternative indicators of problem video gaming. 63 participants (26.2%) were found to be problem players as defined by 5 or more symptoms; males (34.8%) were more likely than females (10.6%) to present IGD; p < .001, Φ = .26.
Conclusion: The Chinese version of the PVP scale presents adequate psychometric and diagnostic properties for the assessment of internet gaming disorder, at least in young Chinese adults.

1. INTRODUCTION

According to the Higher Education Statistics Agency, in 2011/12 there were 488,000 international higher education students (IHES) in the United Kingdom (UK), which represents almost one in five students at this level (https://www.hesa.ac.uk). China provides the most numerous group (19.8%), far above the runner-up (India, with 5.3%). At the university where this study was conducted, this flow of Chinese IHES originates mainly from a partner university in Eastern China, whose academic offer provides students with the opportunity to complete part of their studies in the UK via a range of options.

The IHES' experience has become a growing topic for care and enquiry. Whilst many of the challenges faced by these students are similar to those of their national counterparts—e.g., leaving home, sharing accommodation with strangers, dealing with financial difficulties or adapting to new academic methods—, they present generally greater adaptation difficulties than home students in aspects such as language proficiency, academic expectations and social integration [1]. Expected outcomes vary largely: whilst Pedersen's concept of culture shock includes anxiety, depression and anger [2], other authors limit the extent of the damage and, in line with Chen's concept of culture bump [3], report that most sojourners perceive their stay as enjoyable and academically successful [4].

During her daily contacts with Chinese IEHS at the target institution, the second author of the present paper—a Chinese culture and language advisor—was made aware of the possibility of an excessive use of video games by some sojourners as a sort of compensation for their lack of adjustment to their new context. Some students referred to that excessive use with the term addiction.

Addiction is one of the problems most commonly associated with the use of video games (reported estimations for video game addiction vary notably but most fall within the 5-15% range) [5]. All studies coincide in finding a higher commitment to video games and a higher presence of problem or addictive game in males, as compared to females. Also, whilst this problem seems to affect both offline and online gamers, it has been suggested that online gaming may have a greater addictive potential [6]. In the fifth edition of the Diagnostic and Statistical Manual of the American Psychiatric Association (DSM-5) [7], the possible addiction to video games was included within a new category called Internet Gaming Disorder (IGD), a condition for further study defined as a "persistent and recurrent use of the Internet to engage in games, often with other players, leading to clinical impairment or distress" (p.795). Nine criteria (with a cutoff point of 5 or more) are suggested for its diagnosis: preoccupation, withdrawal, tolerance, loss of control, loss of interest in previous hobbies, continued use despite knowledge of psychosocial problems, deception, escape and conflict with relationships, job or school. Further, the individuals presenting IGD typically face important health hazards in terms of lack of sleep or food intake [7].

King, Haagsma, Delfabbro, Gradisar and Griffiths systematically reviewed the 18 instruments for the measurement of video game addiction presented between 1996 and 2012 and concluded that only one, the Problem Videogame Playing (PVP) scale [8], adequately assessed IGD, and that the PVP scale may provide the

best overall measure of the disorder among all available instruments [9]. Also, the PVP scale was found to be the one of the most extensively utilized across the world. After King et al.'s revision, the IGD-20 test [10] and the IGDS-SF9 [11] were presented, but both were developed from online self-selected samples, which introduces a significant bias and reduces their representativeness [12].

The PVP is a 9-item dichotomous questionnaire based on the DSM-IV [13] criteria for substance dependence and for pathological gambling. Psychometric analyses show that the PVP is one-dimensional and numerous studies in different countries have reported a moderate to good internal consistency (Cronbach's α = .69 to .91). The scale demonstrates strong convergent validity by having statistically significant associations with clinical indicators, and its criterion validity is supported by the pattern of associations between scores and alternative measures of problem play.

The adaptation of the PVP scale to the Chinese context appears as a useful step towards knowledge exchange in this area. Adapting an existing instrument rather than developing a new one allows researchers to compare data from different samples and backgrounds, with a greater ability to generalize [14]. The Chinese correlate of a psychological assessment tool developed in a European country may pose a particular challenge though, due to the existence of differences in the perceptions on mental health [15]. Nevertheless, the third version of the Chinese Classification of Mental Disorders (CCMD-3) [16], which is the most commonly used classification system in China [17] is not substantially different to earlier versions of the DSM. Video game addiction is not defined as a separate category but can be considered within habit and impulse disorders (code 61) together with pathological gambling—which mirrors the classification in the DSM-IV [13]. The study by Zhou and Li at Shenzen University (China) is also revealing: they built their own questionnaire for the assessment of video game addiction after reviewing 78 academic papers on the topic in mainland China as well as after conducting a focus group to discuss the validity, wording and format of their questionnaire [18]. The resulting tool—Online Game Addiction Index—was remarkably similar to the PVP scale and other questionnaires developed in Europe, America or Australia, with items such as "I would neglect household activities to spend more time on online games", "I spend longer time than originally intended when playing online games" or "I want to play more after being awarded for accomplishing tasks in online games".

