Measuring problem video game playing in adolescents

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ABSTRACT

Aims Some researchers suggest that for some people, video game playing is an addictive behaviour similar to substance dependence. Our aim was to design and validate a scale to measure the problems associated with the apparently addictive use of all types of video games and video game systems, because there is no instrument at the present time that can be used for this purpose.

Design We reviewed the DSM-IV criteria for substance dependence and for pathological gambling, as well as the literature on the addictions in order to design a short scale (PVP; problem video game playing) that is quick and easy to apply.

Participants The scale was administered to 223 Spanish adolescents aged between 13 and 18 years. The study was carried out in Granada and Algeciras, Spain.

Findings Psychometric analyses show that the PVP seems to be unidimensional and has acceptable internal consistency (Cronbach's alpha) at 0.69. The pattern of associations between the scale scores and alternative measures of problem play supports its construct validity (higher total scores in the scale were associated with higher frequency of play, mean and longest times per session, self and parents' perception of playing to excess, and scores in the Severity of Dependence Scale).

Conclusions Our results confirm that the excessive use of video games is associated with a number of problems which resemble a dependence syndrome, and the PVP appears as a useful instrument for the measurement of such problems.

KEYWORDS Addiction, adolescence, dependence, scale validation, video games.

INTRODUCTION

Most of the debate concerning the video games centres upon the question of whether they are potentially addictive, but to date there has been very little systematic research into this area, and many studies are vague or imprecise about their theoretical framework. Most of these studies have used a survey approach, with a focus on variables such as frequency and duration of play, expenditure of money and illegal acts or antisocial behaviours associated with video game playing. With this methodology, a number of researchers have shown that certain people have severe behavioural problems as a result of their video game playing, and some argue that those people must be considered as being addicted to the games. However, the debate is open about how large that group is. Some simply indicate that they are 'a minority' (e.g. Brooks 1983), while others report that they represent 10–15% of all the players (Egli & Meyers 1984).

Some authors have focused on specific aspects of the addictive phenomenon. For instance, a survey of high school students found that 15% of the subjects used video games to escape from outside pressures (McClure & Mears 1984), and 2 years later the same authors reported that video game players did not indicate high rates of playing to escape bad family situations (McClure & Mears 1986). It has also been found that initial high involvement with a new video game soon decreases (Creasey & Myers 1986), which might be considered evidence for the absence of tolerance.

One serious problem with previous findings is the lack of well-validated diagnostic criteria for video game 'addic-

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tion'. In this respect, some have used questions adapted from the diagnostic criteria for pathological gambling. The rationale underlying these studies is that, although pathological gambling is classified by the American Psychiatric Association as an 'impulse control disorder not elsewhere classified', many experts in this domain claim that it should be considered as a behavioural addiction, although this assumption is not shared by all (see Shaffer 1999).

In line with this, Griffiths (1991) adapted from DSM-III-R (APA 1987) a set of criteria shown to discriminate pathological gambling effectively. His scale comprises nine dimensions of addiction, and a score of four or more criteria is considered as an indication of video game dependence. No psychometric properties were reported for the scale. Different results have been found by studies using this instrument. Griffiths & Dancaster (1995) reported that 8% of the subjects in their sample were 'addicted' to computer games, with 29% of subjects who were 'addicted' in the past but not at the moment of the study. Phillips et al. (1995) indicated that 7.5% of children between the ages of 11 and 16 years scored at addictive levels, and Griffiths & Hunt (1998) reported that one in five adolescents were dependent at the time of the study and that one in four adolescents had been dependent at some point in their lives.

Similarly, Fisher (1994, 1995) adapted the criteria for pathological gambling in the DSM-IV (APA 1994) to provide a screening measure of addictive use of video games. This author's scale was presented as DSM-IV-JV (J = juvenile; V = arcade video game). If a person answered 'yes' to four (or more) of the nine items of the questionnaire, the person was deemed to be a video game 'addict'. This was found for 6% of the 460 subjects in her sample, aged 11–16 years. Acceptable psychometric properties were reported. However, the DSM-IV-JV is applicable only to arcade (coin-operated) video game machines, and therefore it is strongly biased, as the financial component of three of the nine criteria is relevant only for this particular type of machine (e.g. 'need to spend more and more money in order to achieve the desired excitement').

