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The role of video game consumption habits in the relationship between gender and attitudes towards violence among adolescents

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Research in adolescent population is key to understand the behaviors and attitudes that can modulate their personal and social development. This research examines the mediating role of video game consumption habits (interference with other activities, interference with academic activities, degree of attraction and degree of restlessness) in the relationship between gender and attitudes towards violence among adolescents. Moreover, the moderating role of frustration tolerance in the influence of mediation effects is analyzed. The main contribution of the study is the consideration of different indicators of consumption habits that explain gender differences in attitudes towards violence among adolescents. The study comprised a total of 877 secondary school students aged 12–18 male (*N* = 465) and female (*N* = 412) adolescents. The empirical estimation uses Hayes' moderated mediation framework. The results showed that the indirect effect of gender attitudes of violence among adolescents through video game consumption habits was conditioned by the level of frustration tolerance. Specifically, when frustration tolerance is high, being female is associated with a reduction in the interference that video games produce in activities, which in turn reduces their positive attitudes towards violence. The promotion of pedagogical strategies and guidelines based on frustration tolerance in a younger population could be relevant to rejecting positive attitudes towards violence.

Keywords Consumption of video games, Attitudes towards violence, Frustration tolerance, Adolescents

In the 21 st century, the active role of teachers in education has become a fundamental pillar for the individual and group development of learners in an increasingly interconnected world[1]. Therefore, education plays a crucial role in promoting the well-being of learners, who face numerous challenges such as gendered social norms, referring to social expectations about appropriate behaviors for women and men, girls and boys[2]. Scientific evidence shows how gender norms impact on population behavior and health, including youth violence[3]. Youth violence, among many other consequences, has been associated with 37% of homicides among people aged 15 to 29 worldwide[4]. Violence in the school environment is a social problem due to its high prevalence, where three out of ten children suffer from it, and the consequences for both victims and perpetrators[5–7]. Aggression at school can affect individual development due to the harmful consequences it has for adolescents, such as depression[8], drug use[9] as well as lower life satisfaction and health[7]. Nevertheless, the evidence regarding the prevalence of violent behaviour by gender and age is inconsistent[10].

Numerous studies have addressed the relationship between school violence and other variables. These include impulsivity, attitudes, depression, empathy, and video game use[3,11,12]. Attitudes towards violence have been widely reported as a relevant variable in school conflicts[14,15]. Some studies indicate that these positive attitudes are more prevalent in adolescent boys[3], while others find no differences[15], therefore more evidence is needed. Regarding the consumption of video games, while the literature relates them to increased aggression and reduced empathy[12], less evidence focuses on the association of video games with normative attitudes or beliefs about video games in adolescents[16].

Among the most important functions of educational centers is the promotion of competences, as well as personal and social skills in students that have an impact on their personal development[17]. In this regard,

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adolescence takes on special significance in the educational context, as it is a developmental stage characterized by both contextual and individual changes that can impact not only students' academic performance but also their overall personal development[18]. Due to the above, it is necessary to understand the mechanisms that drive the acceptance of violence among adolescents of both genders to promote preventive interventions to reduce it in the educational context.

Literature review

Attitudes towards violence among adolescents

The General Aggression Model (GAM)[19] postulates two main processes: proximal and distal. First, proximal processes describe the immediate impact of violent content. Second, distal processes refer to the long-term effects of frequent exposure to violent content. Within the first process there are factors that influence the internal state of the individual, where personal (e.g., attitudes towards violence) and situational (e.g., exposure to violence) factors can be found. Specifically, this paper understands positive attitudes towards violence as a psychological tendency with a certain degree of favourability in children to display violent behaviour in certain situations[20].

Violent behaviors in adolescents constitute an important social problem due to the exponential increase in the number of cases with serious consequences for both families and education professionals[21]. Among its incidences in the adolescent population, domestic violence stands out, which contributes to the perpetuation of cycles of violence in the lives of young people[22]. This could affect their interpersonal relationships[23]or even lead to sexual violence and physical abuse[24]. Consequences include mental health and socialization problems that have repercussions in adulthood[25].

