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The relationship between video game use, antisocial behaviour, and bullying in adolescents and young adults, and gender differences

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Abstract

Adolescence is a complex stage. During the process of experimentation, several risk behaviours may coincide, such as bullying or other antisocial behaviours.

Data from a survey conducted with 6209 adolescents and young adults were examined. The variables of video game use, bullying, and antisocial behaviour were dichotomised, and the relationship was analysed using the Odds Ratio.

Victims of bullying are found to spend more hours playing, as do perpetrators and those who have committed violence against people and objects. Moreover, the effect size of these differences is larger among women.

According to several authors and interpretative hypotheses derived from the literature, video games offer victims an escape valve and a safe place. People who engage in violence may find in video games a space where they can share risk and aggression.

A notable link has been found between excessive video game use and bullying and certain antisocial behaviours, and it is more pronounced among girls than among boys.

Keywords Video games, Young adults, Adolescents, Bullying, Antisocial behaviour

Introduction

Adolescence is a transitional stage characterised by intense personal and social changes, in which individuals seek their identity through experimentation and autonomy from established norms [1–3]. During this process, the interaction between the individual and their environment can act as a risk or protective factor, influencing the emergence or maintenance of risky behaviours, including antisocial behaviours and bullying.

At this stage, several risk behaviours may coincide, such as antisocial behaviour (ASB) and bullying, among others. However, this article will focus on these two specific violent behaviours.

ASB refers to those actions that typically take the form of aggression, infringement of social norms, or violation of the rights of others. These actions cause harm to others and to oneself and are not socially accepted [1, 4].

Bullying includes all those behaviours or actions sustained over time and carried out by one or more people against an individual within the school environment. This type of harassment can occur either directly or indirectly

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through social exclusion or social networks (cyberbullying) [4–7]. Furthermore, bullying is one of the most prevalent victimising experiences worldwide in childhood and adolescence and can be considered a public health concern [7].

With the advent of technology and social changes, these risk behaviours are no longer confined to the offline environment; they also manifest in the online world, where young people are very present, affecting how their personal identity is formed. This online identity may fulfil needs that are unmet in the offline world [8–10]; for instance, video games serve to satisfy the needs of adolescence for competence, autonomy, and belonging to a group [8, 10–14].

While most individuals who play video games do so in a non-problematic way, excessive use can have a negative impact and affect their behaviour and cognitive development [8, 10, 14, 15]. According to Gallardo et al. [16], the use of technology can influence mental health and contribute to the onset of risk behaviours. This relationship is bidirectional and involves a wide range of underlying factors that make it difficult to analyse.

Recent literature has shown that video games constitute a complex social environment where aggressive behaviours can coexist with other prosocial and cooperative behaviours, without there being a consensus on their behavioural effects [17]. Current research highlights that video games include both representations of violent and aggressive content and prosocial dynamics. However, findings on their influence on social behaviour remain contradictory, depending on the gaming context, the type of feedback received, and the personal characteristics of the players [18].

Classic experiments by Carnagey and Anderson [19] showed that rewarding aggressive behaviour within the game increases aggressive emotions, thoughts, and behaviours; while punishing it causes negative emotions but not necessarily aggressive behaviours. In contrast, Ying et al. [20] found that players punished for not being prosocial learned to behave collaboratively more quickly than those rewarded for doing so, suggesting that feedback from the gaming environment can moderate the relationship between video game content and aggressive or prosocial behaviours [17].

In this regard, the competitive or cooperative structure of the video game has become a key variable. Several recent studies [18] indicate that competitive contexts can reinforce the association between aggression and competition, increasing the likelihood of aggressive responses after gaming. Conversely, cooperative environments seem to promote altruism and helpful behaviour, favouring prosocial attitudes among adolescents. These findings are consistent with the General Aggression Model, which posits that exposure to competitive and violent stimuli can trigger emotional responses such as anger or frustration, reinforcing patterns of reactive aggression [18, 21].

From an evolutionary perspective, adolescence is a particularly sensitive stage for these processes. Wei et al. [18] point out that adolescents spend much of their free time playing video games, which can have implications for their emotional and social development. While some studies point to positive effects, others warn of risks such as anxiety, depression, addictive behaviour, aggression, or sexist attitudes. The evidence, however, remains ambivalent and dependent on the type of game, frequency, and characteristics of the player.

In terms of gender, the findings are also heterogeneous. Research such as that by Ohannessian [22] and Desai et al. [23] shows that gaming time may be associated with lower levels of anxiety in adolescent males, but higher levels in females. Likewise, in adolescent girls, intensive use of video games seems to be associated with externalising behaviours, such as participating in fights or carrying weapons, an association that is not observed in boys. These gender differences show that the impact of video games on mental health and behaviour cannot be interpreted in a homogeneous manner [24].

Another emerging area of study is cyberaggression, defined as the use of information technologies to cause harm to individuals or groups, motivated both by offline factors and by dynamics specific to the digital environment [25]. In recent years, multiplayer gaming environments have become a prominent setting for the emergence of toxic behaviour, characterised by insults, hostility or sabotage within the gaming community [26]. Although similar to cyberbullying, these behaviours are integrated into the culture of video games, making it difficult to recognise them as violence. Anonymity, disinhibition, and the lack of direct consequences facilitate its normalisation and perpetuation [27].