Table 1. Correspondence between Problem Video Game (PVP) scale Items and Internet Gaming Disorder (IGD) criteria

IGD	PVP
Preoccupation	Item 1. When I am not playing with the video games, I keep thinking about them, i.e. remembering games, planning the next game, etc.
Withdrawal	Item 4. When I can't use the video games I get restless or irritable.
Tolerance	Item 2. I spend an increasing amount of time playing video games.
Loss of control	Item 3. I have tried to control, cut back or stop playing, or I usually play with the video games over a longer period than I intended. Item 6 When I lose in a game or I have not obtained the desired results, I need to play again to achieve my target.
Loss of interest in previous hobbies	-
Continued use despite knowledge of psychosocial problems	Item 8.3 and 8.4. In order to play video games I have […] or stolen, or had an argument or a fight with someone. Item 9.1, 9.3 and 9.4. Because of video game playing I have reduced my homework […] or I have not eaten, or I have gone to bed late […].
Deception	Item 7. Sometimes I conceal my video game playing to the others, this is, my parents, friends, teachers… Item 8.2. In order to play video games I have […] lied.
Escape	Item 5. When I feel bad, e.g. nervous, sad, or angry, or when I have problems, I use the video games more often
Conflict with relationships, job or school	Item 8.1. In order to play video games I have skipped classes or work […]. Item 9.2 and 9.5. Because of the video game playing I have reduced my […] schoolwork […] or I spend less time with my friends and family.

Further, considerable research suggests health-risk outcomes as a function of problem video game play in children and adolescents, but evidence in adults is lacking—although it has been linked with lower sleep quality [19] or overweight [20]. The scarcity of studies on adult video gaming is important because both relevant similarities [21,22] and differences [23] with adolescents have been reported.

Finally, despite King et al.'s conclusions above [9], the PVP items do not fully match the IGD criteria. For instance, deception, loss of control or conflict are included in two different items, whereas loss of interest in previous hobbies is absent from the PVP. Table 1 summarizes the correspondence between PVP items and IGD criteria. This issue must be adequately addressed before considering the possible use of the scale for diagnosis.

This paper presents an adaptation to Chinese of the PVP scale (PVP$_{CH}$) after the necessary modifications for the diagnosis of Internet Gaming Disorder, and reports the reliability and validity in young Chinese adults. It also represents an exploratory approach to the existence of problems associated with the use of video games in the Chinese IHES at the UK, although the correlates of those potential problems will be addressed in future studies. Our hypotheses can be summarized in (a) the PVP$_{CH}$ scale will be one-dimensional, (b) the psychometric properties of the scale, in terms of internal consistency, convergent validity and criterion validity will be good and similar to those of the original PVP, (c) online players and males will present higher commitment to videogames and a higher presence of IGD, and (d) commitment to video gaming and prevalence of IGD in Chinese IHES in the UK will be higher than the findings of previous studies on other populations.

2. METHODS

2.1 Participants

A sample of 240 adult Chinese students who followed different higher education programmes at the target British university during the course 2014/2015 participated in the study. One hundred and fifty five (64.6%) were male and 85 (35.4%) were female. Ages ranged from 17 to 33 years (Mean = 21.5, *SD* = 2.27); no age differences existed between males and females. Time of residence in the UK ranged from 1 to 36 months (Mean = 7.22, *SD* = 7.22, Mdn = 3); 61.3% (*n* = 147) had stayed 6 or less months and 24.2% (*n* = 58) between 7 and 12 months.

2.2 Materials

A questionnaire designed for the study elicited information on the respondents' sex, age, number of months living in the UK at the moment of the study and use of video games during the previous 12 months (frequency, mean and longest session, and use of offline or online video games). Students were orally instructed to consider all type of video games played in consoles, personal computers, television, mobile phones or any other system.

The Problem Video Game Playing (PVP) [8] scale was also presented. In our study, stealing was excluded following the DSM-5 recommendations for IGD. Also, the two original items addressing loss of control were included in the questionnaire in order to select, for the PVP$_{CH}$ scale, the one with better properties. A new item was included to address the missing IGD item. The PVP$_{CH}$ scale and its English translation are presented in Appendix 1.

