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GAMING DISORDER IS NOT LIMITED TO THE INTERNET: A COMPARATIVE STUDY BETWEEN OFFLINE AND ONLINE GAMERS

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The Problem Video Game Playing (PVP) scale, considered as one of the best measures for the assessment of the Internet Gaming Disorder (IGD), has been utilized for the diagnosis and analysis of this disorder but it is still unknown whether this or any other scale can be utilized equally for online and offline gaming. Young offline (n = 512) and online (n = 314) gamers completed a survey including the PVP, Severity of Dependence Scale, patterns of play, and other measures of playing to excess, and the psychometric and diagnostic properties of the PVP were analyzed and compared. The scale reliability, factorial validity and construct validity were similar in both samples and were adequate. We found a common pattern of relationships between answers to the scale and other measures of playing to excess, but online games presented a higher potential for the development of addictive problems. Suggestions regarding the concept and diagnosis of video game addiction are presented.

Key words: Assessment; Problem Video Game Playing scale; Internet Gaming Disorder; Addiction; Video games.

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Over the last 30 years, addiction has been one of the problems most commonly associated with the use of video games (Tejeiro, Gómez-Vallecillo, Pelegrina, Wallace, & Emberley, 2012), but until very recently it has been excluded from the Diagnostic and Statistical Manual of the American Psychiatric Association (APA). The fifth edition of the manual (DSM-5; APA, 2013) included Internet Gaming Disorder (IGD) within the conditions for further study, pointing out that it is also commonly referred to as Internet Use Disorder, Internet Addiction and Gaming Addiction, and that it has been defined as an addiction by the Chinese government. IGD is defined as a "persistent and recurrent use of the Internet to engage in games, often with other play-

ers, leading to clinical impairment or distress" (APA, 2013, p. 795), and nine criteria 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. These symptoms build an obvious link with the literature on addictions, and some have already suggested that IGD should be included in the DSM-5's section of Substance-Related and Addictive Disorders (e.g., Lopez-Fernandez, Honrubia-Serrano, Baguley, & Griffiths, 2014). On the other hand, IGD is limited to online games, but the manual suggests that it "could involve non-Internet computerized games as well" (APA, 2013, p. 796), and some authors have recommended a revision of IGD to encompass offline video gaming (Griffiths, Kuss, & King, 2012).

Recently, King, Haagsma, Delfabbro, Gradisar, and Griffiths (2013) systematically reviewed the 18 instruments for the measurement of video game addiction published between 1996 and 2012 in order to test their ability to measure IGD. Some of these instruments addressed Internet addiction in general. Among those specifically focused on video gaming, some were designed only for their use online: Online Game Addiction Scale for Adolescents in Taiwan (OAST; Wan & Chiou, 2006), Problematic Online Game Use Scale (POGU; Kim & Kim, 2010), and Problematic Online Gaming Questionnaire (POGQ; Demetrovics et al., 2012). Other scales — either in this systematic review or not included in it — do not specify whether they are applicable to online games, offline games or both: Game Addiction Scale (GAS; Lemmens, Valkenburg, & Peter, 2009), Video Game Addiction Test (VAT; Van Rooij, Schoenmakers, Vermulst, van de Eijnden, & van de Mheen, 2010), Video Game Dependency Scale (KFN-CSAS-II; Rehbein, Kleimann, & Mößle, 2010), Problem Video Game Playing Test (PVGT; King, Delfabbro, & Zajac, 2011), and Problematic Video Game Scale Use (PVGU; Topor et al., 2011). King et al. (2013) reviewed each instrument's capacity to assess IGD and concluded that "only one instrument, the Problem Videogame Playing (PVP) scale (Tejeiro & Moran, 2002), demonstrated this capacity" (p. 338) and that "the PVP scale may provide the best overall measure of Internet Use Disorder" (p. 340) among all available instruments. Similar results were obtained by Lopez-Fernandez et al. (2014), who found that the PVP scale matched the criteria for IGD and showed adequate sensitivity, specificity, and classification accuracy both in the United Kingdom and in Spain. It must be noted that after King et al.'s (2013) revision, the IGD-20 test (Pontes, Király, Demetrovics, & Griffiths, 2014) and the IGDS-SF9 (Pontes & Griffiths, 2015) have been presented for the measurement of IGD, but both were developed from online self-selected samples, which has been found to introduce a significant bias and reduce their representativeness (Khazaal et al., 2014).