The unified theory of toxic behaviour proposed by Zsila et al. [27] argues that reactive aggression, an emotional response to frustration, is common in online gaming environments and is reinforced by normative beliefs about aggression in cyberspace. These perceptions contribute to establishing social norms that legitimise hostility among players. Repeated exposure to toxic behaviour and the perception of a lack of control over it can generate a cycle of frustration and sustained aggression [28]. Similarly, problematic use of social media and addiction to digital devices are associated with increased antisocial and aggressive behaviour, mediated by personality traits such as sadism, hostility, or moral disengagement [28, 29].

Taken together, the evidence suggests that video games are not in themselves a cause of aggressive or antisocial behaviour, but rather act as spaces where pre-existing individual traits and social dynamics are reflected and amplified. Therefore, their influence must be understood

in context, considering personal, social and gender factors, as well as the nature of the virtual environment in which adolescents interact.

Despite the advances noted, it remains unclear to what extent intensive video game use is associated with the emergence of antisocial behaviour and bullying in adolescence, especially considering gender differences. In this context, the present study seeks to analyse these associations in a large sample of adolescents in the Basque Country, contributing to a more nuanced understanding of these phenomena.

Research objectives, questions, and hypotheses

In light of the literature reviewed, this exploratory study aims to provide empirical evidence on the relationship between video game use and involvement in antisocial behaviour and bullying during adolescence. Although previous research has explored these links, most studies have focused on general populations or have used small samples and partial designs. Furthermore, few studies have analysed the possible effects of gender in a differentiated manner, an aspect that recent literature points out as crucial [18, 24, 30]. In this sense, the present study expands and contextualises previous findings using a representative sample of adolescents and young people from the Basque Country.

Based on the theoretical review and existing empirical evidence, the following research questions are posed:

1. Is there a link between the amount of time spent playing video games and involvement in bullying behaviour (as a victim or perpetrator)?
2. Is intensive video game use related to the emergence of antisocial behaviour, such as violence against people or objects or minor offences?
3. Are there significant differences in these relationships based on gender?

Based on these questions, the following exploratory hypotheses are proposed:

- H1: Adolescents who play video games intensively (more than two hours per day) are more likely to be involved in bullying and antisocial behaviour.
- H2: The associations between intensive video game use and risky behaviour will be more pronounced in females than in males.
- H3: The relationships observed will be correlational in nature, without implying direct causality.

The objective of this article was twofold: on the one hand, to understand the relationship between hours spent playing video games and the incidence of bullying and antisocial behaviour, and on the other, to analyse the existence of gender differences in involvement in such behaviours.

This approach allows us to advance our understanding of how video games can constitute a space for social interaction linked to both risk behaviours and coping dynamics, providing a contextualised and gender-sensitive view.

Methodology

Data were analysed from the survey "Drugs and School X", conducted by the Deusto Institute of Drug Addiction of the University of Deusto and funded by the Department of Public Health and Addictions of the Basque Government [31].

This study used two-stage cluster sampling, with educational centres in the Autonomous Community of the Basque Country as the reference clusters. These centres were selected because they had students within the age range under study.

In the first phase, a letter of invitation was sent to all educational centres in the Basque community, informing them of the study's objectives and requesting their voluntary participation. Subsequently, a stratified and weighted selection was made among the centres that agreed to participate in order to ensure the representativeness of the sample.

Three main stratification variables were taken into account for this selection: school year, educational network (public or private subsidised) and province (Araba, Gipuzkoa and Bizkaia). The distribution of schools in the sample was adjusted according to enrolment data provided by the Basque Government's Department of Education, so that the final composition reflected the actual structure of the student body in the region. In the second stage of sampling, within each selected school, the participating classroom groups were chosen at random, thus ensuring diversity and avoiding biases arising from the individual selection of students.

The use of two-stage cluster sampling was particularly appropriate for this study, given that the target population (secondary school students) is distributed across different educational institutions and is not isolated. This approach allows for the optimisation of logistical resources, reduces travel costs, and maintains the heterogeneity necessary to make valid inferences at the population level, while ensuring the feasibility of fieldwork.

Data were collected between October 2021 and April 2022. It consisted of 6,209 secondary school students in the Basque Country [31], with the mean age being 15.1 years (SD = 2.8), and 52.6% of those participating were male.

Instruments

In order to measure the amount of time spent on video games (those that can be played without an internet connection and the person typically plays alone) and online games (video games that can be played with other people, often requiring cooperation to progress), participants were asked about the number of hours they played per day, both during the week and at weekends.

To assess bullying, items based on Olweus' classic model [32, 33] were used, adapted to the context of the Drugs and School X survey [31]. The instrument included two sections: one on victimisation and the other on aggression.

The first section assessed how often the participant had suffered behaviours such as teasing, insults, theft, damage to personal belongings, physical aggression or online harassment. The second section included parallel items to assess involvement as a perpetrator, investigating behaviours of harassment or harm towards others (e.g., insulting, hitting, stealing, or online harassment, including sexual harassment).