The person's perceived control of video games during the past 12 months (the same time-frame specified in the DSM-5 for IGD) was also assessed with four items extracted from Tejeiro and Moran [8]: "did you think you played video games too much?", "did you think you had some sort of problem associated with video games?", "did your parents, couple, relatives and/or friends worry because they thought you play video games to excess?", and "have you felt that video games provide a sense of control that you miss in other aspects of your life?". Answers were on a 4-point scale from never or almost never to always or almost always. Finally, the Severity of Dependence Scale (SDS) [24] was adapted to video gaming. The SDS is a 5-item self-administered scale designed to measure the psychological correlates of dependence and presents moderately good psychometric properties [24,25]; Cronbach's α for the scale was .64 in the present study. The exclusion of item 5 would increase the scale reliability to .73, and therefore analyses were conducted on both the 4-item and 5-item SDS versions.

The guidelines by the World Health Organization for the translation and adaptation of instruments (http://www.who.int/substance_abuse/research_tools/translation/en/) were carefully followed. First, the questionnaire was forward translated

into Chinese by the second researcher, who emphasized conceptual rather than literal translation. Then, two bilingual (in English and Chinese) members of staff at the target university joined the second author to act as an expert panel and discuss the translation. An independent translator whose mother language is English back-translated the questionnaire, which was tested on 10 undergraduate Chinese students—who did not participate in the study—and the corresponding interviews were conducted. The final version of the instrument in Chinese was the result of all the iterations described above.

2.3 Procedure

The study protocol was approved by the Ethical Committee of the academic institution where the study was conducted. Five hundred paper questionnaires were distributed by the second researcher in a casual sample of classrooms with Chinese IHES during regular teaching hours, and all the subjects who were present at the moment of the study were invited to participate, with the only exclusion criterion that they had to have played video games in the previous 12 months. Of the distributed questionnaires, a total of 240 usable forms were collected. To increase the validity of the responses, efforts were made to guarantee complete anonymity. Five to 10 minutes were required to complete the questionnaires.

2.4 Data Analysis

The SPSS version 21.0 statistical package with the AMOS module version 21 were utilized for data analyses. Chi-square tests were used for nominal variables and effect size was measured with Φ for binary variables and with Cramér's V or Φ_{Cramer} for categorical non-dichotomous variables. Normality (Shapiro-Wilk) and homoscedasticity (Levene's) tests were conducted for each continuous variable and t-tests or Mann-Whitney's U where appropriate were utilized for pairwise comparisons. As we used dichotomous items, a principal components analysis on the matrix of tetrachoric inter-item correlations was utilized to test factorial validity [26].

3. RESULTS

3.1 Sample Descriptive Results

Eighty-nine participants (37.1%) played daily or almost daily, 28.8% ($n = 69$) played once or twice

a week, 9.6% ($n = 23$) played once or twice a month, and 24.6% ($n = 59$) had played video games once or twice during the previous year. Frequent gamers—defined as daily or almost daily—represented 47.7% of males and 17.6% of females; $\chi^2(1, N = 240) = 21.31$, $p < .001$, $\Phi = .30$. We found no age differences in frequency of play.

The most common average time per session was 30 minutes to 1 hour ($n = 78$, 32.5%), followed by 1 to 3 hours ($n = 68$, 28.3%). Seventeen participants (7.1%) engaged in more than 3 hours per session as an average. Frequent gamers tended to play also longer average sessions; $\chi^2(4, N = 240) = 20.92$, $p < .001$, $\Phi_{Cramer} = .29$. More than one third of all participants ($n = 90$, 37.5%) had played at least one session of more than 3 hours in the previous 12 months, with an additional 22.1% ($n = 53$) with longest session between 1 and 3 hours. Frequent gamers tended to report longer maximum times of play, as compared to non-frequent gamers; $\chi^2(4, N = 240) = 36.35$, $p < .001$, $\Phi = .40$. Spearman's correlation between average and maximum time per session was highly significant at $r_s = .83$; contrariwise, Spearman correlations between time of residence in the UK on the one hand and frequency of play, average time and maximum time on the other were not significant.