The PVP scale is a nine-item dichotomous questionnaire based on the DSM-4 (APA, 1994) criteria for substance dependence and for pathological gambling, as well as on the literature on addictions. Different studies in a variety of countries and settings have confirmed that the PVP is one-dimensional, has a good internal consistency (Cronbach's alpha .69 to .91), and strong convergent and criterion validity (e.g., Adlaf, Paglia-Boak, Beitchman, & Wolfe, 2008; Caillon, Bouju, & Grall-Bronnec, 2014; Icassati, Vieira, Araujo, & Magalhães, 2009; Lopez-Fernandez et al., 2014; Parker, Taylor, Eastabrook, Schell, & Wood, 2008; Vallejos & Capa, 2010).

It is important to note that the original analysis of the PVP made no distinction between online and offline gaming, with its items containing no allusion to the delivery mechanism. Most of the studies utilizing the scale have simply neglected this aspect in their data collection and analyses,

and despite the extensive use of the scale, to date no study has analyzed whether it is equally applicable — in terms of psychometric and diagnostic properties — to both online and offline gaming.

Several reasons make this a relevant issue. On the one hand, a growing number of studies highlight the differences between online and offline gaming. Unlike traditional video games, online video games integrate play within an Internet-based social context, creating a distinctive environment for social play (Kowert & Oldmeadow, 2013). The social elements contained within these environments constitute a primary reason for continued play frequency (Kolo & Baur, 2004) and extended duration (Caplan, Williams, & Yee, 2010; Hsu, Wen, & Wu, 2009). Not surprisingly, online video games (in particular, massively multiplayer online role-playing games or MMORPGs) are more likely than offline games to be associated with problem use (Lee et al., 2007; Peters & Malesky, 2008; Porter, Starcevic, Berle, & Fenech, 2010).

On the other hand, when the PVP scale was developed in 2002, online video games were a small number, whilst today they represent an important part of the market, with many video games implementing a multiplayer online system. Online distribution and online usage are currently the biggest drivers of growth in the sector, and the revenue of the online game market in 2011 is expected to double by 2017 (Gaudiosi, 2012), with the mobile and online game sectors growing at a compound annual rate of 23.6 percent by that year (Takahashi, 2014).

This paper aims to close this gap in the current knowledge by examining differences in the performance on the PVP in two groups of young gamers: those who play only or mostly offline video games and those who play only or mostly online video games. PVP items address the same areas suggested by the DSM-5 for the diagnosis of IGD (see above), and although all previous studies find that the commitment of online gamers is greater than that of offline gamers, there is no evidence to suggest that excessive or problem use of video games is associated with different symptoms depending on the type of environment utilized. Consistent with the implicit assumption of the studies that have utilized the PVP scale indistinctly on offline and online players during more than a decade, our hypothesis is that the symptoms of video game overuse do not differ depending on the type of environment (online or offline), and therefore the psychometric and diagnostic properties of the PVP will be similar in online and offline gamers.