Responses were collected using a four-point Likert scale: 1 = Never; 2 = Once or twice a month; 3 = Three to five times; and 4 = Six or more times. For the analyses, a participant was considered to have experienced or perpetrated bullying when they indicated a frequency greater than 'Never' for any of the behaviours. This criterion is consistent with previous studies on the prevalence of bullying in adolescent populations [7, 33].

An adaptation of the Scale of Antisocial and Criminal Behaviour in Adolescents [34] was used to assess antisocial and criminal behaviour. The questionnaire included twenty items ranging from minor offences to violent or vandalistic acts, rated on a 4-point Likert scale (1 = Never; 2 = Sometimes [less than 5 times]; 3 = 5 to 10 times; 4 = More than 10 times).

The items were grouped into three conceptual factors, following the structure of the original scale:

(a) Violence against persons (VP), for example, carrying or using a weapon, threatening or assaulting another person, participating in fights;
(b) Violence against property or vandalism (VP), for example, breaking public or school property, painting on walls, or intentionally starting fires; and.
(c) Offences or pre-delinquent behaviour (F), for example, travelling without paying, petty theft, driving without a licence, or trading in illegal goods or substances.

This structure allows for differentiation between the frequency and type of antisocial behaviour, ensuring accurate measurement consistent with previous studies [34].

Analysis

The use of video games and online gaming (VyJo) was classified into two groups according to daily usage time: less than or more than two hours, both on school days and weekends. This classification is based on scientific evidence analysing the effects of screen time on adolescents. Strasburger et al. [35] recommend limiting total digital entertainment time to less than one or two hours per day to prevent possible negative consequences on physical and mental health. In addition, several studies have pointed out that two to four hours of continuous use can lead to atypical visual or musculoskeletal problems [36, 37]. Likewise, in the specific field of video games, Stavropoulos et al. [38] and Anderson et al. [39] consider that moderate use (between 7 and 10 h per week) is not usually associated with adverse effects, while Siddiqui et al. [28] classify those who spend more than 10 h per week as excessive gamers. Based on these references [40], this research adopts the threshold of two hours per day as an operational criterion to distinguish between moderate and potentially excessive use of video games.

In the case of bullying, participants were considered victims if they responded affirmatively to any of the four items related to being a victim, and were classified as perpetrators if they answered yes to any of the four items related to aggression.

In order to analyse ASB, the three behavioural factors of the scale were selected: violent behaviour or violence against people (VP) (e.g., assaulting someone with a knife, stick, or other weapon), vandalism or violence against objects (VO) (e.g., damaging or destroying school furniture), and pre-delinquent behaviour or minor offences (e.g., travelling by bus, underground, or train without paying). The responses obtained were dichotomised, following the same criteria as for bullying.

The distribution of some of these variables is characterised by skewness, primarily because of the high percentage of participants who do not engage in such behaviour. Consequently, non-parametric statistics were used, and once these variables were dichotomised, an Odds Ratio (OR) analysis was applied to examine the connection between V&Og use, bullying, and ASB. This analysis compares the proportion of occurrences of a phenomenon (e.g., the proportion of participants who are victims of bullying) between two groups (e.g., those who excessively use video games and those who do not). The Odds Ratio (OR) result indicates the direction of the relationship (e.g., whether the proportion of victims of bullying is higher or lower among those who engage in excessive video game use), the strength of the relationship, and its statistical significance (if zero is not included in the estimated interval).

Table 1 Daily frequency of V&Og use during the week and at weekends

		Use < 2 h/day		Use > 2 h/day	
		%	n	%	n
Total	DUW video games	78.9	4592	21.1	1228
	DUWe video games	68.3	3940	31.7	1826
	DUW online gaming	82.7	4795	17.3	1006
	DUWe online gaming	73.4	4222	26.6	1533
Male	DUW video games	69.8	2128	30.2	921
	DUWe video games	73.1	2222	26.9	816
	DUW online gaming	50.6	1529	49.4	1493
	DUWe online gaming	57.5	1734	42.5	1283
Female	DUW video games	89.1	2453	10.9	300
	DUWe video games	93.3	2561	6.7	185
	DUW online gaming	88.1	2403	11.9	324
	DUWe online gaming	91.1	2479	8.9	242

DUW daily use during the week, *DUWe* daily use at the weekend

These analyses were repeated separately for men and women so as to detect a possible moderating effect of gender on the reported relationships.

Data processing and statistical analysis were performed using Jamovi (version 2.3.18).

Results

As shown in Table 1, the respondents mostly play V&Og less than two hours per day, while their daily online gaming time is lower. An increase in use is observed at weekends.

Men tend to use V&Og more frequently. Online gaming is significantly higher than the use of video games, with the percentages of those who play for under or more than two hours being nearly equal.

Meanwhile, women are more likely to use V&Og for less than two hours per day, and the percentage of them who play for more than two hours a day is considerably lower than for men.

In the case of bullying, 32% ($n = 1928$) of the participants in the research reported having been victims of such behaviour, and 22.7% ($n = 1366$) acknowledged having been the perpetrator. Men have a higher percentage of bullies, 27.4% ($n = 862$), with a similar percentage of victims, 31.6% ($n = 1000$). Conversely, women present a notably lower percentage of bullies than men, 17.6% ($n = 500$), but the proportion of victims is comparable at 32.5% ($n = 921$).

