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GAMING HABITS AND SYMPTOMS OF VIDEO GAME ADDICTION IN SPANISH ADOLESCENTS

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Abstract

Gaming disorder has been receiving increased attention since its inclusion in the ICD-11. However, there are still few studies on minors in the Spanish context. The present study aimed to explore the gaming habits and symptomatology of gaming disorder in this population, as well as analyzing the relationship between both. Gaming habits were assessed such as frequency and weekly hours played and the Game Addiction Scale for Adolescents was applied to a sample of 3748 students between 12 and 17 years old. It was found that 13.5% presented symptoms of problematic gaming and 3.3% a possible video game addiction. There was also a relationship between gambling habits and the presence of addiction symptoms. These results are compared to other studies and the heterogeneity of data available in the field is highlighted. Additionally, the implications of the results for preventive actions carried out by developers and families are discussed.
KEY WORDS: *gaming, addiction, adolescents, prevention.*

Resumen

El trastorno por uso de videojuegos ha recibido mayor atención desde su inclusión en la CIE-11. Sin embargo, apenas hay investigación en menores de edad en el contexto español. El presente trabajo tiene como objetivo de explorar los hábitos de uso de videojuegos y la sintomatología del trastorno por uso de videojuegos en esta población, así como analizar la relación entre ambos. Los hábitos fueron evaluados como la frecuencia y las horas semanales jugadas y la "Escala de adicción al juego para adolescentes" (GASA) fue aplicada a una muestra de 3748 estudiantes de entre 12 y 17 años. Los resultados mostraron que el 13,5% presentaba síntomas de juego problemático y el 3,3% una posible adicción a los videojuegos. También fue encontrada una relación entre los hábitos de juego y la presencia de síntomas de adicción. Estos resultados se comparan con los de otros estudios y se pone de manifiesto la heterogeneidad de datos disponibles en este ámbito. Además, se discuten las implicaciones de los

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resultados para posibles acciones preventivas llevadas a cabo por desarrolladores y familias.
PALABRAS CLAVE: *videojuego, adicción, adolescentes, prevención.*

Introduction

The role played by electronic media in our leisure time has constantly increased, leading to the current situation in which 85% of Europeans are frequent Internet users (European Commission, 2020). Video game stands out as an industry which business volume reached 21 million euros in Europe in the year 2018, and continues to grow at a rate of 15% per year (Interactive Software Federation of Europe, 2019), which seems to have attracted the attention of international organizations dedicated to the protection of children (American Academic of Pediatrics, 2016; UNICEF, 2019). Despite this apparent growing social concern, a review of the literature by Kardefelt-Winther (2017) concluded that few positive or negative effects have been found in the correlation between the use of video games and the mental well-being of children. This review also highlights that when negative effects were found it was due to the amount of time spent playing video games (Kardefelt-Winther, 2017). Consequently, it seems that the focus of attention should be placed on the context and habits related to the use of video games. In this sense, parents are a pivotal element as they have a great influence on the acquisition of their children's Internet habits (Dias et al., 2016; Nikken & Schols, 2015). On the other hand, it should be noted that any prevention or intervention approach must take into consideration the rights of minors, especially the right to rest, play, and to have a cultural and artistic life (UNICEF, 2019).

The time spent playing games has been a central element in the proposed characterization for video game disorder through the criterion of tolerance, inherited from substance use disorders (Griffiths et al., 2012). This has been the subject of debate in the most recent formulations (Griffiths et al., 2016; Petry et al., 2014), where the criterion of impact on daily life has been considered of greater relevance (WHO, 2018). In this way, a distinction must be made between highly involved players and players who may suffer from a disorder (Billieux et al., 2019). However, the time spent playing continues to be studied, either to corroborate its role as a risk factor (Gómez-Gonzalvo et al., 2020; Kovess-Masfety et al., 2016) or to assess how it impacts the life of the players in relation to other variables (Triberti et al., 2018).

