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Pathological video game playing in Spanish and British adolescents: Towards the exploration of Internet Gaming Disorder symptomatology

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ABSTRACT

Research into problematic video gaming has increased greatly over the last decade and many screening instruments have been developed to identify such behaviour. This study re-examined the Problematic Videogame Playing [PVP] Scale. The objectives of the study were to (i) examine its psychometric properties in two European countries, (ii) estimate the prevalence of potential pathological gaming among adolescents in both countries, and (iii) assess the classification accuracy of the PVP Scale based on its symptomatology as a way of exploring its relationship with both the behavioural component model of addiction and the proposed Internet Gaming Disorder. The data were collected via a survey administered to 2356 adolescents aged between 11 and 18 years from Spain (n = 1132) and Great Britain (n = 1224). Results indicated that the reliability of both versions was adequate, and the factorial and construct validity were good. Findings also showed that the prevalence of pathological gamers estimated with a rigorous cut-off point was 7.7% for Spanish and 14.6% for British adolescents. The scale showed adequate sensitivity, specificity and classification accuracy in both countries, and was able to differentiate between social and potential pathological gamers, and from their addictive symptomatology. The implications of these findings are discussed.

1. Introduction

Across the spectrum of cyber-addictions, video game playing (VGP) – sometimes referred to as video gaming (VG) – was one of the first potential behavioural activities identified as a 'technological addiction' (Griffiths, 1995; 1996; 2008) including video games played offline via arcade machines, consoles, and handheld devices, and played online via personal computers, laptops, tablets, and mobile phones. As the technologies for playing video games have evolved, so too have the genres and formats. Video gaming is also a very popular leisure activity among adolescents (Kuss & Griffiths, 2012), considered a habit that has raised concerns because of its potentially addictive nature (e.g., Kuss & Griffiths, 2012; Prot, McDonald, Anderson, & Gentile, 2012), and has been referred to as 'video game addiction' (VGA; King, Delfabbro, & Griffiths, 2013). This persistent and maladaptive pattern of VGP behaviours has been studied since the early 1980s' first generation of offline video games (Griffiths, 1991; Phillips, Rolls, Rouse, & Griffiths, 1995) through to online video gaming (OVG; Hussain, Griffiths, & Baguley, 2012). In order to understand this potentially addictive and pathological behaviour, a number of studies have examined the behaviour as clinical entity in populations from both Western and Eastern countries across the world (Anderson et al., 2010; Colwell & Kato, 2005).

This line of research has been far from systematic (Salguero & Morán, 2002), and despite the increase of epidemiological studies over the last decade there is still insufficient empirical research to support the notion that VGA could be classed as a psychiatric disorder (King, Haagsma, Delfabbro, Gradisar, & Griffiths, 2013), although the empirical research is rapidly growing (Griffiths, Kuss, & King, 2012). From the mid-1990s to the present day, the

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prevalence of VGA among various populations has differed widely. For instance, some papers have estimated that between 6% and 19% of individuals are addicted to video games (Tejeiro, Gómez-Vallecillo, Pelegrina, Wallace, & Emberley, 2012) with others showing even greater variability of between 0.5% and 46% (King, Haagsma, Delfabbro, Gradisar, & Griffiths, 2013). Some of the main reasons for these wide discrepancies are the different conceptualizations of VGA, the non-standardized scales used to assess VGA, and the use of different methods to estimate the prevalence of VGA. King and Colleagues (2013) noted that the overestimation of VGA prevalence may be due to several factors including: (i) the widespread use of online surveys; (ii) adolescents and young gamers playing more online games (e.g., Massively Multiplayer Online Role Playing Games [MMORPGs]) than middle-aged adults; (iii) cultural differences (e.g., gamers from South East Asia appear to engage in more gaming compared with Western ones and their VGP preferences are different with the first playing more real-time strategy games compared with the second who prefer shooting games); and (iv) high engagement not being sufficiently differentiated from VGA.

As Tejeiro and colleagues (2012) stated, the VGA profile seems to be more heterogeneous and complex. Griffiths (1996) has long written about the biopsychosocial nature of addiction; in relation to VGA, researchers must pay attention to the individual's psychological characteristics (e.g., Haagsma, Caplan, Peters, & Pieterse, 2013), the sociological context of VGP (e.g., Lemmens, Valkenburg, & Peter, 2011), and its cultural dimension (e.g., King et al., 2013). Outside of the individual, to examine the structural characteristics of the video game and other technological features (e.g., King, Delfabbro, & Griffiths, 2011), because the interplay between the individuals, the games they play, and the context in which they play them may help to identify the underlying factors that play a role in the acquisition, development, and maintenance of VGA.

Research into behavioural addictions (e.g., gambling to gaming addiction), suggests that a minority of users experience symptoms traditionally associated with substance-related addictions (Griffiths, 1991). However, the current focus is on understanding the underlying factors of VGP and the possibility that this excessive behaviour leads to a behavioural addiction among adolescents (Topor et al., 2011). Traditionally, the most common practice has been to adapt criteria from similar conditions (e.g., pathological gambling) in the *Diagnostic and Statistical Manual of Mental Disorders* [DSM] (American Psychiatric Association [APA]) to construct diagnostic criteria for technological addictions. Criteria for VGA have mainly been adapted from the DSM criteria for pathological gambling (Fisher, 1994; Griffiths, 1991; Lemmens, Valkenburg, & Peter, 2009; Lemmens et al., 2011), but sometimes from the DSM substance dependence criteria (Salguero & Morán, 2002). In addition to adaptation of DSM criteria, excessive behaviours associated with addictive symptomatology have been also studied using scales developed using the behavioural components model of addiction (Griffiths, 2005) covering its six symptoms (salience, mood modification, tolerance, withdrawal, conflict and relapse). For example, it has been studied in relation to internet addiction (Kuss, Shorter, Rooij, Griffiths, & Schoenmakers, 2013), exercise addiction (Terry, Szabo, & Griffiths, 2004), work addiction (Andreassen, Griffiths, Hetland, & Pallesen, 2012) and social networking addiction (Andraessen, Tosheim, BrunBerg, & Pallesen, 2012).