As can be seen in Table 2, excessive use of V&Og is more frequent among victims of bullying. These differences are relevant for daily video game use on weekdays and at weekends, as well as for online gaming during the week, even though the effect size is small [41].

Concerning aggression in bullying, non-offenders dedicate fewer hours per day to V&Og. While these differences have a small effect size, they are significant in terms

Table 2 Relationship between the daily use of V&Og and being a victim or perpetrator of school bullying

		Non-Victim				Victim				OR		
		Use < 2 h/day		Use > 2 h/day		Use < 2 h/day		Use > 2 h/day		95% Confidence Intervals		
		%	n	%	N	%	n	%	n	Lower	Upper	
Victim	Vg W	69.5	3170	62.9	766	30.5	1394	37.1	451	1.34	1.17	1.53
	Vg We	69.3	2714	65.6	1191	30.7	1201	34.4	624	1.18	1.05	1.33
	Og W	68.8	3277	65	649	31.2	1488	35	350	1.19	1.03	1.37
	Og We	68.8	2891	66.2	1006	31.2	1308	33.8	514	1.13	0.997	1.28
		Non-Perpetrator				**Perpetrator**				**OR**		
		Use < 2 h/day		Use > 2 h/day		Use < 2 h/day		Use > 2 h/day		95% Confidence Intervals		
		%	n	%	N	%	n	%	n	Lower	Upper	
Perpetrator	Vg W	78.7	3591	72.3	882	21.3	974	27.7	338	1.41	1.22	1.63
	Vg We	79.3	3107	73.1	1328	20.7	809	26.9	489	1.41	1.24	1.61
	Og W	78.9	3758	70	701	21.1	1008	30.0	300	1.60	1.37	1.86
	Og We	79.3	3329	72.3	1101	20.7	871	27.7	422	1.46	1.28	1.68

Vg W Daily use of video games during the week, *Vg We* Daily use of video games at the weekend, *Og W* Daily use of online games during the week, *Og We* Daily use of online games at the weekend

of video game use on weekdays and at weekends, as well as online gaming during the weekend. The extent of the difference in use between those who have been perpetrators and those who have not is more pronounced when it comes to playing online games on weekdays, ranging from small to moderate.

In comparing the effects on men (Table 3), only minor variations were observed between having been a victim of bullying or not being targeted by such behaviour as far as their use of video games during the week. A similar occurrence arises in the case of identifying oneself as a bully, where very slight differences are seen in video game use at weekends.

For female victims of bullying (Table 4), notable differences were shown in their use of V&Og, with the effect size of these variations being larger, ranging between small to medium. This pattern is also evident among female perpetrators of bullying, and significant variations in their use of V&Og can be observed, all with a small to moderate effect size.

Regarding ASB, 7.6% ($n = 450$) of the participants reported having committed VP, 30.1% ($n = 1779$) indicated they had engaged in VO, and 42.6% ($n = 2540$) stated they had committed a minor offence. As was shown with the frequency of using V&Og and being a perpetrator of bullying, men also demonstrate higher rates of ASB: VP increases to 11.1% ($n = 343$), VO rises to 34.6% ($n = 1071$), and offences to 47.3% ($n = 1482$). In line with the trend observed in bullying, women exhibit lower percentages than their men in VP (3.8%, $n = 105$), VO (25.1%, $n = 702$), and minor offences (37.3 $n = 1050$).

As with individuals involved in bullying, those who have engaged in VP tend to play more frequently (Table 5). The differences with those who have not committed VP are significant, where the effect size is small to moderate in the case of both video game use and online gaming during the week. Meanwhile, this effect size is small for online gaming at the weekend, whereas no notable variations are observed when it comes to the use of video games at weekends between individuals who have engaged in VP and those who have not.

Concerning VO, the trend is similar to VP in that individuals who have not engaged in VO spend fewer hours playing than those who have. These differences are all significant, although the effect size is very small.

Finally, with regard to minor offences, no significant differences were found in the use of V&Og.

Furthermore, there are no notable distinctions among men (Table 6) who have committed VP, VO, or minor offenses and their daily use of V&Og.

However, in women (Table 7), the differences in V&Og use between individuals who have engaged in PV and those who have not are more pronounced, with the effect size ranging from small to moderate. The highest score

Table 3 Relationship between the daily use of V&Og and being a victim or perpetrator of school bullying in men

		Non-Victim				Victim				OR		
		Use < 2 h/day		Use > 2 h/day		Use < 2 h/day		Use > 2 h/day			95% Confidence Intervals	
		%	n	%	N	%	n	%	n		Lower	Upper
Victim	Vg W	69.8	1478	65.4	597	30.2	639	34.6	316	1.22	1.04	1.44
	Vg We	69.0	1527	67.0	542	31.0	685	33.0	267	1.10	0.925	1.30
	Og W	69.5	1055	67.6	1003	30.5	464	32.4	481	1.09	0.935	1.27
	Og We	68.7	1185	68.2	869	31.3	539	31.8	405	1.02	0.877	1.20
		Non-Perpetrator				Perpetrator				OR		
		Use < 2 h/day		Use > 2 h/day		Use < 2 h/day		Use > 2 h/day			95% Confidence Intervals	
		%	n	%	N	%	n	%	n		Lower	Upper
Perpetrator	Vg W	73.5	1551	70.9	649	26.5	560	29.1	266	1.14	0.955	1.35
	Vg We	73.8	1628	69.5	564	26.2	577	30.5	247	1.24	1.04	1.48
	Og W	73.3	1110	72.1	1070	26.7	405	27.9	415	1.06	0.905	1.25
	Og We	73.3	1262	71.9	917	26.7	459	28.1	358	1.07	0.913	1.26

Vg W Daily use of video games during the week, *Vg We* Daily use of video games at the weekend, *Og W* Daily use of online games during the week, *Og We* Daily use of online games at the weekend

can be observed in the use of video games at weekends, whereas no differences are seen between the use of V&Og in the case of VO and minor offences.