Although video game-related disorders have been studied for decades under different denominations and conceptualizations (Kuss, 2013), the greatest milestone in this field of research is the inclusion of Gaming Disorder in the ICD-11 (Khoury et al., 2017; WHO, 2018). According to Carbonell (2020), this allows to better distinguish between a mere intensive use and the presence of a disorder, which can help to avoid overdiagnosis (Billieux et al., 2019). Another benefit would be to enable people suffering this disorder to be treated by health insurance or public health systems in countries where they are available (Griffiths et al., 2017; Rumpf et al., 2018). In addition, it constitutes a support point that will allow the creation of diagnostic tools based on common criteria. However, the

formalization of any disorder involves a series of risks. The main one is the possible pathologization of everyday life (Billieux et al., 2015), as normal behaviours could be classified as disorders if they are not well defined (Aarseth et al., 2017). In the specific case of video games, it has been argued that the officialization of a disorder could be premature due to a lack of robust evidence (Kardefelt-Winther, 2015; van Rooij et al., 2018). Another risk exposed by Carbonell (2020) is that of establishing diagnostic criteria focused on the adult population, despite the fact that clinical treatment is mainly demanded for children and adolescents. All of which serve to reinforce the importance of further research using screening tools adapted to the adolescent population.

Concretely in Spain, there is not yet a large volume of studies on the prevalence of video game disorder (Feng et al., 2017; Fam, 2018; Observatorio Español de las Drogas y las Adicciones [OEDA] & Plan Nacional sobre Drogas [PNSD], 2019). Specifically, there seems to be few studies that analyse the prevalence and habits of video game usage among minors. This makes it difficult to address gaming disorder in Spain, as it is unknown whether the prevalence and the associated risk factors are generalizable among different countries (Cheng et al., 2018). As a consequence of all the aforementioned, the present study has been proposed with three objectives. Firstly, to know the habits adolescents have to playing videogames, concretely frequency and hours spent playing. Secondly, to obtain updated data on the rates of video game addiction symptoms among Galician minors with a validated instrument. Thirdly, to analyse the relationship between the explored gaming habits and video game addiction.

Method

Participants

An intentional sampling was used, contacting 34 schools located on an urban setting, agreeing to participate in the study 29 of them (8 public and 21 charter schools). The initial sample consisted of 4423 questionnaires, of which 675 cases were eliminated because they were outside the age range under study (12-17 years old), they contained an excessive number of missing values or had inconsistent response patterns. Therefore, the final sample consisted of 3,748 adolescents between 12 and 17 years old (M= 14.61; SD= 1.55), from which 49.8% self-identified themselves as female, 48.5% as male, and 1.7% as other gender.

Instruments

The data for this study were collected through an *ad hoc* online survey. The survey included:

a) Items to measure gambling behaviour. Initially, two items were included to assess time spent playing both in frequency (ranging from "Never" to "Every day/ almost every day") and the number of gaming hours. It was decided to ask about the hours of weekly play, so that the average of weekday and weekend play would be reported in one measurement.

b) *Game Addiction Scale for Adolescents* (GASA; Lemmens et al., 2009), Spanish version by Lloret et al. (2018). This scale consists of 7 items based on the DSM-5 criteria for Internet gambling disorder (salience, tolerance, emotion, relapses, abstinence, conflict and problems). It is a Likert-type scale that ranges from 1 ("Never") to 5 ("Very Often") that surveys for the six months prior to the application of the questionnaire. Each criterion is considered fulfilled if the individual replies with a 3 ("Sometimes") or more. When at least 4 criteria are fulfilled, the person is considered to present "problematic gaming"; and if they reach all 7, it is considered that they present symptoms of a "possible addiction". Internal consistency was assessed using Cronbach's alpha, obtaining a coefficient of .91.
c) Socio-demographic questions. The end of the survey included questions relating to socio-demographic information (i.e. age, gender, educational centre, and grade).

Procedure

In order to achieve the proposed objectives, a cross-sectional observational methodology was used, consisting of conducting a survey among secondary education students from the autonomous community of Galicia (Northwest of Spain). Collaboration with the management of the schools was secured prior to data collection. The students received letters for their parents from the principals of each school explaining the objective and date of the data collection and asking for their consent to include their children in the study. The data were collected between the months of March and May 2019 in the schools through an online survey implemented in LimeSurvey (Limesurvey GmbH., 2003), accessible from computers in a classroom setting. Data collection was carried out under the supervision of the people designated and trained for such work. Participants were informed of the purpose of the study, as well as of the confidentiality and anonymity of their responses. Participation was completely voluntary and students could withdraw from the study at any time. The average time to complete the questionnaire was 30 minutes. This study had the approval of the Bioethics Committee of the authors' University.