At present, the Internet Gaming Disorder [IGD] symptomatology proposed in Section 3 of the latest DSM-5 (APA, 2013) includes nine criteria (i.e., preoccupation, withdrawal, tolerance, unsuccessful attempts to control the OVG behaviour, loss of other activities except OVG, continued OVG despite knowledge of problems, to lie or deceive other people, escape or relieve a dysphoric mood, and to compromise significant relationships). However, it is interesting to note that the DSM-5 uses the terms "internet" and "gaming", and appears to only focus on OVG as a subtype of problematic internet use (Griffiths, King, & Demetrovics, 2014), although IGD it is still considered as a broader term, namely "Internet Use Disorder" [IUD] (King, Haagsma et al., 2013; Petry & O'Brien, 2013); King, Haagsma et al. (2013) state there is still work needed to achieve a terminological consensus between clinicians and researchers, because only three symptoms are consistently measured in the present problematic, pathological or addictive gaming scales (i.e., withdrawal, loss of control and conflict), and only one instrument has shown the capacity to assess the majority of DSM-5 IGD criteria – the Problem Videogame Playing (PVP; Salguero & Morán, 2002) Scale.

The PVP Scale was the first validated scale to measure "problem video game play", developed to detect video game abusers (Tejeiro et al., 2012). The researchers' first intention was to look for adolescent problems associated with the addictive use of all types of video games (offline and online) and video game systems (consoles and computers). Since its development in 2000, it has been used in a few studies (e.g., Collins, Freeman, & Chamarro-Premuzic, 2012; Hart et al., 2009; Kuss, Louws, & Wiers, 2012; Parker, Taylor, Eastabrook, Schell, & Wood, 2008), very few have paid attention to the symptomatology measured. However, most studies using PVP have simply compared if differences between groups (Bioulac, Arfi, & Bouvard, 2008: ADHD children and a controls; Caillon, Bouju, & Grall-Bronnec, 2014: adolescents versus adults).

Using this validated scale, the present study has three objectives: (i) to examine its psychometric properties in two European countries, (ii) to estimate the prevalence of pathological gaming among adolescents in Spain and Great Britain, and (iii) to assess the classification accuracy of the PVP Scale based on its addictive symptomatology as a way of exploring its relationship with both the behavioural component model of addiction and the recently proposed IGD.

2. Method

2.1. Participants and procedure

The study surveyed a convenience sample comprising 2356 adolescents from two sub-samples in Spain (Barcelona: $n = 1132$) and Great Britain (London: $n = 1224$). The selection of these countries was twofold: (i) the PVP has only been developed and published in two languages (i.e., Spanish and English), and (ii) according to international organizations, both countries are among those with the highest addiction rates (European Commission, 2006; United Nations Office on Drugs and Crime, 2013). The sample comprised high school students that were selected from several districts in each city, as well as from different school types (state, public and private) to aid representativeness. Confidentiality and anonymity was assured to all participants. Additionally, permission to participate in the study was obtained. 92.5% of students successfully completed all the PVP items in Spain and 77.5% in Great Britain (Barcelona: $n = 1047$; London: $n = 949$). The participants were aged between 11 and 18 years (Spain: $M = 14.55$, SD = 1.82; Great Britain: $M = 13.56$; SD = 1.50), and the distribution of ages was segmented following Salguero and Morán's (2002) proposal (the age groups: 11–12, 13–15, 16–18): in the Spanish were 15.23%, 49.8% and 34.9%; in the British 26.2%, 64.7%, and 9.1% respectively. More than half of the sub-samples were male (Spain: 53.4%; Great Britain: 67.3%).

2.2. Measures

The paper-and-pencil questionnaire comprised three sections: (a) socio-demographics; (b) video game patterns usage; and (c)

the PVP for Spanish and British adolescents using both authors' original versions. The variables examined in the socio-demographic section included: gender, age (in years old), the family unit members (numbers of members living in the same home), the parents' educational level and employment status, participant's place of residence (in or out of city), usual alcohol or tobacco consumption, and other leisure forms of entertainment that did not involve technology. The patterns of gaming use measured were: if they played video games regularly, what type of use they preferred (to play alone, or in company – virtually or physically), if they were the owner of at least one console or a computer with internet to play, at what age they started to regularly play video games (online or offline), their mean time per playing session (in minutes), and their weekly video game frequency play (days per week). The PVP is a validated scale originally constructed in Spanish, but published in English (Salguero & Morán, 2002). It contains nine items rated on a dichotomous scale (1 "yes", 0 "no"). The total score ranges between 0 and 9, with the highest score being the maximum presence of the construct under study in the past year. The scale covers the following eight symptoms (based on substance dependence and pathological gambling disorders proposed in DSM-IV; APA, 1994): preoccupation, tolerance, loss of control, withdrawal, escape, lies and deception, disregard for the physical and psychological consequences, and disruption of family or schooling.

2.3. Analysis performed

2.3.1. Psychometric properties of PVP in Spain and Great Britain

As the PVP Scale had nine items, and following Nunnally (1978), more than 900 adolescents (10 participants per variable) of each sub-sample (Spain: $n = 1047$: Great Britain: $n = 949$) were collected and psychometrically analysed. The factor validity of PVP was assessed using Principal Component Analysis (PCA) made on tetrachoric items-correlation matrix to each sub-sample, as well as an Exploratory Factor Analyses (EFA) with the Kaiser–Mayer–Olkin index (KMO) and Bartlett's test of sphericity respectively. According to Kaiser's criterion, a factor was obtained (with eigenvalues above 1, factor loadings above 0.3 that explained part of the variance). Item analysis was carried out to observe how the different statements performed in each sub-sample, as well as Cronbach's alpha and McDonald's omega coefficients with their respective confidence intervals (CI) (Dunn, Baguley, & Brundsen, 2013) to estimate PVP internal consistency in the Spanish and British version. Construct validity was obtained through associations of the total PVP score with indicators of two types (VGP time and PVP players' perceptions; Salguero & Morán, 2002). Moreover, a descriptive analysis of PVP total scores by gender and age was included to update results from Salguero and Morán's (2002) findings. Most of the analyses was carried out using SPSS version 21. The tetrachoric analyses were carried out using R packages version 3.0.2 and version 3.3.3.