METHOD

Participants

The sample was formed by 1190 participants aged 11 to 29 (M = 18.2, SD = 3.73). The group aged 11-14 years represented 21.5% of the sample, 30.1% were aged 15-18, 41.5% were aged 19-23, and 6.9% were aged 24-29. Females were 57.8% (n = 688) of the sample; there was no sex difference across age groups. The majority (93.8%) had Spanish nationality; the remaining 6.2% was composed of participants from 26 other nationalities plus two participants that did not declare their nationality (data available on request); all non-Spanish participants were fluent enough in Spanish to understand the instructions and the questionnaires utilized. Adolescents (11-17 years) were recruited from three high schools in the city of Elche (n = 438) and one in the city of Rafal (n = 48), both in the Spanish province of Alicante. Adult participants were undergraduate university students at Miguel Hernández University in Elche (n = 502) and University of Cadiz (n = 202). All students in a random casual sample of classrooms in the three institutions

were invited to participate and data were collected from all those who complied. No data were collected regarding ethnic group or socioeconomic level in order to comply with school requirements, but the vast majority of both adolescents and adults were White (Caucasian) and middle class.

Materials

Video game usage. Participants described their use of video games during the previous 12 months: frequency (5-point scale: *never or almost never*, *2-3 times*, *once or twice a month*, *once or twice a week*, *daily or almost daily*), mean and longest session (5-point scale: *less than 10 minutes*, *10-30 minutes*, *30 minutes to 1 hour*, *1-3 hours*, *more than 3 hours*), and use of offline or online video games (5-point scale: *only offline*, *mostly offline*, *both equally*, *mostly online*, *only online*). Potential problems associated with video gaming were measured with three sets of questions. First, the person's perceived control of video games during the past 12 months was assessed with three items extracted from Tejeiro and Moran (2002): "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?"; answers were on a 4-point scale from *never or almost never* to *always or almost always*.

Severity of Dependence Scale (SDS; Gossop et al., 1995; Spanish version by González-Sáiz & Salvador-Carulla, 1998). This scale was adapted to video gaming as in Tejeiro and Moran (2002). The SDS is a five-item self-administered scale designed to measure the psychological correlates of dependence. Moderately good psychometric properties have been reported both for the original version (Gossop et al., 1995; Topp & Mattick, 1997) and for the Spanish version (González-Sáiz & Salvador-Carulla, 1998). One example of adapted SDS items is "Do you think your use of video games was out of control?"

Problem Video Game Playing (PVP; Tejeiro & Moran, 2002) scale. The PVP is a 9-point ordinal scale in which higher scores are indicative of problems with video gaming. Examples of PVP items are "I spend an increasing amount of time playing video games" (Item 2), "When I feel bad, for example, nervous, sad, or angry, or when I have problems, I use the video games more often" (Item 5), and "When I lose in a game or I have not obtained the desired results, I need to play again to achieve my target" (Item 6).

Procedure

After approval of the study by an ethics committee as well as by the school and University boards, participants (and their parents, in the case of teenagers) were informed about its objectives and provided written informed assent or consent. All measures to ensure confidentiality and anonymity were implemented and explained to the participants. After short oral instructions, participants provided demographic information (age, gender, and nationality) before completing the questionnaire battery which was administered by two members of the research team to groups of around 30 participants in their regular classrooms during school hours. Completion of questionnaires required 10 to 20 minutes.

Data Analysis

The SPSS version 21.0 statistical package and Amos version 21.0 were utilized for data analyses. Chi-square tests were used for nominal variables and effect size was measured with odds ratio and Φ for binary variables, and with Cramér's V for categorical nondichotomous variables. Normality (Shapiro-Wilk) and homoscedasticity (Levene's) tests were conducted for each variable with pairwise comparisons conducted utilizing *t*-tests or Mann-Whitney's *U* where appropriate. Effect size was calculated using Cohen's *d* (Cohen, 1988) for Gaussian variables and with *r* for non-Gaussian variables (Fritz, Morris, & Richler, 2012). The fit of the data in confirmatory factor analysis was tested with absolute fix indices (normed chi-square, i.e., χ^2/df; and standardized root mean square residual, SRMR), parsimony-adjusted indices (root mean square error of approximation, RMSEA), and incremental fit indices (Tucker-Lewis index, TLI; and comparative fit index, CFI). For χ^2/df, values between 1 and 2 are indicative of a good fit and between 2 and 3 an acceptable model fit (Carmines & McIver, 1981); TLI and CFI values ≥ .90 are acceptable and ≥ .95 are optimal; RMSEA values ≤ .08 are acceptable and ≤ .06 are optimal (Marsch, Hau, & Wen, 2004); and SRMR values < .08 are representative of good model fit (Ullman, 2001). Confidence intervals for the comparison of correlations (Zou, 2007) were calculated using the cocor package for *R* (Diedenhofen & Musch, 2015).