In the last decade, the study of violence in the adolescent population when it occurs within the school context has been studied in greater depth[26]. One explanatory mechanism for violent behavior among adolescents is their attitudes towards authority figures and towards the transgression of social norms[27,28]. Attitudes in adolescents are learned, in part, through their first authority Figures[29], such as legal guardians and teachers. The acquisition of attitudes during adolescence can shape their personality in adulthood[30].

A comprehensive analysis of attitudes towards violence in the adolescent population must therefore be linked to a comprehensive study of their immediate contexts[31], such as the family, school and community[32]. Numerous studies highlight that children's perception of high parental support favors school adjustment[33,34], the development of self-esteem and happiness at school[35], higher social skills and sense of belonging[36] as well as a favorable attitude towards the school institution[37]. In contrast, lack of parental support represents an important risk factor associated with the development of behavioural problems, such as a higher incidence of delinquent and violent behaviour in adolescence[38–40].

Regarding gender, some authors have found that adolescent boys have stronger attitudes towards violence and exhibit more violent behaviours[3,7,41–43]. However, other authors indicate that there are no gender differences[44,45] and further research is needed.

As noted above, attitudes towards violence are a multidimensional phenomenon involving numerous factors that can affect students' personal and academic development[46].

Video game consumption habits

Mechanisms described in GAM indicate that certain factors may promote the formation of increased aggression and decreased empathy[47], such as exposure to violence, which includes exposure to video games. The latest guidelines of the World Health Organisation[4] regarding the quality of physical activity and sedentary life allude to the increase in the time adolescents spend in front of digital screens. The growing trend of video game consumption habits is one of the inherent factors linked to the psychosocial and educational context of young people[48] in terms of sedentary lifestyles. In recent decades, there have been major technological advances in our society that condition the lifestyle of young people, who show a greater adaptation compared to adult populations[49,50]. The characteristics of video games, i.e. their aesthetics, graphics or content, promote consumption habits in adolescents[51].

The scientific literature offers various studies on the factors associated with video game addiction in terms of positive or negative effects on adolescents. On the one hand, some studies focus on the favorable impact they can have on subjective well-being, such as the satisfaction of young people's psychological needs, as well as achievement, creativity, exploration and socialization[52], improvement of visual attention and working memory[53] and promotion of teamwork[54,55], among others. On the other hand, different studies mention the unfavorable impact they can have on behavior, such as impulsivity, anger[56] and even poorer academic performance[57].

Exploration of the intrapersonal effects of video games has shown their relationship with hostile thoughts and aggressive behaviour[58]. In relation, GAM postulates that repeated exposure to violent content can increase aggression and decrease empathy[59]. This is in line with Social Learning Theory[60] to understand how people learn behaviours by observing and imitating others. This study focuses on the effects within the person, i.e. their attitudes towards violence, and not on their own reactive or non-aggressive outcomes.

Concerning gender differences, the consumption of video games has traditionally been more linked to the male gender than to the female gender[61,62]. However, consumption habits among women have been increasing in recent years[63]. Specifically, the study by Becerra[64] indicates that males report a greater degree of interference of video games on other types of activities, on academic activities, and greater discomfort with video games than females as dimensions of video game consumption habits. Despite the growing interest in video games, there is a demand for studies on the underlying causes of problematic video game use among young people[65]. In this way, the consumption habits of video games in the adolescent population have become a priority line of research at present[66].

Frustration tolerance

In human thinking, the processes of planning, decision-making and analysis of alternatives to a problem or event are crucial throughout a person's life and especially in the adolescent stage[67]. This is due to the physical, cognitive and emotional changes at the behavioral and emotional level in the psychological adjustment and personal development of students[68]. Coping with stressful situations is one of the key skills that define an emotionally intelligent person to successfully cope with everyday life, allowing for adequate psychological and social adjustment[69]. In relation to this, frustration tolerance is understood as the ability to cope with adverse and stressful situations without feeling overwhelmed including the ability to manage situations when desired goals are not achieved, interrupted, or even postponed[70,71].