2.3.2. Prevalence estimation of VGP users with addictive symptomology

The prevalence was estimated using two possibilities. First, the cut-off point of 4 (out of 9) to classify "problem players" (following Tejeiro et al., 2012), on the counterpart, users below 4 were considered as "social players". This border was selected following Griffiths' (1991) and Fisher's (1994, 1995) suggestions for the original authors of PVP test, although Tejeiro and colleagues consider that a slight variation of this cut-off point (to 3 or 5) did not affect the results from their post hoc analysis. However, in early studies of VGP, the cut-of point of 4 (out of 9) was for an amusement machine 'addict' (Griffiths, 2001) adapting the DSM-III-R pathological gambling criteria adapted to gaming. Here, a cut-of point of 4 (out of 8) indicated the participant was operationally defined as at playing at "addictive" levels (Griffiths & Dancaster, 1995). Second, in relation to the PVP Scale, recent studies have argued for an increase in the cut-of point. For example, Lemmens et al. (2009) stated that gamers must meet half or more of the diagnostic criteria to be classed as an addict, whereas other researchers have considered it to select a cut-off point of 5 or more to classify users as addicts (Adiele & Olatokun, 2014; Collins et al., 2012; Turner et al., 2012). Hart et al. (2009) have shown evidence that a cut-off point of 4 or more on the PVP to determine addiction is not supported by their findings. This study therefore used this latter option (5 or more) to classify potential "pathological players".

2.3.3. Epidemiological analysis to prove classification accuracy

The sensitivity, specificity, and overall accuracy of the symptoms measured through the PVP Scale were compared between the pathological players and a random selection of social players with identical sub-samples sizes for each country were extracted by the statistical software used. A procedure similar to previous cyber-addiction studies was used (i.e., Lopez-Fernandez, Honrubia-Serrano, & Freixa-Blanxart, 2013; Siomos, Dafouli, Braimiotis, Mouzas, & Angelopoulos, 2008), although these were slightly different because the PVP is a dichotomous response test. Moreover, all the items addressed a single addiction symptom, except items 3 and 6 (that both assessed loss of control). If any player endorsed either one of these it was considered that this symptom of addiction was present within the individual. Additionally, the frequency and percentage of incidence of each symptom was calculated for pathological players.

2.3.4. PVP in relation with the component model of addiction and the IGD

Almost all the PVP symptoms can be related to a specific component from the model for behavioural addictions proposed by Griffiths (2005). More specifically, "preoccupation" (Item 1) is a type of cognitive "salience" in Griffiths' model; "tolerance" (Item 2) relates to Griffiths' 'tolerance' component; "loss of control" (Item 3) relates to Griffiths' "relapse" component (and the other item that addressed this symptom – Item 6 – is a typical gambling symptom known as 'chasing losses', and a reason to remove from the final comparative analysis); "withdrawal" (Item 4) fits Griffiths' 'withdrawal' component; "escape" (Item 5) is "mood modification" in Griffiths' model; and the last three PVP criteria (Items 7, 8 and 9) all relate to Griffiths' component of "conflict" (if any of these three items was endorsed this symptom was present). Similarly, the newly proposed IGD criteria were able to be matched with the PVP items: preoccupation (Item 1), withdrawal (Item 4), tolerance (Item 2), unsuccessful to control (Item 3), loss of activities (item 9), continue despite problems (Item 6), to lie or deceive people (Item 7), escape or relieve (item 5), and to lose personal things (Item 8).

3. Results

3.1. Sample descriptive results

The initial sample came from families between four and five family members including the adolescent surveyed (Spain: mean [M] was 4.02, standard deviation [SD] = 1.05; Great Britain: $M = 5.19$, SD = 1.86). The majority lived in central Barcelona (95.2%) or London (71.8%), with parents employed (Spain: 93.7% fathers, 83.6% mothers; Great Britain: 74.2% and 49.4% respectively), and who completed secondary school too (Spain: 48% and 43.7%; Great Britain: 54.3% and 55.6%). A minority of adolescents reported habitual alcohol and/or tobacco consumption (Spain: 23.3%; Great Britain: 12.4%), and a minority confirmed they used

only technology-based leisure entertainment (Spain: 21%; Great Britain: 30.6%).

3.2. Psychometric study of the PVP for Spanish and British adolescents

3.2.1. Factor validity

The tetrachoric items-correlation matrix to each sub-sample demonstrated higher correlations between British PVP items (where the lowest $r_{Items\ 3–4}$ was .3; and higher $r_{Items\ 1–7\ and}$ $r_{Items\ 5–7}$ was .62) than Spanish PVP items (where the lowest $r_{Items\ 4–6}$ and $r_{Items\ 6–8}$ was .13; and higher $r_{Items\ 7–8}$ was .51). The PCA performed on these two matrices showed that one component was sufficient, with a proportion of .26 variance explained for Spain, and .36 for Great Britain. The measures of this factor scored adequately (Spain: correlation of scores with factor .81, multiple R^2 of scores with factor .66 and minimum correlation of possible factor scores .32; Great Britain: r of scores with factor = .89, multiple R^2 = .79 and minimum r of possible factor scores = .58). These results were almost equal to those obtained through the EFA (Spain: KMO = .803; Bartlett's test: $\chi^2_{(36)} = 757.79$; $p < .001$; Great Britain: KMO = .876; Bartlett's test: $\chi^2_{(36)} = 1541.11$; $p < .001$) that yielded one factor (see Fig. 1). The factor "PVP in adolescents" explained 26.7% of total variance in Spain and 36.7% in Great Britain.