Most respondents tended to play equally online and offline games ($n = 100$, 41.7%), followed by mostly or only online ($n = 95$; 39.6%), and mostly or only offline ($n = 45$; 18.8%). Females tended to play equally online and offline (55.3% of females) whereas males tended to play online (49% of males); $\chi^2(2, N = 240) = 16.65$, $p < .001$, $\Phi_{Cramer} = .26$. Frequent players tended to play online ($n = 47$, 52.8%) and nonfrequent players tended to use both systems ($n = 65$, 43%); $\chi^2(2, N = 240) = 15.38$, $p < .001$, $\Phi_{Cramer} = .25$. Those who play online also present higher average times per session (57.9% of online gamers played during at least one hour, as compared to only 20% of offline gamers; $\chi^2(8, N = 240) = 78.81$, $p < .001$, $\Phi_{Cramer} = .40$) and higher maximum times per session (78.9% of online gamers had played for more than an hour, as compared to 51.1% of offline gamers; $\chi^2(8, N = 240) = 78.37$, $p < .001$, $\Phi_{Cramer} = .40$).

3.2 PVP$_{CH}$ Psychometric Properties

With loss of control measured as in the original item 3, the PVP$_{CH}$ internal consistency was high

at Cronbach's α = .84 (alpha was .82 for males and .80 for females); with loss of control measured as in the original item 6, the scale´s internal consistency was similar for the whole sample and for males at .80, and slightly lower for females at .79—therefore the first option was selected. Cronbach's alpha was highest for the 9-item solution in the total sample; the deletion of item 3 would slightly increase the internal consistency in males, whereas the deletion of item 2 would slightly increase it in females. As shown in Table 2, most homogeneity indices were higher than .30 (only one was lower in females). Table 2 also shows each item's endorsement. Continued use despite knowledge of psychosocial problems was the most prevalent symptom with 63.3% or affirmative responses, followed by conflict with relationships, job or school (48.8%); the least frequent symptoms were escape (12.5%) and tolerance (15.4%). Males presented higher endorsement of all

items, as compared to females. Total PVP_{CH} scores are presented in Table 3; males' Median score was significantly higher than that of females; U = 3723, p < .001, r = .36.

Sample size and subjects-to-variables ratio in the total sample was 26.7, which exceeded the minimum established for an adequate factorial analysis [27]. According to Kaiser's criterion (retaining all factors that are above the eigenvalue of 1) [28], two factors or groups of items resulted from a factor analysis on the matrix of tetrachoric inter-item correlations. Nevertheless, the first factor explained 44.5% of the variance, which largely exceeds the threshold of 40% that Carmines and Zeller suggest for a test to be considered one-dimensional [29]. Also, the break or point of inflexion in the scree test is placed between the first and the second factor, which can also be considered as an indication of one-dimensionality [30].

Table 2. PVP_{CH} item analysis

Item	Males			Females			Total		
	n(%)	Corr. item-total	α if item deleted	n(%)	Corr. item-total	α if item deleted	n(%)	Corr. item-total	α if item deleted
1	47(30.3)	.67	.78	13(15.3)	.62	.77	60(25.0)	.66	.81
2	35(22.6)	.55	.80	2(2.4)	.22	.81	37(15.4)	.53	.82
3	83(53.5)	.32	.83	23(27.1)	.38	.80	106(44.2)	.39	.84
4	76(49.0)	.46	.81	19(22.4)	.63	.76	95(39.6)	.54	.82
5	28(18.1)	.47	.81	2(2.4)	.34	.80	30(12.5)	.48	.83
6	43(27.7)	.45	.81	9(10.6)	.46	.79	52(21.7)	.49	.83
7	43(27.7)	.59	.79	9(10.6)	.46	.79	52(21.7)	.59	.82
8	112(72.3)	.57	.80	40(47.1)	.69	.75	152(63.3)	.63	.81
9	90(58.1)	.63	.79	27(31.8)	.68	.75	117(48.8)	.67	.81

Table 3. PVP_{CH} total scores

Score	Males		Females		Total	
	n	%	n	%	n	%
0	22	14.2	41	48.2	63	26.3
1	23	14.8	6	7.1	29	12.1
2	14	9.0	12	14.1	26	10.8
3	19	12.7	8	9.4	27	11.3
4	23	14.8	9	10.6	32	13.3
5	15	9.7	3	3.5	18	7.5
6	13	8.4	3	3.5	16	6.7
7	9	5.8	3	3.5	12	5.0
8	12	7.7	0	0	12	5.0
9	5	3.2	0	0	5	2.1
n	155		85		240	
M	3.59		1.69		2.92	
Mdn	3		1		3	
SD	2.64		2.01		2.61	

Spearman's correlations were significant for the association between PVP_{CH} score and all alternative indicators of problem video gaming: frequency of play (r_s = .40), average time per session (r_s = .61), maximum time per session (r_s = .57), 4-item SDS score (r_s = .62), 5-item SDS score (r_s = .62), perception of excessive playing (r_s = .53), perception of having some problem with video gaming (r_s = .52), worries amongst relatives and friends (r_s = .49) and use of video games to gain control of one's life (r_s = .42); all p < .001.