Data analysis

After a first descriptive analysis, bivariate tabulations were carried out, with the application of χ^2 contrasts for the comparison of percentages. A Kolmogorov-Smirnov test was applied to assess the normality of the distribution of the quantitative variable (mean hours played per week). The data was found to significantly deviate from a normal distribution (K-S= 0.32; $p< .001$), resulting in the need to apply non-parametric tests. Mann-Whitney U was employed for two group comparisons (gender) and Kruskall-Wallis H was used for multi-group comparisons (age and result in the GASA). Due to the small size of the sample that had self-identified as "other gender", they were excluded from the gender comparisons. To estimate the effect size, contingency coefficients (CC) were included for qualitative variables and eta coefficient (η) for the quantitative ones.

Finally, a binary logistic regression was performed using the assessed gaming habits as independent variables and the positive/negative GASA as dependant variable. The analyses were performed with the statistical package IBM SPSS Statistics 25.

Confirmatory factor analysis (CFA) was performed to verify the one-dimensional structure of GASA found by both the original authors (Lemmens et al., 2009) and the Spanish validation (Lloret et al., 2018). Given the non-normal distribution of the data, the unweighted least squares method was used, which requires no further assumptions in addition to robustness (Jöreskog & Sörbom, 1989). A high goodness-of-fit was found for the one-dimensional model (Byrne, 2009; Kline, 2005), given the goodness of fit index (.997), the adjusted goodness of fit index (.994), the normed fit index (.996) and the standardized root mean square residual (.037). The CFA was performed using AMOS 23.

Results

Of the total of the sample, 76% report playing video games, with 6.72 (*SD*= 12.51) mean hours played per week. The habits of video game usage are presented in detail in Table 1 both in overall rates and by gender and age. A greater gaming frequency as well as more time invested playing is found among males, informing about mean hours that more than triple the ones reported by females. Regarding age, although the younger participants (among 12-15 years-old) report higher rates of frequency of playing if weekly and daily video game use are taken into account at once, the 16 and 17 years-old seem to be more intensive users, as they present higher mean hours per week played. However, the age differences in weekly video games usage are not statistically significant.

The application of GASA allowed to estimate the overall rate of problematic gaming in 13.5% and the possible addiction in 3.3%. By gender, the rate of players with symptoms of problematic use or a possible addiction is significantly higher among males (χ^2= 350.18, p< .001, CC= .29). On the other hand, there seems to be an inverted U-shaped relationship between Age and the rate of positives in the GASA. The lowest positive rates found were in the 12 and 17 years old and the higher in the 14 years old group. These differences are statistically significant (χ^2= 18.78, p< .05, CC= .07) and are presented in Table 2.

Table 1
Habits of video game use

Frequency	Overall	Gender				Age (years)							
		Female	Male	χ^2	CC	12	13	14	15	16	17	χ^2	CC
Never	24%	42.1%	5.6%	670.09**	.39	19.7%	21.9%	22.6%	24.2%	27.1%	27.5%	13.56*	.06
Almost never	15.8%	24.1%	7.4%	191.15**	.22	14.5%	15%	14.3%	16.1%	17.3%	17.5%	4.47	-
At least once a month	12.9%	15.5%	10.3%	21.51**	.08	12.8%	12.7%	12.2%	13.9%	11.9%	13.8%	2.03	-
At least once a week	28.4%	13.3%	44.1%	427.34**	.32	40%	30%	31.9%	24.5%	25.5%	22.2%	50.51**	.11
Every day/ almost every day	18.9%	5%	32.6%	461.90**	.33	13%	20.3%	19%	21.3%	18.2%	18.9%	13.10*	.06
Hours	Overall	Gender				Age							
		Female	Male	U	η	12	13	14	15	16	17	H	η
M (per week)	6.72	2.95	10.28	584919**	.30	5.40	6.87	6.89	6.40	7.15	7.23	4.54	-
SD	12.51	7.96	14.28			9.23	12.97	12.04	11.38	13.94	14.24		

Notes: CC= contingency coefficients. *p< .05; **p≤ .001.

Table 2
Results of the Game Addiction Scale for Adolescents (GASA)

Variables	Overall	Gender				Age (years)							
		Female	Male	χ^2	CC	12	13	14	15	16	17	χ^2	CC
Negative	83.2%	94.7%	71.8%	350.18**	.29	89.2%	84.5%	80.9%	81.5%	81.6%	84.8%	18.78*	.07
Problematic use	13.5%	4.4%	22.6%			8.8%	12.6%	15.5%	14.4%	14.9%	12.3%		
Possible addiction	3.3%	0.9%	5.6%			2%	2.9%	3.6%	4.1%	3.5%	2.9%		
Total positives	16.8%	5.3%	28.2%	348.13**	.29	10.8%	15.5%	19.1%	18.5%	18.4%	15.2%	19.12*	.07

Notes: CC= contingency coefficients. *p< .05; **p≤ .001.