3.2.2. Item analysis and internal consistency

Table 1 shows the scores and the analysis of each item per country. When examining the descriptive of participants answering "yes" to the PVP statements, there was variability in their response in each sub-sample. In Spain, Item 6 (loss of control) was the most endorsed (46.9%) whereas in Great Britain, Item 3 (loss of control) and Item 4 (withdrawal) were the most endorsed (with 39.6% and 40.4% respectively). In Spain, Items 4 and 8 (disregard for consequences) were the least endorsed (8.9% and 4.3% respectively) whereas in Great Britain, the least endorsed was Item 8 (although with a higher percentage: 11.4%). In regards to their factor loading, in both countries the items were above .30, which is important due to the sub-samples sizes (Stevens, 1992). Almost all items (except Item 3 in the Spanish sub-sample) were above 0.45; also squaring the highest factor loadings (Field, 2005) it is estimated that Item 1 (preoccupation) for both countries explained 35.16% and 48.86% of total variance of the construct measured. In relation to homogeneity indices, all the items in both sub-samples showed expected correlations with the corrected total score (above 0.30). The PVP achieved adequate reliability for a 9-item test (Kline, 1999), with $\alpha = .63$ [95% CI: .60, .66] for Spain and $\alpha = .78$ [95% CI: .76, .79] for Great Britain, and a McDonald's $\Omega = .63$ [95% CI: .59, .67] for Spain and $\Omega = .78$ [95% CI: .75, .80] for Great Britain.

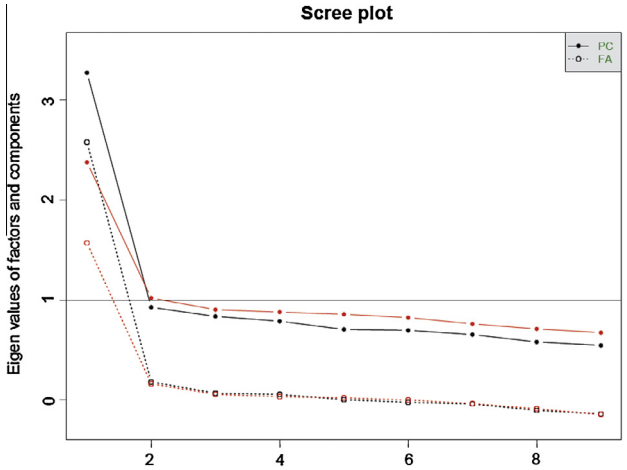

Fig. 1. Scree plot of PVP principal component (PC) and factor analysis (FA) for Spain (red colour) and Great Britain (black colour) adolescents surveyed. (For interpretation of the references to colour in this figure legend, the reader is referred to the web version of this article.)

3.2.3. Construct validity

3.2.3.1. Associations with patterns of usage related with time. The total M score on the PVP Scale for the Spanish adolescents that completed the whole scale was 1.74 (SD = 1.70), and for the British adolescents was 2.47 (SD = 2.33).

Table 2 shows the Spearman correlations between the PVP total score and the patterns of usage related with time. Almost all the variables were significantly positively associated in both countries, with higher PVP scores associated with more days per week adolescents were playing video games (Spain: $r^2 = .08$; Great Britain: $r^2 = .07$), a greater mean time per session (Spain: $r^2 = .09$; Great Britain: $r^2 = .06$) and with increasing their maximum time per session (Spain: $r = =.08$; Great Britain: $r^2 = .05$). Significant inverse associations were obtained: the younger the participants started playing the more problematic playing they experienced (Spain: $r^2 = .03$; Great Britain: $r = =.05$), greater frequency of days per week (Spain: $r^2 = .09$; Great Britain: $r^2 = .09$), more time per playing session (Spain: $r^2 = .05$; Great Britain: $r^2 = .04$) and longest sessions (Spain: $r^2 = .05$; Great Britain: $r = =.04$).

3.2.3.2. Associations with PVP perception measures. Similarly, the analysis of perception of having problematic video gaming revealed significant relationships to PVP Scale score in both countries. The median [Mdn] of the PVP total score was significantly higher for adolescents confirming: 'I think I play video games too much' (Spain: $Mdn_{yes} = 3$, $Mdn_{no} = 1$, $U = 33{,}947$, $Z = 12.48$, $p < .001$, $r = .39$; Great Britain: $Mdn_{yes} = 4$, $Mdn_{no} = 1$, $U = 29510.50$, $Z = 14.23$, $p < .001$, $r = .46$) 'I think I have some type of problem associated with my video game playing' (Spain: $Mdn_{yes} = 4$, $Mdn_{no} = 1$, $U = 9290.50$, $Z = 10.07$, $p < .001$, $r = .31$; Great Britain: $Mdn_{yes} = 5$, $Mdn_{no} = 1$, $U = 15{,}207$, $Z = 13.02$, $p < .001$, $r = .42$) and 'My parents are worried because they think I play video games too much' (Spain: $Mdn_{yes} = 3$, $Mdn_{no} = 1$, $U = 21{,}017$, $Z = 10.96$, $p < .001$, $r = .34$; Great Britain: $Mdn_{yes} = 5$, $Mdn_{no} = 1$, $U = 23{,}567$, $Z = 13.30$, $p < .001$, $r = .43$).

3.2.3.3. Descriptive of PVP total scores by gender and age. The descriptive results of the PVP total score of each country in relation to gender and the age groups (See Table 3) show that the proportion of gamers scoring 6 or more (out of 9) in the Spanish adolescents, and 7 or more (out of 9) in the British adolescents was very low (even more so among female players).