3.3 Estimation of the Prevalence of IGD and Classification Function

According to the DSM-5, those with five or more symptoms can be considered as presenting IGD (hereto referred as *IGD* players, as opposed to *social* players or those who present less than five symptoms). With this criterion, 63 participants (26.2%) were found to be IGD players; males (n = 54, 34.8%) were more likely than females (n = 9, 10.6%) to present IGD; $\chi^2(1, N = 240) = 16.68$, p < .001, Φ = .26).

Table 4 shows a comparison of IGD and social players in each PVP_{CH} item, as well as the classification function of the scale´s items in terms of sensitivity, specificity and area under the curve (AUC) in receiver operating characteristic (ROC) curve analyses with each item as contrast variable. IGD players' endorsement of each item was significantly higher than that of social players. In both groups item 8 received the highest endorsement and items 5 and 2 the lowest; Kendall Tau correlation between the orders of endorsement in both groups was r_τ = .72, p = .007. Sensitivity (or correct identification of IGD cases) ranged from 41.3% to 100%, whereas specificity (or correct rejection of non-IGD cases) ranged from 49.7% to 97.7%. All AUC values were significantly better than random allocation at p < .001.

4. DISCUSSION

The present study is the first to adapt to Chinese—and to the criteria for IGD—a tool widely used for the assessment of video game problem play. Our results support hypotheses a (the PVP_{CH} scale will be one-dimensional) and b (the psychometric properties of the scale, in terms of internal consistency, convergent validity and criterion validity will be good and similar to those of the original PVP). In fact, the alpha internal consistency coefficient for the PVP_{CH} scale (α = .84) is adequate and higher than in previous studies conducted in Canada (.79) [31]; Netherlands (.78) [32]; Spain (.69 and .75) [8, 33]; Thailand (.70) [34]; United Kingdom (.79 and .75) [33,35]; and United States (.69) [36]. Also, continued use despite psychosocial problems obtained the highest endorsement and escape and tolerance the lowest, which contrasts with other studies on adults where different order of endorsement has been found [8,22,33].

Hypotheses c (online players and males will present higher commitment to videogames and a higher presence of IGD), and d (commitment to video gaming and prevalence of IGD in Chinese IHES in the UK will be higher than the findings of previous studies on other populations) were also supported. More than one in four participants—and one third of males—were found to present IGD, as defined by the DSM-5.

Table 4. Classification function of PVP_{CH} items and comparison of IGD and social players

Item	IGD	Social	Sensitivity	Specificity	AUC[95% CI]	$\chi^2(1)$	Φ
	n	*n(%)*					
1	51	9(5.1)	81.0	94.9	.879[.819, .940]	142.63***	.77
2	32	5(2.8)	50.8	97.2	.740[.657, .822]	81.99***	.58
3	46	60(33.9)	73.0	66.1	.696[.620, .771]	28.83***	.35
4	54	41(23.2)	85.7	76.8	.813[.751, .875]	76.01***	.56
5	26	4(2.3)	41.3	97.7	.695[.610, .781]	64.65***	.52
6	35	17(9.6)	55.6	90.4	.730[.649, .810]	57.80***	.49
7	44	8(4.5)	69.8	95.5	.827[.755, .898]	116.81***	.70
8	63	89(50.3)	100	49.7	.749[.689, .808]	49.46***	.45
9	60	57(32.2)	95.2	67.8	.815[.760, .870]	73.89***	.56

Notes. The percentage of endorsement in IGD players equals sensitivity.
***p < .001

We are aware that the modifications to the original PVP scale to match the criteria for IGD challenge direct comparisons between our results and those of previous studies. Some of these modifications may be minor (e.g., deleting the reference to stealing) whereas other may have a greater impact (e.g., including a new item for the loss of interest in previous hobbies). This limitation refers also to the cutoff values utilized for diagnosis. Although Tejeiro and Moran presented their instrument as an ordinal 9-point scale [8], other authors have conducted diagnostic studies using unsubstantiated cutoff values of three [37], four [5], and five [33,38]. We must highlight that our study does not aim at diagnosing problem players as defined in those studies, but players presenting IGD. Determining whether they are actually the same disorder is out of the scope of our study and links to the debates around their consideration within the DSM-5, such the confusion of the internet and video games within a single classification, the exclusion of offline video gaming, or the possible addictive character of IGD [33]. Other limitations to our findings come from the opportunistic and convenience sample, or the fact that the study was conducted in an academic setting with strong evaluative connotations (which may discourage the disclosure of negative behaviours or their consequences).