Discussion

According to the findings, adolescents and young adults in the Basque Country generally spend less than two hours a day playing video games, with the highest percentages occurring at weekends. A possible explanation for this could be that they have fewer commitments on those days of the week [11, 40].

The results obtained confirm the existence of significant associations between intensive video game use and involvement in antisocial behaviour and bullying, especially in the case of women. This finding coincides with recent studies that highlight the influence of gender on the relationship between video games and risky behaviour [18, 24]. In particular, while males tend to be more involved in competitive gaming and experiences linked to instrumental aggression, female adolescents may have a more emotional and self-referential relationship with the digital environment, which could explain their greater vulnerability to bullying or victimisation [22–24]

If we examine these percentages of use alongside those from the ESTUDES survey (Survey on Drug Use in Secondary Education in Spain), we can see that Basque adolescents and young adults play less than the national average [42]. In line with the national level, men are found to dedicate more hours to video games than women, which is consistent with other studies [12, 43, 44].

This study explored the relationship between hours spent playing video games and bullying and ASB, seeking to gain insights into how video game use is related to these types of behaviour. Furthermore, gender differences were also analysed to determine whether there is a possible moderating effect.

Firstly, in relation to bullying, differences in video game use during the week were found according to whether young people were victims or non-victims, perpetrators or non-perpetrators, male victims or non-victims, female victims or non-victims, and female perpetrators or non-perpetrators. Concerning video game use at weekends, distinctions were observed among the following groups: victims and non-victims, perpetrators and non-perpetrators, male perpetrators and non-perpetrators, female victims and non-victims, and female perpetrators and non-perpetrators. Meanwhile, online gaming during the week showed variations among victims and non-victims of bullying, perpetrators and non-perpetrators, female victims and non-victims, and female perpetrators and non-perpetrators. Finally, regarding differences in online game usage by the bullying groups, variations were observed among perpetrators and non-perpetrators, female victims and non-victims, and female perpetrators and non-perpetrators.

Given that both victims and perpetrators of bullying tend to spend more time per day playing, the relationship between bullying and excessive use of V&Og is likely to be quite distinct in nature for victims and perpetrators.

According to several authors and interpretative hypotheses derived from the literature, for example, the investigations of González-Bueso et al. [12] and Chamarro et al. [43], video games can serve as a means of escape, providing a safe haven for individuals who have been victims of bullying where they can connect with others who have similar interests to their own. In fact, video games allow the player to create an ideal version of themselves and detach from their offline reality and problems [45, 46].

In the case of ASB, differences were only found in the use of video games during the week among the groups that have committed VP and VO and in women who have committed VP. With respect to video game use at weekends, distinctions emerged among the women who have engaged in VP. When examining online gaming during the week, differences can be seen among the groups who have committed VP and VO and in women who have committed VP. Lastly, regarding online gaming patterns during the weekend, variations emerged among those who have engaged in VP and VO, as well as among women who have engaged in VP.

Additionally, individuals who have committed VP and VO also devote more time to V&Og, with the exception of the use of video games at the weekend, where no differences were found. A possible explanation for this variation may be that weekend use is more widespread, as it is when people have more free time and fewer responsibilities [47].

Conversely, no differences can be seen in the amount of time spent playing among people who have committed minor offences, which could be due to the fact that adolescence often involves engaging in risky behaviour and committing minor offences [48].

While components of violence and aggression are indeed evident in bullying, PV, and VO, the connection between video game use and violence is not clearly demonstrated, and, as stated by Mendoza [49], there is a general tendency to stigmatise video game use. It is not possible to determine whether it is the use of video games that leads to violent and aggressive behaviour, or if the reverse is true. Nonetheless, Gallardo [16] argues that video game exposure has a causal impact on aggression and that glorifying risk may alter self-perception and affect real-life behaviour.