The PVP Mdn score of male players was significantly higher than females (Spain: $U = 99{,}586$, $Z = 7.62$, $p < .001$, $r = .24$; Great Britain: $U = 71{,}632$, $Z = 7.87$, $p < .001$, $r = .26$). As with Salguero and Morán (2002), this could be due because males played significantly more frequently on a daily (Spain: $U = 41683.5$, $Z = 7.52$, $p < .001$, $r = .28$; Great Britain: $U = 43445.5$, $Z = 9.32$, $p < .001$, $r = .32$) and for significantly longer periods within session (Spain: $Mdn_{males} = 90$, $Mdn_{females} = 60$; $U = 39{,}899$, $Z = 8.70$, $p < .001$, $r = .32$; Great Britain: $Mdn_{males} = 90$, $Mdn_{females} = 60$ $U = 48910.5$, $Z = 8.33$, $p < .001$, $r = .28$). No differences were observed in any country in relation to duration of play (Spain: $H_{(2)} = 1.87$, $p = .393$; Great Britain: $H_{(2)} = 22.37$ $p = .795$).

3.3. Estimation of the prevalence of video game "problem" and "pathological" players

Following Tejeiro and colleagues' (2012) suggested cut-off point of 4 to classify problem players on the PVP scale, the Spanish sub-sample contained 158 participants (15.1%) and in the British

Table 1
Item analysis and internal consistency in PVP for Spanish and British adolescents ($N = 1996$) (item number, its statement, its symptom, and for each country number and percentage of "yes" answers, item factor load, corrected item-total correlation).

PVP Scale items		Spain ($n = 1047$)				Great Britain ($n = 949$)			
n.	Statement [symptom]	Yes		Item factor load	Corrected item-total *r*	Yes		Item factor load	Corrected item-total *r*
		n	%			*n*	%		
1	When I am not playing with the video games, I keep thinking about them, i.e. remembering games, planning the next game, etc.) [preoccupation]	237	21.8	.593	.388	214	21.3	.699	.557
2	I spend an increasing amount of time playing video games [tolerance]	159	14.7	.580	.381	283	28.3	.646	.508
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 [loss of control]	206	19	.478	.297	398	39.6	.522	.394
4	When I can't use the video games I get restless or irritable [withdrawal]	96	8.9	.563	.346	495	40.4	.494	.372
5	When I feel bad, e.g. nervous, sad, or angry, or when I have problems, I use the video games more often [escape]	273	25.1	.451	.279	218	17.8	.672	.523
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 control]	506	46.9	.323	.203	303	30.4	.607	.472
7	Sometimes I conceal my video game playing to the others, this is, my parents, friends, teachers [lies and deception]	150	13.9	.586	.367	200	16.3	.626	.475
8	In order to play video games I have skipped classes or work, or lied, or stolen, or had an argument or a fight with someone [disregard for the physical or psychological consequences]	47	4.3	.481	.289	114	11.4	.581	.436
9	Because of the video game playing I have reduced my homework, or schoolwork, or I have not eaten, or I have gone to bed late, or I spent less time with my friends and family [family/schooling disruption]	217	20.1	.538	.335	269	27.1	.571	.431

Note 1: "Instructions: Please answer each of the following questions telling us if you have had the following thoughts, feelings or behaviours during the past year. In each question you are asked to consider your answers to be "yes" or "no".
Note 2: Spain: Total-test alpha = 0.627; Great Britain: Total-test alpha = 0.775.

Table 2
Construct validity through associations between PVP patterns of video game use: initial age playing video games, days per week, mean time playing and maximum minutes usually playing in a session (Spearman correlations, the significance value *p*).

	PVP total score	Initial age	Days per week	Mean duration of play	Longest time per session
Spain					
PVP total score					
Initial age	−.163**				
Days per week	.287**	−.294**			
Mean time playing	.298**	−.229**	.204**		
Longest time per session	.289**	−.215**	.209**	.958**	
Great Britain					
PVP total score					
Initial age	−.224**				
Days per week	.266**	−.297**			
Mean duration of play	.238**	−.211**	.338**		
Maximum time playing	.226**	−.212**	.352**	.964**	

* $p < .01$.
** $p < .001$.

sub-sample contained 286 (30.1%). These percentages are relatively high, and the present study was more restrictive and rigorous applying a cut-off point of endorsing 5 or more items. Examination of the descriptive results (in Tables 3 and 4) showed that in Spain 7.7% of players ($n = 81$) were classed as potential pathological players, and 14.6% in Great Britain ($n = 179$). Significant statistical differences were found among each sub-sample. In Spain, the social players (those with less than 5 out of 9) had a mean PVP score of 1.40 (SD = 1.26; Mdn = 1) whereas pathological players had a $M = 5.53$ (SD = 1.08; Mdn = 5) (U: $Z = 15.35$, $p < .001$, $r = .47$). Similarly in Great Britain, social players had a mean PVP score of 1.57 (SD = 1.41; Mdn = 1) while pathological players had a mean PVP score of 6.32 (SD = 1.36; Mdn = 6) (U: $Z = 21.17$, $p < .001$, $r = .69$). However, in relation to patterns of video game play, slight significant differences were observed in video game playing between the two types of players, and important significant relationships were detected. For instance, playing daily and for more than two hours were common patterns among potential pathological gamers (see Table 4).

3.4. Symptoms measured according to the PVP in relation to addiction symptoms

3.4.1. Incidence and classification function of the PVP symptoms in both countries

The addiction item with highest incidence was "loss of control" (items 3 and 6; see Table 5), although the second highest addiction symptom was different in each country (i.e., "preoccupation" in Spain and "withdrawal" in Great Britain). However, it appeared that the PVP Scale had adequate capacity to classify types of players as a function of their symptoms, apart from the "disregard consequences" symptom (Item 8) that obtained a low sensitivity in both countries. Statistical differences with effect sizes between medium and large (Cohen, 1992) were observed between both

Table 3
PVP total scores by gender and groups of ages from each sub-sample, followed by the total descriptive (frequency, mean, median and standard deviation).