RESULTS

Sample Characteristics

Two-thirds of participants had played video games in the past year (74.5%), with 45.7% of frequent players (at least once a week). Males were over four times more likely than females to play regularly: 65.7% of males, 31.1% of females, $\chi^2(1, N = 1190) = 140.27$, $p < .001$, $OR = 4.25$, 95% CI [3.33, 5.43]. Overall, participants played only or mostly offline (45%), with the remaining number fairly distributed between online gaming (26.8%) and both types (28.2%). Males played online significantly more than females (32.5% of males, 22.7% of females), $\chi^2(1, N = 1190) = 14.19$, $p < .001$, $OR = 1.64$, 95% CI [1.27, 2.12]. Online players were also five times more likely than offline players (67.5% of online players, 29.3% of offline players) to play at high frequency (i.e., at least once or twice a week); $\chi^2(1, n = 826) = 115.48$, $p < .001$, $OR = 5.02$, 95% CI [3.70, 6.79].

Factorial Validity

As the one-dimensionality of the PVP has been reported in several studies, confirmatory factor analyses were utilized to establish whether offline ($n = 512$) and online ($n = 314$) players produced a similar factor structure. The 364 participants who played both online and offline were excluded from this and further analyses, in order to provide clean-cut comparisons between the users of the two systems. Sample size and subjects-to-variables ratio (STV; 91.8 in the total sample, 56.9 in offline players, 34.9 in online players) exceeded the minimum established for an adequate factorial analysis (Costello & Osborne, 2005).

As shown in Table 1, model fit was optimal for the total sample, and good to optimal when adolescents and adults were analyzed separately. In online players, model fit was optimal for the total subsample, and acceptable to optimal for each age group. In offline players, fit was optimal or good for the total subsample in all indices except normed chi-square (which was acceptable); the fit of adults was better than that of adolescents in most indices (adolescents' TLI was below the threshold for acceptable).

TABLE 1
Fit indices in confirmatory factor analysis

Subsample	χ^2/df	CFI	TLI	SRMR	RMSEA [90% CI]
Online					
Adolescents	1.18	.95	.92	.06	.04 [.00, .08]
Adults	0.56	.95	.93	.05	.06 [.01, .09]
Total	1.50	.96	.95	.04	.04 [.00, .07]
Offline					
Adolescents	1.62	.92	.86	.06	.06 [.02, .09]
Adults	2.08	.95	.91	.04	.06 [.03, .09]
Total	2.26	.95	.91	.04	.05 [.03, .07]
Total sample					
Adolescents	1.06	.99	.99	.03	.01 [.00, .05]
Adults	2.22	.96	.94	.04	.05 [.03, .07]
Total	1.74	.98	.97	.03	.03 [.01, .05]

Note. CFI = comparative fit index; TLI = Tucker-Lewis index; SRMR = standardized root mean square residual; RMSEA = root mean square error of approximation; CI = confidence interval.

Item Analysis and Internal Consistency Reliability

Table 2 shows the item analysis for the offline and online subsamples as well as the comparison of each item endorsement. In both subsamples, Items 4 (withdrawal) and 3 (loss of control) were the most endorsed, and Items 5 (escape), 7 (lies and deception), and 8 (disregard for the consequences) were the least endorsed. Online players had greater rates of endorsement of all items as compared to offline players (although differences did not reach statistical significance for Items 4 and 6). The PVP's internal consistency coefficient (Cronbach's alpha) was similar in offline players (α = .61) and in online players (α = .65). Cronbach's alpha was highest for the nine-item solution in both subsamples.