All of these maladaptive behaviours may be associated with the stage of life involving change and transition that adolescents and young adults go through. As already discussed by Santibáñez et al. [48], addictions, violence, and

Table 4 Relationship between the daily use of V&Og and being a victim or perpetrator of school bullying in female

		Non-Victim				Victim				OR		
		Use < 2 h/day		Use > 2 h/day		Use < 2 h/day		Use > 2 h/day		95% Confidence Intervals		
		%	n	%	N	%	n	%	n		Lower	Upper
Victim	Vg W	69.2	1686	54.9	163	30.8	750	45.1	134	1.85	1.45	2.36
	Vg We	68.6	1742	55.7	103	31.4	799	44.3	82	1.74	1.28	2.35
	Og W	69.3	1655	56.2	181	30.7	733	43.8	141	1.76	1.39	2.23
	Og We	69.0	1701	55.0	131	31.0	765	45.0	107	1.82	1.39	2.38
		Non-Perpetrator				Perpetrator				OR		
		Use < 2 h/day		Use > 2 h/day		Use < 2 h/day		Use > 2 h/day		95% Confidence Intervals		
		%	n	%	N	%	n	%	n		Lower	Upper
Perpetrator	Vg W	83.2	2032	75.8	226	16.8	411	24.2	72	1.58	1.18	2.10
	Vg We	83.2	2120	71.4	132	16.8	429	28.6	53	1.98	1.42	2.77
	Og W	83.2	1991	77.4	250	16.8	402	22.6	73	1.45	1.09	1.92
	Og We	83.4	2060	73.8	177	16.6	410	26.3	63	1.79	1.32	2.43

Vg W Daily use of video games during the week, *Vg We* Daily use of video games at the weekend, *Og W* Daily use of online games during the week, *Og We* Daily use of online games at the weekend

petty crime fall under the category of risk behaviours [3]. Most of these behaviours are typically influenced by similar risk factors, such as poor school integration, family problems, or social inclusion [50].

As for the analysis of gender differences, the findings reveal that men have a higher prevalence of video game use, bullying, and ASB. However, in women, excessive use of video games is more closely tied to bullying and ASB, indicating a greater effect size.

This could be attributed to the fact that women who spend more hours playing video games tend to display more aggressive behaviours, a greater likelihood of getting into fights, hypersexualisation (online and offline), and more externalising behaviours than men [51, 52]. European female gamers typically play with the objective of both escaping and competing, which could explain why the effect size is larger for these behaviours [51, 52].

Overall, the findings of this study are consistent with the literature that views video games not as a direct cause of aggression or bullying, but rather as spaces for social interaction where pre-existing individual traits or group dynamics can be reflected and amplified [17, 25, 26]. In this sense, competitiveness, exposure to norms of tolerated aggression, or lack of emotional regulation could act as mediating factors, as proposed by the General Aggression Model [21].

Despite its cross-sectional design, this study provides novel evidence by simultaneously analysing video game use, bullying, and antisocial behaviour in a large sample of adolescents in the Basque Country, while also integrating a gender perspective. These results reinforce the importance of promoting moderate and supervised use of video games, oriented towards cooperative and prosocial contexts, as well as incorporating digital and emotional education as a preventive tool against violent and bullying behaviours.

Conclusions

Links have been found between the use of video games and bullying and ASB (VP and VO). This may be due to the fact that video games today are a social space that must be taken into account when working with adolescents and young adults. Thus, it is imperative to acknowledge and gain insight into the online world to be able to address the reality of this group of people.

The online environment sees a convergence of risk behaviours like bullying and antisocial behaviour, two of the most studied phenomena in adolescents and young adults, together with the use of video games and other practices linked to technologies. However, these behaviours are typically explored separately, lacking an integrated connection. Therefore, it is essential to adopt a global and holistic approach to address these issues effectively.

Table 5 Relationship between the daily use of V&Og and having committed VP, VO, or minor offences

ASB												
		No VP				**VP**				**OR**		
		Use < 2 h/day		**Use > 2 h/day**		**Use < 2 h/day**		**Use > 2 h/day**			**95% Confidence Intervals**	
		%	**n**	**%**	**N**	**%**	**n**	**%**	**n**		**Lower**	**Higher**
VP	Vg W	93.2	4240	89.4	1083	6.8	307	10.6	129	1.65	1.33	2.04
	Vg We	92.8	3631	91.6	1648	7.2	280	8.4	151	1.19	0.967	1.46
	Og W	93.4	4436	88.1	874	6.6	313	11.9	118	1.91	1.53	2.39
	Og We	93	3898	91.2	1376	7	294	8.8	133	1.28	1.03	1.59
		No VO				**VO**				**OR**		
		Use < 2 h/day		**Use > 2 h/day**		**Use < 2 h/day**		**Use > 2 h/day**			**95% Confidence Intervals**	
		%	**n**	**%**	**N**	**%**	**n**	**%**	**n**		**Lower**	**Higher**
VO	Vg W	70.8	3225	66.3	803	29.2	1330	33.7	409	1.24	1.08	1.41
	Vg We	70.6	2764	68	1226	29.4	1150	32	578	1.13	1.00	1.28
	Og W	71	3376	64.2	638	29	1380	35.8	355	1.36	1.18	1.57
	Og We	70.9	2977	66.6	1007	29.1	1219	33.4	505	1.22	1.08	1.39
		No Minor offenses				**Minor offenses**				**OR**		
		Use < 2 h/day		**Use > 2 h/day**		**Use < 2 h/day**		**Use > 2 h/day**			**95% Confidence Intervals**	
		%	**n**	**%**	**N**	**%**	**n**	**%**	**n**		**Lower**	**Upper**
Minor offenses	Vg W	57.3	2606	58.1	705	42.7	1940	41.9	509	0.97	0.853	1.10
	Vg We	56	2187	60.3	1088	44	1717	39.7	716	0.84	0.748	0.939
	Og W	58	2752	55.4	550	42	1996	44.6	443	1.11	0.968	1.27
	Og We	57.4	2401	57.2	866	42.6	1782	42.8	648	1.01	0.895	1.14