Sub-sample	Spain (n = 1047)							Great Britain (n = 949)						
Gender	Male			Female				Male			Female			
Age groups	11–12	13–15	16–18	11–12	13–15	16–18	Total	11–12	13–15	16–18	11–12	13–15	16–18	Total
PVP Total score	% (n)	% (n)	% (n)	% (n)	% (n)	% (n)	% (n)	% (n)	% (n)	% (n)	% (n)	% (n)	% (n)	% (n)
0	18.6(16)	17(44)	24.3(51)	25.4(18)	34.1(90)	45.5(70)	27.6(289)	10.8(17)	20.9(84)	29.3(12)	29.1(16)	34.9(81)	61.2(30)	25.5(242)
1	18.6(16)	24.7(64)	26.2(55)	35.2(25)	28.4(75)	29.9(46)	26.8(281)	21.1(19)	18(72)	22(9)	23.6(13)	20.3(47)	16.3(1)	18.1(172)
2	10.5(9)	24.3(63)	23.3(49)	18.3(13)	15.9(42)	10.4(16)	18.5(194)	18.5(29)	13(52)	17.1(9)	14.5(8)	15.5(36)	8.2(4)	14.4(137)
3	18.6(16)	14.3(37)	10.5(22)	11.3(8)	11(29)	7.8(12)	11.9(125)	14.6(23)	11.5(46)	9.8(4)	9.1(5)	12.5(29)	4.1(2)	11.8(112)
4	14(12)	8.9(23)	8.1(17)	7(5)	4.9(13)	4.5(7)	7.4(77)	18.5(29)	13.7(55)	4.9(2)	9.1(5)	6(14)	2(1)	11.3(107)
5	10.5(9)	5.8(15)	4.3(9)	1.4(1)	3.4(9)	1.9(3)	4.4(46)	8.3(13)	8.5(34)	2.4(1)	3.6(2)	5.2(12)	2(1)	6.6(63)
6	3.5(3)	1.9(5)	1.4(3)	1.4(1)	2.3(6)	0(0)	1.7(18)	9.6(15)	6(24)	4.9(2)	5.5(3)	3.4(8)	4.1(2)	5.9(56)
7	5.8(5)	.8(2)	1(2)	0(0)	0(0)	0(0)	.9(9)	3.2(5)	2.5(10)	0(0)	3.6(2)	.9(2)	0(0)	2(19)
8	0(0)	1.9(5)	.5(1)	0(0)	0(0)	0(0)	.6(6)	3.2(5)	3(12)	0(0)	0(0)	1.3(3)	2(1)	2.2(21)
9	0(0)	.4(1)	.5(1)	0(0)	0(0)	0(0)	.2(2)	1.3(2)	3(12)	9.8(4)	1.8(1)	0(0)	0(0)	2.1(20)
n	86	259	210	71	264	154	1047	157	401	41	55	232	49	949
M	2.65	2.17	1.81	1.49	1.44	1.02	1.74	3.25	2.80	2.34	2.09	1.76	1.04	2.47
Mdn	3	2	1	1	1	1	1	3	2	1	1	1	0	2
SD	2.06	1.82	1.70	1.37	1.52	1.27	1.70	2.18	2.44	2.74	2.22	1.90	1.86	2.33

Table 4
Social and potential pathological gamers and their patterns of VGP use per country (percentage and frequency and chi square test, or mean and standard deviation with t test for "initial age" and Mann–Whitney U test for "mean time per session").

Sub-sample	Spain (n = 1047)		Great Britain (n = 949)	
Type of player	Social (n = 966)	Pathologic (n = 81)	Social (n = 770)	Pathologic (n = 179)
Variable	% (n)/*M(SD)*	% (n)/*M(SD)*	% (n)/*M(SD)*	% (n)/*M(SD)*
Owner of console	(n = 996)	(n = 81)	(n = 768)	(n = 179)
Yes	80.1(774)	86.4(70)	71.7(551)	76(136)
Owner of computer	(n = 995)	(n = 81)	(n = 768)	(n = 179)
Yes	92.1(889)	91.4(74)	86.2(662)	86(154)
Use VGP	(n = 966)	(n = 81)	(n = 760)	(n = 173)
Yes	73.2(707)	86.4(70)*	78.7(606)	89(154)**
Type of player	(n = 966)	(n = 81)	(n = 617)	(n = 159)
Alone	11.3(109)	14.8(12)	11.9(92)	18.9(30
Initial age	(n = 753)	(n = 69)	(n = 545)	(n = 132)
	8.58(2.729)	*6.78(2.52)****	*7.77(2.869)*	*6.67(2.654)****
Mean time per session	(n = 631)	(n = 64)	(n = 562)	(n = 131)
	292.04*(67.235)*	*145.47(97.7)****	*94.3(79.9)*	*138.4(110.7)****
VGP frequency	(n = 916)	(n = 61)	(n = 544)	(n = 128)
Daily	13.6(84)	45.9(28)***	21(114)	44.5(57)***

Note 1: The percentage (%) presented is the valid percentage.
*** Note 2: $p < .001$.
** Note 2: $p < .01$.
* Note 2: $p < .05$.

types of players in each country in reference to each single addictive symptom (see Table 6).

3.4.2. The PVP symptoms related with the component model of behavioural addictions and the IGD

Among the Spanish potential pathological players (n = 81), the components in order of frequency from the most prevalent to the lowest were: conflict (86.4%), salience (84%), tolerance (69.1%), mood modification (67.9%), relapse (64.2%), and withdrawal (51.9%). In the British (n = 179) were: conflict (93.3%), withdrawal (82.7%), relapse (77.7%), tolerance (76%), salience (73.2%) and mood modification (70.9%). In Spain, only four individuals endorsed all six addiction components, whereas in Great Britain were 44.

In Spain, the pathological player' profile was a male, aged from 13 to 16 from a state school, owner of at least one console (75%) and a computer with internet (75%). In Great Britain, similarly, almost all were males (90.7%), aged from 12 to 17 years old, from state schools (63.3%), owners of at least one console (81.8%) and a computer with internet (88.6%). Finally, further analysis showed that if 'salience' and 'mood modification' were not considered compulsory to classify gamer addicts (because could be part of a healthy enthusiasm for video gaming), the prevalence of pathological gaming among Spanish potential pathological gamers would be 12 individuals and 75 among the British counterparts.