Despite these limitations, our paper provides empirical evidence that the PVP_{CH} scale's psychometric and diagnostic properties are adequate for the assessment of internet gaming disorder, at least in young Chinese adults. In the context of our research—and regardless of other potential applications—,this is presented as a necessary step for other studies aiming to identify the correlates of this problem behaviour and to design and implement the adequate measures to minimize its impact on IHES. For instance, it may be the case that those who are apparently addicted to video games utilize them as a sort of compensation for their lack of adjustment to their new context (though escape was the least endorsed item in PVP_{CH} in both males and females). Further studies with qualitative methods (e.g., interviews and focus groups) as well as the comparison of the target population with others (such as age-matched local students or Chinese higher education students in their own country) are required, as well as studies on the applicability of the PVP_{CH} scale in other groups of adult Chinese nationals.

5. CONCLUSION

Despite the limitations above, this paper provides empirical evidence that the PVP_{CH} scale's psychometric and diagnostic properties are adequate for the assessment of internet gaming disorder, at least in young Chinese adults. In the context of our research—and regardless of other potential applications—,this is presented as a necessary step for other studies aiming to identify the correlates of this problem behaviour and to design and implement the adequate measures to minimize its impact on IHES. For instance, it may be the case that those who are apparently addicted to video games utilize them as a sort of compensation for their lack of adjustment to their new context (though escape was the least endorsed item in PVP_{CH} in both males and females). Further studies with qualitative methods (e.g., interviews and focus groups) as well as the comparison of the target population with others (such as age-matched local students or Chinese higher education students in their own country) are required, as well as studies on the applicability of the PVP_{CH} scale in other groups of adult Chinese nationals.

CONSENT

All authors declare that written informed consent was obtained from the participants.

ETHICAL APPROVAL

The study protocol was approved by the Ethical Committee of the academic institution where the research was conducted (Reference No. IPHS-1415-VA-220-Tejeiro & Chan).

COMPETING INTERESTS

Authors have declared that no competing interests exist.

REFERENCES

1. Hechanova-Alampay R, Beehr TA, Christiansen ND, Horn RKV. Adjustment and strain among domestic and international student sojourners. School Psychology International. 2002;23(4):458-74.
   DOI: 10.1177/0143034302234007
2. Pedersen PB. The five stages of culture shock. Westport, CT: Greenwood; 1995.

3. Chen WCD. Reflecting on pre-sessional EAP courses: A pilot study of Taiwanese students' perspectives in the University of Leicester. WHAMPOA – An Interdisciplinary Journal. 2007;53:127-34.

4. Wu W, Hammond M. Challenges of university adjustment in the UK: A study of East Asian Masters degree students. Journal of Further and Higher Education. 2011;35(3):423-38.
    DOI:http://dx.doi.org/10.1080/0309877x.2011.569016

5. Tejeiro RA, Gomez-Vallecillo JL, Pelegrina M, Wallace A, Emberley E. Risk factors associated with the abuse of video games in adolescents. Psychology. 2012;3:310–14.
    DOI:http://dx.doi.org/10.4236/psych.2012.34044

6. Ng BD, Wiemer-Hastings P. Addiction to the internet and online gaming. Cyberpsychology & Behavior. 2005;8:110–3.
    DOI:http://dx.doi.org/10.1089/cpb.2005.8.110

7. American Psychiatric Association. Diagnostic and statistical manual of mental disorders, Fifth Edition. Arlington, VA: Author; 2013.

8. Tejeiro R, Moran RB. Measuring video game pathological playing in adolescents. Addiction. 2002;97:1601-6.
    DOI:http://dx.doi.org/10.1046/j.1360-0443.2002.00218.x

9. King DL, Haagsma MC, Delfabbro PH, Gradisar M, Griffiths MD. Toward a consensus definition of pathological video gaming: A systematic review of psychometric assessment tools. Clinical Psychology Review. 2013;33,331-42.
    DOI:http://dx.doi.org/10.1016/j.cpr.2013.01.002

10. Pontes HM, Király O, Demetrovics Z, Griffiths MD. The conceptualisation and measurement of DSM-5 internet gaming disorder: The development of the IGD-20 Test. PLoS One. 2014;9(10).
    DOI: 10.1371/journal.pone.0110137

11. Pontes HM, Griffiths MD. Measuring DSM-5 Internet gaming disorder: Development and validation of a short psychometric scale. Computers in Human Behavior. 2015;45:137-43.
    DOI: 10.1016/j.chb.2014.12.006

12. Khazaal Y, van Singer M, Chatton A, Achab S, Zullino D, Rothen S, et al. Does self-selection affect samples'

representativeness in online surveys? An investigation in online video game research. Journal of medical Internet research. 2014;16(7).
    DOI: 10.2196/jmir.2759

13. American Psychiatric Association. Diagnostic and statistical manual of mental disorders. 4th ed. Washington, DC: Author; 1994.