The relationship between GASA results and gaming habits was analysed using only the 76% of the sample that reported playing video games (*n*= 2848). A significant positive relationship is found with frequency (χ^2= 501.61, *p*< .001, CC= .39) as well as with weekly hours played (H= 794.26, *p*< .001, η= .36). The Tukey Post Hoc was applied for the ANOVA test, finding significant differences both between the Negative group and the Problematic Gaming group (*p*< .001), and between the latter and the Possible Addiction group (*p*< .001). These results are presented in detail in Table 3.

Table 3
Results of the Game Addiction Scale for Adolescents (GASA) by habits of video game use

Variables	Frequency						Hours		
	Almost never	At least once a month	At least once a week	Every day/ almost every day	χ^2	CC	*M* per week (*SD*)	H	η
Negative	98.7%	93.6%	76.3%	52.2%			5.57 (9.58)		
Problematic use	1%	5.6%	20.5%	35.9%	501.61**	.39	15.27 (17.38)	794.26**	.36
Possible addiction	0.3%	0.8%	3.3%	11.9%			21.68 (22.21)		
Total positives	1.3%	6.4%	23.7%	47.5%	825.70**	.42	16.63 (18.78)	790.55**	.35

Notes: CC= contingency coefficients. ***p*≤ .001.

Finally, a binary logistic regression was performed to evaluate to what extent frequency and hours played could be related to achieving an individual positive score on GASA. The resulting model is statistically significant (χ^2= 614.14, *p*< .001), it explains 30% of the variance (Nagelkerke R^2= .30), and correctly classifies 80.2% of cases. The Odd Ratios [OR] found are of 2.89 for the frequency and 1.02 for hours, implying that a more frequent usage of video games would pose a greater risk than the hours played per week.

Discussion

The present study had a first objective of knowing the gaming habits of adolescents, measured as gaming frequency and hours played per week. The frequency of gaming, understood as playing monthly, weekly, daily or almost never, yields data similar to those offered in the report on behavioural addictions of the OEDA and PNSD (2019). While that report informed of rates of 20.6% monthly, 47.3% weekly and 18.1% daily, the present study finds 12.9%, 28.6%, and 18.9% respectively. The data reported in OEDA & PNSD (2019) was gathered in 2018 and referred to students aged 14 to 18, which could explain the higher rates. However, the most frequent number of hours played reported was less than two hours a day (OEDA & PNSD, 2019), which is in line with the weekly average of 6.71 obtained in the present study. That report also provides information on the prevalence of a possible Video Game Use Disorder evaluated using the DSM-V criteria, finding a positive rate of 6.1% for the total sample and observing a large difference between boys (10.4%) and girls (1.9%), figures higher than the ones found in the present study for possible addiction (5.6% for males and 0.9% for females).

Regarding the second objective in this study, it is found that 16.8% of the 2848 participants who played video games achieve a positive score in the GASA. The rate is disaggregated in 13.5% that meet the criteria to be classified as having "problematic use" and 3.3% that have a "possible addiction". There are few

prevalence studies carried out in Spain (Feng et al., 2017), and even less with minors with which these results can be compared. For example, Müller et al. (2015) carried out a study that covered 7 European countries and included a Spanish sample of 1931 students aged 14 to 17. The instrument used was the Scale for the Assessment of Internet and Computer Game Addiction - Gaming Module (AICA-S-gaming; Wölfling et al., 2011), which classified the participants as "at risk" when they met 2 to 4 criteria, and "addictive use" when they met 5 or more criteria out of the 13 items. These items were based on the definition of Internet Gaming Disorder included in the DSM-5 (APA, 2013). Müller et al. (2015) concluded that 0.6% of the Spanish participants made an addictive use of video games. On the other hand, Buiza-Aguado et al. (2018) carried out a study with 707 adolescents in the city of Malaga aged 12 to 18 years, in which they concluded that 8.3% had 5 or more symptoms in the Nine-Item Internet Gaming Disorder Scale (IGD-9; Lemmens et al., 2015). This scale was also created based on the criteria for Internet Gaming Disorder of the DSM-5. In addition, they reported that the percentage among boys was significantly higher than girls (12.9% vs 2.5% respectively). The differences among all those rates are a sample of the heterogeneity characterizing the study of the problematic use of videogames in Spain. In their systematic review on Video Game Disorder, Paulus at al. (2018) suggested that the wide variability of prevalence is caused by the diversity of definitions of Video Game Disorder employed, as well as the different evaluation methods and also regional differences.