Finally, in a recent survey of 1358 Spanish adolescent video game players, five questions derived from the DSM-IV criteria for pathological gambling were also used (Tejeiro 1998). Several symptoms of addiction were found to be associated strongly with a greater commitment to video games (frequent players scored significantly higher than non-frequent players in measures of tolerance, withdrawal, preoccupation and family/school disruption), but no cut-off point was proposed and no psychometric properties were reported for the scale.

As can be seen from this brief overview, if researchers are to investigate this question empirically, an instrument that measures the problems associated with the apparently addictive use of all type of video games and video game systems is clearly necessary. The current study was undertaken to design such an instrument. However, although both Fisher (1994, 1995) and Griffiths (1991) suggested that the problem use of video games as found in their DSM-based instruments should be labelled as 'addiction', other diagnosis for these problems should not be rejected a priori. Subsequently, and while there is insufficient research to support strong statements about the existence of such video game 'addiction', our instrument will be presented as a scale for the measurement of problem video game playing (PVP).

METHOD

Participants

The sample consisted of 223 adolescents aged between 13 and 18 years (M = 15.1; SD = 1.1) at a public secondary school in two cities in South Spain (Granada and Algeciras). Fifty-three per cent of the adolescents were male and 47% were female. As required by the school board of governors, no data were collected as per ethnic group or socio-economic level, but in both schools the vast majority of children were white (Caucasian) middle-class students.

Materials

First, a questionnaire designed for the study elicited the following information: demographic data (gender, age), commitment to video games (frequency of playing during the previous year, mean and longest duration of play), type of video game systems (hand-held and home console, computer games and arcade coin-operated video game machines) and assessment of the person's own video game use with three dichotomous items ('I think I play video games too much', 'I think I have some type of problem associated with my video game playing' and 'My parents are worried because they think I play video games too much').

Secondly, the DSM-IV criteria for substance dependence and for pathological gambling as well as the literature on the addictions were reviewed in order to design a short scale for the measurement of problem video game playing. The dimensions of addiction and their correlates in the scale's items—with dichotomous 'yes'/'no' answers—are shown in Appendix 1. It should be noted that all but one of the DSM-IV criteria for substance abuse and all but one criteria for pathological gambling are included in the PVP. Subjects were instructed to answer about the occurrence of these behaviours during the pre-

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vious year, because this is the time frame used by the APA's manual.

Finally, the subjects were given the Spanish version of the Severity of Dependence Scale (SDS; Gossop et al. 1995), validated by González-Sáiz & Salvador-Carulla (1998). The SDS is a brief, self-administered scale designed to measure dependence on different types of drugs, with a focus on the psychological variables. The scale has five items, with a four-point scale. Gossop et al. (1995) and Topp & Mattick (1997) have reported moderately good psychometric properties, and test–retest reliability of 0.72 has also been reported for the Spanish version.

Procedure

Questionnaires were distributed by the researchers during regular classroom hours. To increase the validity of the responses, efforts were made to guarantee complete anonymity. All the subjects who were present in the classroom at the moment of the study were invited to participate, and all of them consented. Ten to 20 minutes were required to complete the questionnaires.

RESULTS

Ninety-three per cent of the adolescents ($n = 207$) had played video games in the past year. Fifty-seven per cent played regularly, defined as at least once a week. Males were significantly more likely to play regularly than females: 79% of the males compared with 32% of the females ($\chi^2_{(1)} = 50.95$; $P < 0.001$). Regarding type of video game system, home consoles were used by 73% of the 207 players, computer games (not internet) by 37%, arcade video game machines by 8%, and internet games by 7%.

Factorial validity

Because we used dichotomous items, a principal components analysis was made on the tetrachoric items–correlation matrix. According to Kaiser's criterion ($\lambda \geq 1$), four factors or groups of items might be obtained from the test. Nevertheless, Carmines & Zeller (1979) suggested that a test can be considered as unidimensional when the first factor explains at least 40% of the variance, and Reckase (1979) reduced this percentage to 20%. The first factor, as found in our study, explains 39.1% of the variance, which is close to Carmines & Zeller's criterion and widely exceeds Reckase's. In the Scree test the first eigenvalue is high compared with the second one, which in turn does not show great difference with the rest. This can be considered another indication of the test's unidimensionality (Lord 1980), and therefore the nine items seem to measure a single construct.

Item analysis and internal consistency reliability

As shown in Table 1, items 4 (withdrawal) and 7 (lies and deception) obtained the lowest endorsement. In turn, item 6 (loss of control) obtained the highest endorsement. As per homogeneity indices, only two items (5 and 7) showed a low correlation with the corrected total score (less than 0.30).