Similarly to Tables 3 and 7 shows the endorsement of each PVP item matched with an IGD criterion per country, gender and age group for pathological players. In Spain, the PVP Item 1 ("preoccupation" IGD symptom) and PVP Item 6 ("continue despite problems" IGD symptom) were endorsed by a majority of the males. In Great Britain, the clearest endorsement among males was PVP Item 4 ("withdrawal" IGD symptom). In both countries, females were much less likely to be pathological players (Spain: 31.5%; Great Britain: 28.2%), and an effect of age is observed: the younger the gamers, the more endorsement to these items or symptoms were found. The least endorsed symptom in both countries was PVP item 8 ("loss personal things" IGD symptom).

4. Discussion

The purpose of this study was to re-examine the PVP in two countries, due to it being the scale that most closely fitted the

Table 5
Proposal of the incidence and classification function of the PVP symptoms for each country (Spain: $n = 81$; Great Britain: $n = 358$) in relation to the answers of social and potential pathological players, sensitivity, specificity and overall accuracy.

PVP symptoms (items)	Spain ($n = 162$)							Great Britain ($n = 358$)						
	Answers of Social players $n = 81$		Answers of Pathological players $n = 81$		Classification function			Answers of Social players $n = 179$		Answers of Pathological players $n = 179$		Classification function		
	n Yes	*n* No	*n* Yes (%)*	*n* No	Sensitivity	Specificity	Overall accuracy	*n* Yes	*n* No	*n* Yes (%)*	*n* No	Sensitivity	Specificity	Overall accuracy
Preoccupation (items 1)	18	63	68 (84)	13	84.0	77.8	80.9	14	165	131 (73.2)	48	73.2	92.2	82.7
Tolerance (item 2)	8	73	56 (69.1)	25	69.1	90.1	79.6	20	159	136 (76)	43	76.0	76.0	82.4
Loss of control (items 3 and 6)	46	35	76 (93.8)	5	93.8	43.2	68.5	75	104	174 (97.2)	5	97.2	58.1	77.7
Withdrawal (item 4)	3	78	42 (51.9)	39	51.9	96.3	74.1	75	104	148 (82.7)	31	82.7	58.1	70.4
Escape (item 5)	21	60	55 (67.9)	26	67.9	74.1	71.0	21	158	127 (70.9)	52	71.0	88.3	79.6
Lies/deception (item 7)	9	72	51 (63)	30	63.0	88.9	75.9	21	158	114 (63.7)	65	63.7	88.3	76.0
Consequences (item 8)	3	78	23 (28.4)	58	28.4	96.3	62.4	5	174	78 (43.6)	101	43.6	97.2	70.4
Disruptions (item 9)	8	73	53 (65.4)	28	65.4	90.1	77.8	33	146	125 (69.8)	54	69.8	81.6	75.7

* Note: is the frequency and percentage of incidence for each symptom in pathological players.

Table 6
Comparison of the social and potential pathological players of each country (Spain: $n = 162$; Great Britain: $n = 358$) in relation with each symptom in the PVP Pearson's Chi-Square test (χ^2 statistic, the significance value p, and the effect size with Cramer's V).

PVP symptoms (item/s)	Spanish players ($n = 162$)			British players ($n = 358$)		
	$\chi^2_{(1)}$	p	V	$\chi^2_{(1)}$	p	V
Preoccupation (item 1)	61.97	<.001	.618	158.68	<.001	.666
Tolerance (item 2)	59.51	<.001	.606	152.87	<.001	.653
Loss of control (items 3 and 6)	29.88	<.001	.429	129.28	<.001	.601
Withdrawal (item 4)	46.8	<.001	.537	63.37	<.001	.421
Escape (item 5)	28.65	<.001	.421	129.42	<.001	.601
Lies/deception (item 7)	46.69	<.001	.537	102.85	<.001	.536
Consequences (item 8)	18.33	<.001	.336	83.58	<.001	.483
Disruptions (item 9)	53.25	<.001	.573	95.90	<.001	.518

Table 7
PVP items with a "yes" endorsement by gender and groups of ages from each potential pathological players' sub-samples (frequency and percentage) to explore IGD symptomatology.

Sub-samples	Spain ($n = 162$)						Great Britain ($n = 358$)					
Gender (size group)	Male ($n = 111$)			Female ($n = 51$)			Male ($n = 251$)			Female ($n = 101$)		
Age groups	11–12	13–15	16–18	11–12	13–15	16–18	11–12	13–15	16–18	11–12	13–15	16–18
Size sub-group	$N = 27$	$N = 53$	$N = 31$	$N = 8$	$N = 32$	$N = 11$	$N = 68$	$N = 171$	$N = 12$	$N = 18$	$N = 71$	$N = 12$
Descriptive	% (*n*)	% (*n*)	% (*n*)	% (*n*)	% (*n*)	% (*n*)	% (*n*)	% (*n*)	% (*n*)	% (*n*)	% (*n*)	% (*n*)
PVP Item number – IGD symptom												
1–preoccupation	70.4(19)	60.4(32)	54.8(17)	37.5(3)	37.5(12)	27.7(3)	42.6(29)	47.4(81)	50(6)	33.3(6)	23.9(17)	33.3(4)
2–tolerance	63(17)	39.6(21)	38.7(12)	12.5(1)	34.4(11)	18.2(2)	47.1(32)	49.1(84)	41.7(5)	33.3(6)	35.2(25)	25(3)
3–unsuccessful to control l	37(10)	47.2(25)	32.3(10)	37.5(3)	43.8(14)	9.1(1)	64.7(44)	53.8(92)	58.3(7)	50(9)	47.9(34)	25(3)
4–withdrawal	33.3(9)	30.2(16)	32.3(10)	25(2)	18.8(6)	18.2(2)	75(51)	63.2(108)	75(9)	61.1(11)	46.5(33)	58.3(7)
5–escape or relieve	40.7(11)	41.5(22)	67.7(21)	37.5(3)	43.8(14)	45.5(5)	50(34)	43.9(75)	50(6)	27.8(5)	29.6(21)	25(3)
6–continue despite problems	74.1(20)	77.4(41)	61.3(19)	37.5(3)	59.4(19)	54.5(6)	55.9(38)	49.1(84)	41.7(5)	50(9)	31(22)	41.7(5)
7–to lie or deceive people	37(10)	45.3(24)	38.7(12)	12.5(1)	34.4(11)	18.2(2)	48.9(33)	41.5(71)	50(6)	33.3(6)	21.1(15)	8.3(1)
8–loss personal things	11.1(3)	18.9(10)	25.8(8)	25(2)	6.3(2)	3.2(5)	23.5(16)	26.9(46)	33.3(4)	27.8(5)	11.3(8)	8.3(1)
9–loss of activities	44.4(12)	41.5(22)	25.8(8)	12.5(1)	46.9(15)	27.7(3)	36.8(25)	44.4(76)	100(12)	33.3(6)	49(35)	41.7(5)