Adolescents who have high levels of frustration tolerance could choose the best form of coping with stressful situations, have acquired resources to do so and are effective in seeking possible solutions[72]. The scientific literature relates high levels of frustration tolerance to a greater disposition to optimism[73], calmness in unbalanced situations[74], greater happiness and emotional well-being[75]. Conversely, adolescents with low levels of frustration tolerance tend to be associated with poor conflict resolution and decision-making skills[76], weaker impulse control[77] and stress and anxiety[78].

Video games, especially those that are competitive or of high difficulty, can generate situations of frustration, as players face numerous failures before achieving their goals[79]. Specifically, Kneer and Rieger[80] found that those with a low frustration tolerance tended to avoid complex games, while those with a high tolerance were more motivated to continue playing.

In terms of gender, the study by Srivastava et al.[81] shows higher frustration tolerance in females compared to males. A trend of studies maintains the same direction to the prevalence of the female gender over the male[77,82,83]. However, the studies focus on the general population, so it is not known whether these gender differences are found in earlier stages, such as adolescence.

In short, frustration tolerance during adolescence is revealed as a fundamental adaptive behaviour where different stressful situations are experienced. Coping strategies and tolerance skills could help their emotional development[84].

Relationship between attitudes towards violence, video game playing habits and frustration tolerance

Scientific evidence shows a positive relationship between the consumption of video games and attitudes towards violence[85–88]. Addo et al.[89] note that the consumption of violent video games leads to a desensitization to violence and aggression-related thoughts. The authors Orozco-Marín et al.[90] explain this positive relationship by finding increased levels of anger and aggressiveness, and reduced empathy in adolescent consumers. Bonnaire & Conan[87] argue that the positive relationship between video game consumption and positive attitudes toward violence is due to reduced emotional regulation, lack of affection and the search for new sensations. Nevertheless, it is not known whether there are differences according to gender.

On the other hand, video game addiction is often associated with lower levels of frustration tolerance, as noted by Akbaş & Işleyen[91], due to increased anger and dissocial behaviors. Among its consequences, the above authors point to a decrease in adolescents' mental health. Bradt et al.[92] relate video game consumption to school disinterest and academic burnout, while García-Gil et al.[93] include a maladaptive pattern characterized by unhappiness, fear and anger in video game consumption.

Regarding gender, Paaßen et al.[94] reported that high frustration tolerance could be a factor explaining why men play more games. Also, the authors reported that high tolerance might increase video game participation among women because they tend to have less habituation to negative or frustrating experiences. However, it is not known whether the above relationships may have any impact on attitudes towards violence.

To summarise, there are gender differences in video game playing habits, with males tending to play more than females[95] due, in part, to gender socialisation[96]. Rehbein et al.[97] indicate that frustration tolerance influences the relationship between gender and video game playing habits. They explain that low tolerance may cause both men and women to reduce their use of video games that require high perseverance. However, Rehbein et al.[97], note that men tend to persist more in gaming. To continue, some authors report that greater exposure to video games is associated with more positive attitudes towards violence[19,98]. Furthermore, video games may act as a learning mechanism that reinforces violent attitudes in line with Bandura's Social Learning Theory[60]. Nevertheless, all of the above relationships have been examined in isolation and therefore an integrative model is required that also considers the various dimensions that make up video game consumption habits.

Finally, as Martínez et al.[99] point out, there are still numerous variables to be analysed that have an impact on attitudes towards violence in adolescents. Therefore, it is necessary to increase knowledge about the causes that give rise to positive attitudes towards violence among adolescents to favor the development of more effective interventions that advocate the correct personal, social and academic development of students[99].

Objective and hypothesis The aim of this research is to analyze the mediation of video game consumption habits in the relationship between gender and attitudes towards violence among adolescents, and to test whether this mediation is moderated by the level of frustration tolerance. Specifically, it seeks to examine whether the relationship between gender and video game playing habits varies as a function of frustration tolerance levels, and how this impacts attitudes towards violence. For this study, a mediation hypothesis, a moderation hypothesis and a moderate mediation hypothesis are reported (Fig. 1). The first mediation hypothesis was:

Hypothesis 1 (H1) Video game consumption habits: video game interference with other activities (*H1a*), video game interference with academic activities (*H1b*), attraction (*H1c*) and restlessness (*H1d*) to video games; mediate the effect of gender on attitudes towards violence among adolescents.