The scale's internal consistency coefficient (Cronbach's alpha) is acceptable for a scale of nine items at 0.69. No item could be excluded because removal of any item would have a negative effect on alpha, which implies that all of them contribute to increase the test's internal consistency.

Construct validity

The nine items scores have been found to be relatively consistent (reliability) and they seem to measure a single construct (validity). Therefore, we can sum up the item scores in order to obtain a total score on the construct. In this heading we will analyse the validity of the test's total scores, referred to as the 'degree to which empirical evidence and theoretical rationales support the adequacy and appropriateness of interpretations and actions based on test scores or other modes of assessment' (Messick 1994, p. 1). Different evidences for validity appear when the PVP total score is compared with alternative measures of excessive play.

Spearman's correlation coefficients were calculated between the PVP total score and frequency and duration of play. Positive relationships were found with frequency

Table 1 CPV item analysis.

	Answer					
	No		*Yes*		*Corrected item-total correlation*	*Alpha if item deleted*
Item	n	%	n	%		
1	185	83.0	38	17.0	0.4709	0.6362
2	208	93.3	15	6.7	0.3227	0.6691
3	143	64.1	80	35.9	0.3414	0.6669
4	212	95.1	11	4.9	0.4469	0.6571
5	180	80.7	43	19.3	0.2877	0.6742
6	97	43.5	126	56.5	0.3471	0.6668
7	212	95.1	11	4.9	0.2136	0.6833
8	185	83.0	38	17.0	0.3756	0.6559
9	115	51.6	108	48.4	0.5417	0.6123

Total-test alpha = 0.6853.

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Table 2 Means and standard deviations of PVP total score.

Question	*Answer*	n	*Mean*	*SD*
I think I play video games too much	No	197	1.919	1.736
	Yes	25	3.640	1.997
I think I have some type of problem associated with my video game playing	No	215	2.028	1.769
	Yes	8	4.250	2.550
My parents are worried because they think I play video games too much	No	202	1.886	1.679
	Yes	20	4.350	2.007

Table 3 Descriptives of PVP total scores.

	Male						*Female*					
	Age (years)						*Age (years)*					
	13–15		*16–18*		*Total*		*13–15*		*16–18*		*Total*	
Total score	n	%	n	%	n	%	n	%	n	%	n	%
0	8	12.3	6	12.5	14	12.4	21	34.4	18	36.7	39	35.5
1	15	23.1	7	14.6	22	19.5	10	16.4	11	22.4	21	19.1
2	11	16.9	9	18.8	20	17.7	15	24.6	9	18.4	24	21.8
3	12	18.5	8	16.7	20	17.7	8	13.1	7	14.3	15	13.6
4	11	16.9	8	16.7	19	16.8	4	6.6	3	6.1	7	6.4
5	3	4.6	6	12.5	9	8.0	1	1.6	1	2.0	2	1.8
6	1	1.5	3	6.3	4	3.5	1	1.6	0	0.0	1	0.9
7	1	1.5	1	2.1	2	1.8	1	1.6	0	0.0	1	0.9
8	3	4.6	0	0.0	3	2.7	0	0.0	0	0.0	0	0.0
9	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
n	65		48		113		61		49		110	
Mean	2.600		2.833		2.699		1.607		1.367		1.500	
SD	1.998		1.872		1.941		1.626		1.380		1.519	

of play ($r = 0.64$), mean duration of play ($r = 0.52$) and longest time per session ($r = 0.56$). In the three cases these relationships reached statistical significance ($P < 0.001$), which indicates that the higher the frequency and the duration of play, the higher the score on the PVP.

A direct relationship was also found between the PVP total scores and the scores on the Severity of Dependence Scale ($r = 0.47$; $P < 0.001$). This provides further evidence for construct validity: the PVP appears to measure problems which are associated with video game dependence.

The participants were also asked if they considered that they played video games too much. As shown in Table 2, those who answered affirmatively also obtained a PVP mean score significantly higher than those who answered negatively ($t_{(220)} = -4.59$; $P < 0.001$). The same was found when they were asked about their perception of having some type of problem associated with their video game playing ($t_{(221)} = -3.43$; $P = 0.001$). Furthermore, those who thought that their parents were worried because of excessive video game playing also obtained higher PVP total scores ($t_{(200)} = -6.15$; $P < 0.001$).