proposed IGD criteria in the DSM-5 (King et al., 2013). The psychometric properties of the Spanish and English versions, from the validity analyses, showed its unifactoriality (such as Hart et al., 2009; Turner et al., 2012) through two analysis techniques which achieved very similar results, with an adequate variance explained for a short explorative test (Reckase, 1979), and construct validity through associations with VGP patterns of usage related with time, as well as perception of the own VGP problematic and the significant others perception of the adolescent VGA (King et al., 2013; Salguero & Morán, 2002). Reliability measures achieved were fair and identic measured with two coefficients ($\alpha_{Spain} = .63$ and $\alpha_{GB} = .78$; $\Omega_{Spain} = .63$ and $\Omega_{GB} = .78$) following Cicchetti (1994), and similar to those obtained by previous studies in Spain ($\alpha = .69$; Salguero and Morán (2002), Great Britain ($\alpha = .75$; Collins et al., 2012), Netherlands ($\alpha = .78$; Kuss et al., 2012), and Canada ($\alpha = .79$; Parker et al., 2008). However, other VGA Scales have

reported better psychometric properties. For instance, the short Game Addiction scale (GA; Lemmens et al., 2009) reported a higher internal consistency (α = .81 and .86), such as the Problem Video Game Playing Test (PVGT; King, Delbraffo, & Zajac, 2011: α = .92) or the Problematic Video Game Use Scale (PVGU; Topor et al., 2011: α = .83).

The present item analysis of the PVP Scale contributes to the evidence-base that suggests increasing the cut-off point should be increased to a minimum of 5 out of 9 (Adiele & Olatkun, 2014; Collins et al., 2012; Hart et al., 2009; Lemmens et al., 2009; Turner et al., 2012). In fact, based on the evidence presented here, it could perhaps be argued that the cut-off point be increased at 6 out of 9 criteria to categorize players as having a potential pathological problem. This proposal could be extended to future VGA Scales, based on their addictive criteria measured, and on the basis of empirical and clinical evidence.

The descriptive findings of the present study showed slight cultural differences, with British gamers tending to play more excessively compared to Spanish gamers. In relation to the addictive symptoms endorsed, both sub-samples converged with "loss of control" being the most endorsed symptom associated with VGA the least endorsed symptom being "disregard for the physical or psychological consequences". However, British adolescents endorsed 'withdrawal' as second most endorsed symptom, while for Spanish adolescents it was the second least endorsed. Comparing the findings of the present study with the few other VGA studies that have explored the addictive symptomatology within a healthy population, there is considerable agreement as to the most endorsed symptoms being 'loss of control/relapse', 'family/school disruption' and 'preoccupation', and the least endorsed symptoms being 'disregard for the consequences' and 'withdrawal' (e.g., Bioulac et al., 2008; Caillion et al., 2014; Gentile, 2009; Turner et al., 2012).

There is a need to periodically update and refine prevalence estimates of adolescent pathological gamers (Gentile et al. (2011) both online and offline (Van Rooij, Schoenmakers, Vermulst, Van den Eijden, and Van de Mheen (2010)). The present study is the first to make a comparison more than a decade after the first study using the PVP as well as carrying out a cross-cultural comparison simultaneously in different countries with an identical methodology to aid epidemiological research. In this study, the prevalence rates were quite different among countries (Spain: 7.7%; Great Britain: 14.6%), although they were inside the common range of PVP Scale prevalence from 2002 (Tejeiro et al., 2012). The classification accuracy of the PVP Scale based on its symptomatology showed notable classification accuracy with high effect sizes in both countries (in particular the 'preoccupation' symptom and the 'Consequences' symptom being fair), and was a way of indirectly exploring the PVP Scale with behavioural addiction symptoms. In relation to the components model, both countries showed the 'conflict' component as being highly prevalent (King et al., 2013) although very few players endorsed all six components. In relation to endorsement of IGD symptoms, a cultural difference was observed. The most highly endorsed items for Spanish gamers were 'preoccupation' (cognitive salience) and 'continue despite problems' (conflict) while in British gamers it was 'withdrawal'. Despite the obvious strengths of the present study (including a large sample size and cross-cultural comparison) there are clearly some limitations; the most obvious of these are the opportunistic and convenience sample used and the self-report method.

5. Conclusions

To the authors' knowledge, the present study is the first cross-cultural exploration of IGD symptomatology (i.e., comparing Spanish and British gamers). The study's findings suggest that IGD should be included it in DSM-5's section of "Substance-Related and Addictive Disorders", along with "Gambling Disorder". It is also recommended that researchers in the gaming studies filed should use similar assessment measures to facilitate comparability across demographic groups and to facilitate cross-cultural comparison (Griffiths et al., 2014). Moreover, according to Petry and O'Brien (2013) it is necessary define and describe the features of IGD to be included as a potential new disorder in the DSM-5. However, new scales adapting these criteria are needed, and this paper provides empirical evidence for the building of a bridge between the construct of VGA and the newly proposed IGD.

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