Construct Validity

Spearman correlations between PVP total score and all measures of video game use were positive and highly significant (p < .001) in both groups: frequency of play (r_s = .42

TABLE 2
Problem video game playing item analysis for the offline and online subsamples and comparison of each item endorsement

	Offline			Online				
Item	*n* (%)	Corrected item-total *r*	α if item deleted	*n* (%)	Corrected item-total *r*	α if item deleted	χ^2	Φ
1	28 (5.5)	.34	.58	78 (24.8)	.54	.56	65.30***	.28
2	24 (4.7)	.36	.58	57 (18.2)	.39	.61	39.90***	.14
3	98 (19.1)	.31	.59	98 (31.2)	.30	.63	15.67***	.14
4	193 (37.7)	.30	.61	134 (42.7)	.23	.65	2.02	.05
5	11 (2.1)	.38	.58	33 (10.5)	.30	.63	26.98***	.18
6	74 (14.5)	.37	.56	60 (19.1)	.26	.63	3.10	.06
7	13 (2.5)	.15	.61	24 (7.6)	.32	.63	11.85***	.12
8	12 (2.3)	.38	.58	40 (12.7)	.34	.62	35.65***	.21
9	48 (9.4)	.38	.56	86 (27.4)	.34	.62	46.47***	.24

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

for offline and $r_s = .56$ for online players), mean time per session ($r_s = .33$ offline, $r_s = .59$ online) and longest time per session ($r_s = .37$ offline, $r_s = .59$ online). Similarly, Spearman correlations revealed highly significant ($p < .001$) positive associations between PVP total score and the alternative measures of problem video gaming: score on the Severity of Dependence Scale ($r_s = .44$ offline, $r_s = .64$ online), perception of having played video games to excess ($r_s = .40$ offline, $r_s = .44$ online), and perception of problems with the video games by the participants' relatives or friends ($r_s = .29$ offline, $r_s = .35$ online). However, the correlation between PVP total score and perception of having a problem with video games was significant in online gamers ($r_s = .27$, $p < .001$) but not in offline players ($r_s = .09$, $p = .093$).

Online gamers presented significantly higher correlations between PVP and frequency of play, 95% CI [–.24, –.34], average time per session, 95% CI [–.36, –.15], longest time per session, 95% CI [–.32, –.11], and SDS score, 95% CI [–.29, –.10], as compared to offline gamers. The latter presented a higher correlation only between PVP score and perception of problems, 95% CI [.04, .32]. No differences were found with regards to the correlations between PVP on the one hand, and perception of playing to excess, 95% CI [–.15, .08] and perception by relatives 95% CI [–.18, .07] on the other.

Descriptives of PVP Total Scores

The PVP total score for online players ($M = 1.94$, $SD = 1.84$, $Mdn = 2$) was significantly higher than the total score for offline players ($M = .98$, $SD = 1.30$, $Mdn = 1$), $U = 54702$, $p < .001$, $r = .28$. Males scored significantly higher than females in both subsamples ($U = 26498$, $p = .02$, $r = .10$ offline; $U = 6472$, $p < .001$, $r = .42$ online). PVP scores did not differ as a function of age in offline players ($r_s = –.07$, $p = .09$) but decreased with age in online players ($r_s = –.26$, $p < .001$).