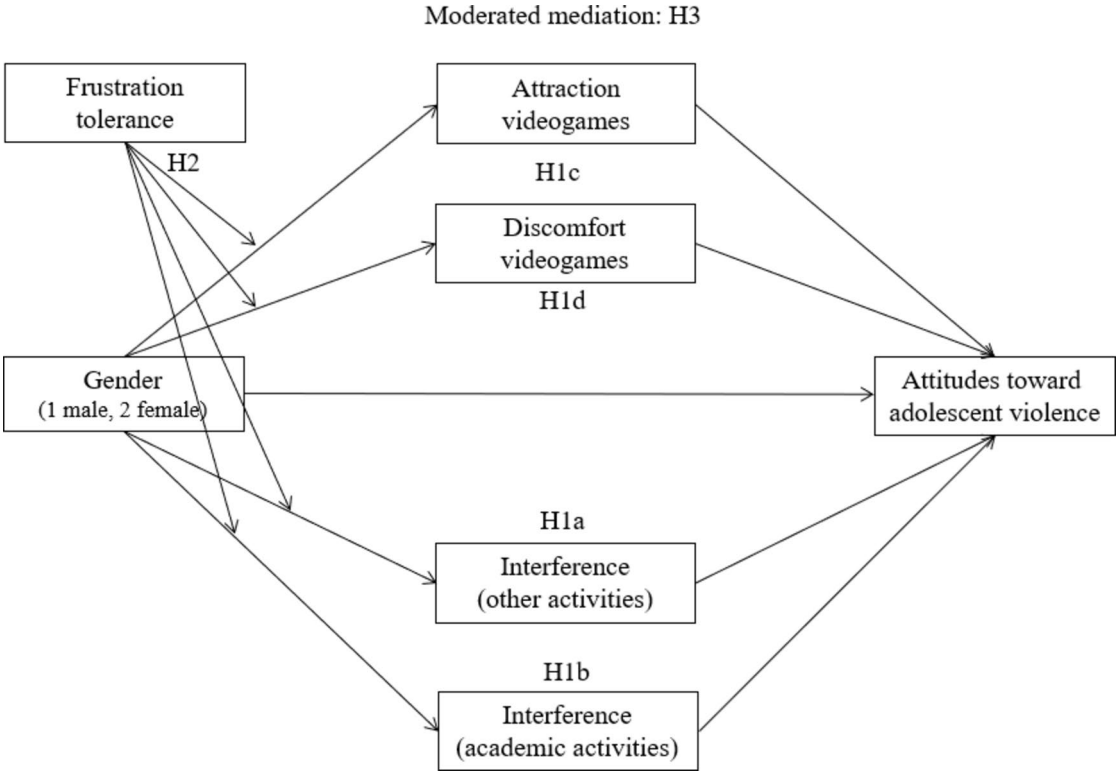

Fig. 1. Moderated mediation model.

Specifically, it is predicted that females (compared to males) will experience less interference of video games with other activities, and with academic activities, as well as a lower degree of attraction to and restlessness about video games. Which, in turn, will be related to have rejecting attitudes toward violence among adolescents. The second moderate hypothesis indicates that.

Hypothesis 2 (H2) The level of frustration tolerance moderates the relationship between gender and video game consumption habits.

The expectation here is that at high levels of frustration tolerance, females will experience a more significant reduction in video game playing habits compared to males, while at low levels of frustration tolerance this difference will be smaller. Third, it is hypothesized as a moderate mediation that.

Hypothesis 3 (H3) The effect of gender on attitudes towards violence among adolescents through video game consumption habits is stronger for individuals with high levels of frustration tolerance, while weaker for individuals with low levels of tolerance.

Finally, it is expected that having a high frustration tolerance is associated with a greater reduction in video game playing habits, which in turn will significantly rejecting positive attitudes toward violence among adolescents, with this effect being stronger for females than for males.