A third objective of the present study was to explore the relationship between the gaming habits and Video Game Disorder symptoms. A significant relationship is found with both gaming frequency and weekly hours played, and the logistic regression shows that gaming frequency has a slightly higher relationship with the GASA scores than the weekly hours played. However, a recent study carried out by Johannes et al. (2021) has found a positive relation between game play and affective well-being. Although the results of Johannes et al. (2021) and the present study are difficult to compare due to the differences in the sample and the focus on only two games in said study, they show that the relation between time playing and mental health is complex and could work in different directions for certain people and contexts. For instance, in the present study it is found that, although the more frequent the gaming, the higher percentage of students with symptoms, half of the adolescents who played every day (52,2%) did not meet the criteria for a positive score in GASA. It should also be noted that Johannes et al. (2021) employed an innovative research methodology with telemetric measurements, which allowed them to obtain direct data of the hours that adult players spent playing video games, also making it possible to find that this number differed from what the players themselves reported.

Bearing in mind that high involvement in gaming is not synonymous with addiction (Billieux et al., 2019; Entwistle et al., 2020), further research and prevention is needed for the factors associated with pathological behaviour. The control of game hours has been recommended for years (Griffiths, 2003), although its degree of implementation remains unknown. As of today, the three main consoles (Play Station, Nintendo Switch and Xbox) include the possibility of limiting the duration of the hours of play through parental control applications.

However, this option is only available through another account in the same device, so that one person can control the use that another person makes with another account. On the other hand, the platform most used in Spain to play is the PC (AEVI, 2019), and it does not include this functionality natively, nor does the largest online platform for the sale and use of video games, named *Steam*. Mobile phones and tablets share this situation. Developers themselves could implement the possibility of controlling the frequency and duration of game sessions in all these gaming platforms, as well as showing messages about healthy use or even allowing the possibility to end the game session at a given time under user configuration. In their article on ethical video game design, Klemm and Pieters (2017) go even further in their suggestions. They argue that developers could use the same seductive strategies devised to make the game enjoyable and maintain consumer adherence to promote healthy usage habits instead.

Beside game providers, the other great actors in the management of children's videogame habits are their parents. The most direct control measure that parents can use is to restrict access to the gaming device or to some of its functionalities, such as disconnecting it from the Internet. However, this strategy can cause unwanted side effects (Wu et al., 2016). On the one hand, the total ban on playing video games has the risk of increasing the desire to play, making controlling the behaviour more difficult for the parents and even the children themselves. On the other hand, not being allowed to be in contact with video games keeps them from developing their own self-regulation strategies. In addition, external restraint may lose effectiveness as age increases and if there are already unregulated behaviours established. Finally, the total prohibition of accessing video games without a health risk situation that justifies it would conflict with the rights of the minor (UNICEF, 2019). King and Delfabbro (2020) suggest a series of recommendations for parents, which include: learning about the types of games available and about the preferences of the children; being a model of healthy use; knowing the signs of a problematic use of video games; and setting time limits in advance. Although there are systems that facilitate control and recommendations, decision-making rests ultimately with the parents. All variables must be taken into account, including the level of maturity and other personal characteristics of each child, something that nor electronic system nor law can do (Higuchi et al., 2017).

This study has a number of limitations that should be mentioned. In the first place, using a screening scale does not replace the clinical interview when diagnosing a disorder, but it merely allows establishing the presence of symptoms. Future studies could benefit from including markers of affectation in the relevant life areas and from including measurements of mechanisms of addiction instead of using a symptomatology approach. Secondly, since it was a correlational study, it was not possible to establish a direction in the relationship between the different variables studied. In future research, a longitudinal design will allow a better understanding of the etiology of a video game problematic use or disorder. Thirdly, there could be a slight overlap between the Tolerance item in the GASA ("*Did you spend increasing amounts of time on games?*") and the measures of gaming frequency and hours played used in the present study. Finally, the sample includes students from only one city in the autonomous community of Galicia, so it

may not be representative of the population of the same age in Spain or the whole Galicia.

In conclusion, the presence of problematic gaming among minors, and its relationship with the frequency and hours invested playing seems to be verified. Since video games constitute another part of the recreational, social and cultural development of young people, the first and most direct action to be taken should be controlling the time and characteristics of gaming, so that it creates appropriate and balanced behaviour within a context of healthy lifestyle habits.

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