14. Hambleton RK. Issues, designs, and technical guidelines for adapting tests into multiple languages and cultures. In: Hambleton RK, Merenda PF, Spielberger CD, editors. Adapting educational and psychological tests for cross-cultural assessment. Mahwah, NJ: Lawrence Erlbaum; 2005.

15. Kolstad A, Gjesvik N. Collectivism, individualism, and pragmatism in China: Implications for perceptions of mental health. Transcultural Psychiatry. 2014;51(2):264-85.
    DOI: 10.1177/1363461514525220

16. Chinese Society of Psychiatry. The Chinese Classification and Diagnostic Criteria of Mental Disorders Version 3 (CCMD-3). Jinan: Chinese Society of Psychiatry; 2001.

17. Zou Y, Ciu JF, Han B, Ma AL, Li MY, Fan HZ. Chinese psychiatrists views on global features of CCMD-III, ICD-10 and DSM-IV. Asian Journal of Psychiatry. 2008;1:56-9.
    DOI:http://dx.doi.org/10.1016/j.ajp.2008.09.007

18. Zhou Y, Li Z. Online game addiction among Chinese college students: Measurement and attribution. Annual Review of Cybertherapy and Telemedicine. 2009;144:149-54.
    DOI:http://dx.doi.org/10.3389/conf.neuro.14.2009.06.107

19. Exelmans L, Van der Bulck J. Sleep quality is negatively related to video gaming volume in adults. Journal of Sleep Research. 2015;34(2):189-96.
    DOI: http://dx.doi.org/10.1111/jsr.12255

20. Melchior M, Chollet A, Fombonne E, Surkan PJ, Dray-Spira R. Internet and video game use in relation to overweight in young adults. American Journal of Health Promotion. 2014;28(5):321-4.
    DOI:http://dx.doi.org/10.4278/ajhp.121023-arb-515

21. Tejeiro R, Espada JP, Gonzalvez MT, Christiansen P. Psychometric properties of the problem video game playing scale in

adults. European Review of Applied Psychology. 2016;66(1):9-13. DOI: 10.1016/j.erap.2015.11.004

22. Caillon J, Bouju G, Grall-Bronned M. Jeux vidéo: Les motivations et l'intensité de la pratique évoluent-elles avec l'âge? Comparaison entre une population de joueurs adolescents et adultes. Archives de Pediatrie. 2014;21(3):251-7. (French). DOI:http://dx.doi.org/10.1016/j.arcped.201 3.12.018 A

23. Shin DH, Ahn D. Associations between game use and cognitive empathy: A cross-generational study. Cyberpsychology, Behavior & Social Networking. 2013;16(8):599-603. DOI:http://dx.doi.org/10.1089/cyber.2012.0 639

24. Gossop M, Darke S, Griffiths P, Hando J, Powis B, Hall W, et al. The Severity of Dependence Scale (SDS): Psychometric properties of the SDS in English and Australian samples of heroin, cocaine and amphetamines users. Addiction. 2005;90:607–14. DOI:http://dx.doi.org/10.1046/j.1360-0443.1995.9056072.x

25. Topp L, Mattick RP. Choosing a cut-off on the Severity of Dependence Scale (SDS) for amphetamine users. Addiction. 1997;92:839–45. DOI:http://dx.doi.org/10.1046/j.1360-0443.1997.9278397.x

26. Panter AT, Swygert KA, Dahlstrom WG, Tanaka JS. Factor analytic approaches to personality item-level data. Journal of Personality Assessment. 1997;68:561-89. DOI:http://dx.doi.org/10.1037/e569232011-002

27. Costello AB, Osborne JW. Best practices in exploratory factor analysis: Four recommendations for getting the most from your analysis. Practical Assessment, Research and Evaluation. 2005;10(7):1-9.

28. Kaiser HF. The application of electronic computers to factor analysis. Educational and Psychological Measurement. 1960;20:141-51. DOI: 10.1177/001316446002000116

29. Carmines EG, Zeller RA. Reliability and validity assessment. London: Sage; 1979.

30. Parker JDA, Taylor RN, Eastabrook JM, Schell SL, Wood LM. Problem gambling in adolescence: Relationships with Internet misuse, gaming abuse and emotional intelligence. Personality and Individual Differences. 2008;45:174–80.