Vg W Daily use of video games during the week, *Vg We* Daily use of video games at the weekend, *Og W* Daily use of online games during the week, *Og WE* Daily use of online games at the weekend

Table 6 Relationship between the daily use of V&Og and having committed VP, VO, or minor offences in men

		No VP				VP				OR		
		Use < 2 h/day		Use > 2 h/day		Use < 2 h/day		Use > 2 h/day			95% Confidence Intervals	
		%	n	%	N	%	n	%	n		Lower	Upper
VP	Vg W	89.4	1881	88.0	799	10.6	222	12.0	109	1.16	0.906	1.47
	Vg We	89.6	1970	87.5	703	10.4	228	12.5	100	1.23	0.957	1.58
	Og W	86.6	1311	91.6	1348	13.4	203	8.4	124	0.59	0.469	0.752
	Og We	87.6	1507	91.0	1149	12.4	213	9.0	113	0.70	0.547	0.885
		No VO				VO				OR		
		Use < 2 h/day		Use > 2 h/day		Use < 2 h/day		Use > 2 h/day			95% Confidence Intervals	
		%	n	%	N	%	n	%	n		Lower	Upper
VO	Vg W	65.7	1386	64.4	587	34.3	722	35.6	324	1.06	0.900	1.25
	Vg We	66.0	1455	63.3	510	34.0	748	36.7	296	1.13	0.954	1.34
	Og W	63.7	967	67.1	991	36.3	551	32.9	485	0.86	0.739	0.999
	Og We	65.1	1123	65.6	831	34.9	601	34.4	435	0.98	0.840	1.14
		No Minor offenses				Minor offenses				OR		
		Use < 2 h/day		Use > 2 h/day		Use < 2 h/day		Use > 2 h/day			95% Confidence Intervals	
		%	n	%	N	%	N	%	n		Lower	Upper
Minor offenses	Vg W	51.4	1081	56.7	518	48.6	1024	43.3	395	0.81	0.688	0.941
	Vg We	52.1	1146	55.5	447	47.9	1055	44.5	359	0.87	0.742	1.03
	Og W	46.9	711	58.8	868	53.1	804	41.2	608	0.62	0.536	0.716
	Og We	49.7	854	56.8	720	50.3	864	43.2	548	0.75	0.650	0.870

Vg W Daily use of video games during the week, *Vg We* Daily use of video games at the weekend, *Og W* Daily use of online games during the week, *Og WE* Daily use of online games at the weekend

Table 7 Relationship between the daily use of V&Og and having committed VP, VO, or minor offences in female

		No VP				VP				OR		
		Use < 2 h/day		Use > 2 h/day		Use < 2 h/day		Use > 2 h/day			95% Confidence Intervals	
		%	n	%	N	%	n	%	n		Lower	Upper
VP	Vg W	96.6	2350	93.3	277	3.4	83	6.7	20	2.04	1.24	3.38
	Vg We	96.7	2456	90.2	166	3.3	83	9.8	18	3.21	1.88	5.47
	Og W	96.8	2313	91.8	292	3.2	76	8.2	26	2.71	1.71	4.30
	Og We	96.8	2383	92.1	220	3.2	80	7.9	19	2.57	1.53	4.32
		No VO				VO				OR		
		Use < 2 h/day		Use > 2 h/day		Use < 2 h/day		Use > 2 h/day			95% Confidence Intervals	
		%	n	%	N	%	N	%	n		Lower	Upper
VO	Vg W	75.2	1831	71.8	211	24.8	605	28.2	83	1.19	0.909	1.56
	Vg We	75.2	1912	68.7	125	24.8	629	31.3	57	1.39	1.00	1.92
	Og W	75.0	1792	71.5	228	25.0	596	28.5	91	1.20	0.925	1.56
	Og We	75.0	1847	71.8	171	25.0	616	28.2	67	1.17	0.873	1.58
		No Minor offenses				Minor offenses				OR		
		Use < 2 h/day		Use > 2 h/day		Use < 2 h/day		Use > 2 h/day			95% Confidence Intervals	
		%	n	%	N	%	n	%	n		Lower	Upper
Minor offenses	Vg W	62.5	1518	62.4	184	37.5	912	37.6	111	1.00	0.782	1.29
	Vg We	63.0	1598	55.7	102	37.0	937	44.3	81	1.35	1.00	1.83
	Og W	61.7	1470	67.7	216	38.3	911	32.3	103	0.77	0.600	0.987
	Og We	62.7	1540	60.1	143	37.3	916	39.9	95	1.12	0.851	1.47

Vg W Daily use of video games during the week, *Vg We* Daily use of video games at the weekend, *Og W* Daily use of online games during the week, *Og WE* Daily use of online games at the weekend

Although the results obtained in this research show that, although the use of video games among adolescents and young people in the Basque Country is below the national average, this phenomenon is associated with both bullying and various antisocial behaviours, and further study is needed.

It is necessary to emphasise once again that we are talking about causality, if not the existence of a correlation between involvement in both behaviours. In particular, it has been observed that both victims and perpetrators of bullying tend to spend more hours playing video games, which suggests that the digital gaming environment can play different roles (positive or negative) depending on the profile of the user, potentially encouraging escapism and refuge in victims, and the expression or reinforcement of aggression in aggressors.