DISCUSSION

To our knowledge, our study is the first to compare the gaming disorder symptoms presented by offline and online video game players, as well as the first in analyzing the psychometric and diagnostic properties of the PVP in both types of players. The scale presented similar factorial validity and homogeneity indices in both subsamples. Reliability (Cronbach's alpha) was also similar between the two groups although it was lower than results previously reported in Spain (.75, Lopez-Fernandez et al., 2014; .69, Tejeiro & Moran, 2002), Netherlands (.78, Kuss, Louws, & Wiers, 2012), Canada (.79, Parker et al., 2008), United Kingdom (.75, Collins, Freeman, & Chamarro-Premuzic, 2012; .79, Lopez-Fernandez et al., 2014), United States (.69, Hart et al., 2009), or Thailand (.70, Hongsanguansri, Silpakit, & Ruangkanchanasetr, 2006). Because of the relationship between alpha and test length, lower reliability of the measure can be expected in short tests, and satisfactory levels of alpha depend on test use and interpretations (Schmitt, 1996); Tejeiro and Moran's (2002) and Hart et al.'s (2009) alphas were .69, which was considered adequate for a nine-item scale. The order of endorsement of PVP items was the same in both groups and similar to Lopez-Fernandez et al.'s (2014) English sample. Offline and online gamers differed quantitatively — but not qualitatively — in the association between PVP score and other measures of duration and frequency, SDS score and two out of the three items measuring perception of playing to excess. In both groups males scored significantly higher than females, though younger players only scored higher than older players amongst those who played online, especially in females.

In summary, these results reveal that, as hypothesized, there is a fairly common pattern of relationships among sociodemographic characteristics, answers to the PVP, SDS scores and other measures of playing to excess, regardless of the type of video game environment (online or offline) that the individual utilizes. There are quantitative differences, though: higher endorsement of all PVP items and higher correlations with all alternative measures of problem play reveal that online games present a higher potential for the development of problems such as those described in the scale: loss of control, tolerance, withdrawal, lies, and so forth.

The most evident source of limitations to these findings is the PVP scale itself, whose properties might be improved with the deletion, combination, or rewording of some items. For instance, Elliott, Golub, Ream, and Dunlap (2012) modified the PVP for fast application, selecting the five highest-loading items in a principal components analysis conducted on a pilot sample and changing the answer format to a 5-point scale. Our results might also benefit from the comparison of offline and online players above the threshold for a clinical condition. Although several cutoff points have been suggested for the PVP — three (Arab et al., 2007), four (Tejeiro et al., 2012), five (Adiele & Olatkun, 2014), and six (Lopez-Fernandez et al., 2014) —, Hart et al. (2009) found no support for the use of a cutoff score of any level with the scale. We therefore follow the PVP authors' suggestion of considering it as a 9-point ordinal scale, but we urge future research to concentrate on this issue.

Despite these and some other potential limitations (e.g., self-report of the participants may have minimized their PVP scores and behavioral problems, and the homogeneity of the sample in terms of socioeconomic status and ethnicity may limit its representativeness), our findings have several conceptual and diagnostic implications. First, the current definition of IGD — considered by the DSM-5 as a condition for further study — is limited to online players but the similarities revealed in the present study suggest that different diagnoses for online and offline gamers may not be substantiated. One solution might then be to encompass offline video-gaming

within IGD (Griffiths et al., 2012), but it is obvious that Internet Gaming Disorder cannot be applied to offline problem players for the simple reason that they do not use the Internet. Further, IGD confuses two different delivery mechanisms (the Internet and a video game) within a single classification (King & Delfabbro, 2012), disregarding the fact that Internet addiction and video game addiction are related but different concepts (Lemmens et al., 2009). Even online problem video gamers cannot be considered addicted to the Internet: the Internet is merely the place where the game addiction manifests itself (Griffiths & Davies, 2005). Based upon the current findings we echo King and Delfabbro's (2012) suggestion that, because video-gaming is not an exclusively online activity, it should be removed from its current positioning within DSM-5 and, like pathological gambling, it "may be more appropriately placed in its own diagnostic category, which may be termed 'videogaming disorder'. This category would refer to an individual's addictive use of videogames, irrespective of whether the videogame is played online or otherwise" (p. 21). Further, the available evidence suggests that videogaming disorder should be included in the DSM-5's section of Substance-Related and Addictive Disorders, as is the case of Gambling Disorders.

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