DOI:http://dx.doi.org/10.1016/j.paid.2008.0 3.018

31. Yong AG, Pearce S. A beginner's guide to factor analysis: Focusing on exploratory factor analysis. Tutorials in Quantitative Methods for Psychology. 2013;9(2):79-94.

32. Kuss DJ, Louws J, Wiers RW. Online gaming addiction? Motives predict addictive play behavior in massively multiplayer online role-playing games. Cyberpsychology, Behavior and Social Networking. 2012;15(9):480–5. DOI:http://dx.doi.org/10.1089/cyber.2012.0 034

33. Lopez-Fernandez O, Honrubia-Serrano LM, Baguley T, Griffiths MD. Pathological video game playing in Spanish and British adolescents: Towards the exploration of Internet Gaming Disorder symptomatology. Computers in Human Behavior. 2014;41:304–12. DOI:http://dx.doi.org/10.1016/j.chb.2014.1 0.011

34. Hongsanguansri S, Silpakit C, Ruangkanchanasetr S. The development of problem Video Game Playing (PVP) questionnaire, Thai version. Journal of the Psychiatric Association of Thailand. 2006;51.315-29. Thai.

35. Collins E, Freeman J, Chamarro-Premuzic T. Personality traits associated with problematic and non-problematic massively multiplayer online role playing game use. Personality and Individual Differences. 2012;52:133–8. DOI:http://dx.doi.org/10.1016/j.paid.2011.0 9.015

36. Hart GM, Johnson B, Stamm B, Angers N, Robinson A, Lally T, et al. Effects of video games on adolescents and adults. Cyberpsychology & Behavior. 2009;12:63–5. DOI:http://dx.doi.org/10.1089/cpb.2008.01 17

37. Arab E, Sommer K, Herskovic V, Sommer S, Sandoval C, Poblete C. Evaluación del uso de vídeo juego en escolares de la región metropolitana. Revista Chilena de Psiquiatría y Neurología de la Infancia y la Adolescencia. 2007;18:7-11. (Spanish).

38. Adiele I, Olatokun W. Prevalence and determinants of Internet addiction among adolescents. Computers in Human Behavior. 2014;31:100–10. DOI:http://dx.doi.org/10.1016/j.chb.2013.10 .028

APPENDIX – 1

PVP_{CH} items

	Please think of your video game use during the last 12 months and indicate whether the following statements are applicable to you (leave blank if you don't use video games): (Yes/No)	请你想想你在过去 **12 个月玩 游**戏的情况，看看下列情形是否和你相符（如果你不玩游戏，请不要填写）的：
1 (Preoccupation)	When I am not playing with the video games, I keep thinking about them, i.e. remembering games, planning the next game, etc.	当我不玩离线游戏时，**我一直在**想玩游戏。例如：还**记**着**游戏**的事，盘算着下次怎么玩，等等。
2 (Tolerance)	I spend an increasing amount of time playing video games.	我玩游戏所花的**时间越来越多**。
3 (Loss of control)	I have tried to control, cut back or stop playing, or I usually play with the video games over a longer period than I intended.	我曾尝试控制，减少或停止玩游戏，但是我玩游戏的时间通常比我预期的要长。
4 (Withdrawal)	When I can't use the video games I get restless or irritable.	**当我不能玩**线游戏时，我会变得浮躁不安和烦躁。
5 (Escape)	When I feel bad, e.g. nervous, sad, or angry, or when I have problems, I use the video games more often	**当我感**觉不好，例如紧张，悲伤，或愤怒，或当我有麻烦，我会更频繁地玩游戏。
6 (Loss of interest)	Due to the use of video games I have lost interest in previous hobbies.	**我已**经失去了在其他的爱好兴趣，因为视频游戏
7 (Deception)	Sometimes I conceal my video game playing to my parents, friends or teachers.	**有**时我会对其他人（父母，朋友，老师......）隐瞒我玩游戏的事情。
8 (Continued use despite knowledge of psychosocial problems)	Because of video game playing I have: Not eaten, or gone to bed late, or had an argument or a fight with someone.	为了玩在游戏，我曾经：不吃饭, 晚**睡**, 与他人发生争执，或与人打架
9 (Conflict with relationships, job or school)	Because of video game playing, I have: Skipped work or school, reduced schoolwork, spent less time with friends or family	为了玩在游戏，我曾经 不工作，不学习, 减少在校的学习, 与朋友或家人的联系减少