Something similar occurs with gender, which is often analysed in isolation and underrepresented in studies, especially those related to video games. However, it is a key cross-cutting variable, as these behaviours vary significantly according to gender. The differences and similarities in the use of video games between men and women suggest that not segmenting the data could generate biases, making women invisible, especially in the abusive use of video games, traditionally associated with a male profile. All of this highlights the need to incorporate a cross-cutting gender perspective in the analysis and approach to these dynamics, which has been a key focus of this research.

When intervening or preventing risk behaviours in young people and adolescents who are not properly integrated into their offline or online environment, it is necessary to address the problem comprehensively, influencing both risk and protective factors. Thus, protective factors such as proper inclusion in school, adequate family relationships, and good social participation and peer group involvement, among others, can reduce the likelihood that people in this transitional stage will engage in risky behaviours or, if they do, that these behaviours will become problematic and chronic.

Within this framework, and based on these findings, it is appropriate to promote the development of integrated public policies in the areas of education, health and community, aimed at promoting healthy and critical use of video games. We are not talking about prohibition or criminalisation, but we do consider it essential to provide safe spaces that encourage and develop digital literacy strategies, as well as programmes for the prevention of online and offline violence, whether between peers, in romantic relationships, or in other socio-emotional contexts. Public policies must intervene in complex situations that are already taking place, both with adolescents and with the main systems or agents that accompany their transition to adulthood, i.e. school, family and community.

Last but not least, it is important to focus on preventive approaches, providing tools to all those involved, understanding that video games can have key potential as creators and strengtheners of relational and learning spaces, and even as key spaces in the construction of adolescent identity. However, if they become spaces associated with conflict and violence, they can influence not only abusive behaviour but also the experience of violence, both online and offline. For all these reasons, it will be essential to incorporate a preventive approach based on scientific evidence and the analysis of risk and protective factors, which promotes appropriate and adjusted use, rather than disruptive or risky behaviour among adolescents.

Limitations of the study

This study has a number of limitations that should be taken into account when interpreting the results.

Firstly, the cross-sectional design used does not allow causal relationships to be established between video game use, antisocial behaviour and bullying. The results should therefore be understood as correlational associations, consistent with the exploratory nature of the research [17, 21].

Secondly, the statistical analysis was based mainly on bivariate associations and the calculation of odds ratios adjusted only for gender. Although this approach is common in descriptive and initial screening studies [24, 30], it prevents the simultaneous control of the effect of multiple variables. Therefore, future research should incorporate multivariate models (e.g., logistic or structural regressions) that allow for the exploration of possible mediations or moderations and incorporate other key factors. Gender was the only control variable included in the analyses, a decision based on the theoretical relevance of differences between men and women in the use of video games and the expression of aggressive or prosocial behaviours [18, 24]. However, future studies should consider other demographic and contextual variables, such as age, socioeconomic status, or family environment, to increase the accuracy and validity of the estimates.

Future studies should continue to update and contrast these findings to better understand the dynamics between video game use, gender differences, and social behaviours in adolescence.

Abbreviations

ASB	Antisocial behaviour
DUW	Daily use during the week
DUWe	Daily use at the weekend
Og W	Daily use of online games during the week
Og We	Daily use of online games at the weekend
OR	Odds Ratio
V&Og	Video games and online gaming
Vg W	Daily use of video games during the week
Vg We	Daily use of video games at the weekend
VO	Vandalism or violence against objects
VP	Violent behaviour or violence against people

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Authors' contributions
All authors (SGA, MRN and JS) wrote the main manuscript text, prepared figures and reviewed the manuscript.

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Data availability
No datasets were generated or analysed during the current study.

Declarations

Ethics approval and consent to participate
This research obtained the informed consent of the participants before completing the questionnaires (or of their parents or legal guardians in the case of children under 16 years of age). Likewise, consent was obtained from all participating schools. This research complies with the Declaration of Helsinki and did not require the approval of an ethics committee due to its observational epidemiological nature, in which no intervention on the participants was carried out and no clinical or biological variables were manipulated.
Following the guidelines of the 'Guidelines for requesting the assessment of the ethical suitability of a research project' of the Research Ethics Committee of the University of Deusto (CEI-UD), this research is exempt from this committee, as it is a study with anonymous data that does not entail any risk for the participants when answering the questionnaire.
This research does not deal with personal data (European Data Protection Regulation 2016/679 and Ley Orgánica 2/2018 de 5 de diciembre de Protección de Datos Personales y garantía de los derechos digitales), as the information is managed anonymously and it is not possible to identify the natural person or reverse the process to identify them, conserving the information in such a way as to prevent their identification. The information obtained cannot be associated with an identified or identifiable person.
The study was carried out through the application of completely anonymous questionnaires, guaranteeing the confidentiality and privacy of personal data. Moreover, as in other research of this nature [53–55], the legal and ethical procedures in force were strictly followed, including obtaining the signed consent of the schools and the parents or legal guardians of the participating students, thus ensuring compliance with data protection regulations and the rights of the minors involved.

Consent for publication
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Competing interests
The authors declare no competing interests.

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