Descriptives of PVP total scores

Table 3 shows the descriptives of PVP total scores by gender and age. The mean score on the PVP of the male players (M = 2.70) was higher than that of the female players (M = 1.50), $F_{1,219} = 27.07$; $P < 0.0001$. This might be due to the fact than males played more frequently ($\chi^2_{(4)} = 57.86$; $P < 0.001$), and for longer mean periods ($\chi^2_{(4)} = 1.32$; $P = 0.858$) than females. On the contrary, the younger (13–15 years) and the older (16–18 years) adolescents did not differ in PVP mean score ($F_{1,219} = 0$; $P = 0.990$), frequency ($\chi^2_{(4)} = 1.32$; $P = 0.858$) or duration of play ($\chi^2_{(4)} = 4.60$; $P = 0.331$). No interaction effect was found between gender and age ($F_{(3,219)} = 0.99$; $P = 0.319$).

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DISCUSSION

Our findings with a sample of 223 adolescents can be summarized as follows: (1) commitment to video games in our sample was higher than those reported in research published in the 1980s (e.g. Home Office 1988), and similar to the results in the last decade (e.g. Colwell & Pain 2000); (2) the percentage of regular players was also higher than the findings of most previous studies (e.g. Fisher 1994, 1995), but similar to others (Colwell, Gradi & Rhaiti 1995; Colwell & Pain 2000); (3) males play more regularly than females, as with nearly all previous studies of video game playing (e.g. Roe & Muijs 1998; Van Schie & Wiegman 1997); (4) the PVP scale appears to be unidimensional; (5) the alpha internal consistency coefficient for the scores on the PVP was acceptable for a scale of this size; and (6) the pattern of associations between the PVP scores and alternative measures of excessive play supports the construct validity of the scale.

Our results confirm the existence of a number of problems associated with the excessive use of video games. Because the PVP components were based upon the criteria used to identify substance dependence and pathological gambling—a possible non-substance dependence—it appears that this study supports the hypothesis that, in some adolescents, video game playing is a behaviour which resembles dependence. For these people, the behaviour is out of their control (items 3 and 6), is invasive (item 1), is used as an escape from the reality (item 5) or involves serious risks for their social development (item 8).

However, caution must be exercised in generalizing the criteria for substance dependence until there is an established body of research literature on adolescent pathological video game play; i.e. the presence of symptoms of apparent non-chemical addiction cannot be simply taken as an evidence of the addictive character of the syndrome. For example, for players engaged in competitive play, responses might reflect competition rather than an implied pathology. To determine the nature and the possible aetiology of the problems with video games, as detected by this and other studies, more clinically orientated research is clearly needed.

Furthermore, addiction represents not only a behavioural pattern, but also a set of relationships between that pattern and certain other processes or aspects of a person's life. If a behavioural syndrome which meets the criteria described above is to be considered as an addictive disorder, similarities should be found in the person's personality, social and/or biological variables with those associated with other well-known addictions. Therefore, further comparative research is needed before any definitive conclusions are drawn, and the need to establish which factors correlate best with a potentially addictive pattern of video game playing is of paramount importance.

Similarly, longitudinal research is needed to establish whether these problems persist after adolescence or are age-related. Research studies involving possible long-term effects of video games on children behaviour may therefore provide useful information in this area.

An important preliminary step in such investigations is the development of an appropriate instrument to obtain a quantitative index of problem video game use. The PVP appears as a useful questionnaire for this purpose. By using this nine-point checklist (which can be administered quickly and easily to the users of all types of video games and video game systems), it is possible to record objective measures of problem use, which according to Fisher (1994, 1995) and Griffiths (1991) can be considered as an indication of addictive video game playing.

Clearly, our study presents limitations, such as the moderate size of the sample or the possible differential characteristics of the locations where it was recruited. Therefore, more research is needed to assess the use of the scale in samples of different characteristics. Our scale should also be cross-validated against other well-studied instruments designed to assess different components of substance dependence. The establishment of a cut-off point to identify problem versus recreational players would also be a useful step to be targeted in future studies.

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Appendix 1 Dimensions of addiction and their correlates in the scale's items.

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.)
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
Withdrawal	Item 4	When I can't use the video games I get restless or irritable
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
Lies and deception	Item 7	Sometimes I conceal my video game playing to the others, this is, my parents, friends, teachers…)
Disregard for the physical or psychological consequences	Item 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
Family/schooling disruption	Item 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

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