Method

Sample

The sample counted 878 participants recruited using simple random sampling. One participant was excluded for not completing all measures of the questionnaire. The study comprised a total of 877 secondary school students aged 12–18 years (M_{age} = 14.47; SD_{age}= 1.63; 465 males and 412 females), of whom 27% were from a public school, 72% from a charter school, and 6% from a private school. All secondary education centers responded randomly to their inclusion in the study. A sensitivity analysis conducted with G*Power for multiple linear regression (R^2 increase) suggested that the sample ($N = 877$, $\alpha = 0.05$) allowed an effect size as small as $f^2 = 0.01$ with a power of 0.80 to be detected. This indicated that the study had sufficient statistical power to detect a small to medium effect.

Measurement scales

The following measures were presented in counterbalanced order. The counterbalancing of the measurement scales was randomised to minimise any bias in the order of presentation. To this end, we used random assignment of participants to different orders of presentation of the scales (i.e., some participants completed the measures

of teen violence first, followed by the measures of video game playing habits and frustration tolerance, while others completed the measures of frustration tolerance and video game playing habits and then the measure of teen violence), ensuring that each participant was uniquely assigned to a different order. This process was done using a random number generator to ensure an equitable distribution. Finally, participants reported their sociodemographic data.

Frustration tolerance
The Spanish adaptation of the Stress Management subscale of the Emotional Quotioent Inventory[100] was used to assess adolescents' perception of their own ability to manage stress-stress tolerance and impulsive control. This measure consisted of 8 items (α = 0.76; e.g., 'I find it difficult to control my anger'; 'Some things make me very angry'; 'I get into fights with people'). Participants were asked to rate each item between 1 (*Never*) and 5 (*Always*) according to the score that best defined them. The scores were reversed to obtain a measure in a positive direction.

Attitude towards violence among adolescents
To measure students' attitudes towards violence, the Brief Violence Scale for Adolescents[101] was used. The measure was composed of 10 items corresponding to two subscales, of which 6 belonged to gratuitous violence (α = 0.86; e.g., 'I think it's appropriate to beat up those who snitch. They deserve it'), and 4 to violence linked to self-protection (α = .75; e.g., "A confident and courageous person knows how to hit"). The range of responses followed a Likert-type scale, from 1 (*Strongly Disagree*) to 5 (*Strongly Agree*). The reliability of the total scale scored α = .89.

Video game consumption habits
To find out about video game consumption habits, including console and computer games, the Questionnaire on Video Game Consumption Habits[64] was used. The instrument contemplates four dimensions through 19 items: Degree of attraction to video games with 6 items (a = 0.94; e.g., 'I like to play video games'); Interference of video games with other activities with 5 items (a = 0.82; e.g., 'When I play video games'); discomfort related to video game with 5 items (a = 0.87; e.g., "I like to compete in video games and be the best"); and, Interference of video games with academic activities with 3 items (a = 0.86; e.g., "Before doing homework I play video games"). The measure followed a Likert-type response scale, from 1 (*Strongly Disagree*) to 5 (*Strongly Agree*). The reliability of the total scale scored a = 0.95.

Socio-demographic information
Finally, participants provided information on their age, gender and school grade (from 1 = *1stESO* to 6 = *2ndBACH*), type of school (1 = *Public*, 2 = *Charter*, 3 = *Private*), average grade (from 1 = *Poor* to 5 = *Outstanding*) and time spent on homework (from 1 = *Less than 1 h* to 6 = *More than 5 h*).

Procedure
For data collection, the approval of the different secondary education centers was requested, as well as that of the students' legal guardians. To this end, they were provided with informed consent, as well as information on the voluntary nature of participation, anonymity and confidentiality of the responses. The questionnaires were completed in the classrooms of each school under the supervision of the research team. Students were free to leave the study at any time. Previously, the study was approved following the ethical guidelines established by the Research Ethics Committee of the Autonomous Community of Aragon (CEICA) (C.I. PI23/424).

Data analysis
Descriptive analyses and bivariate correlations between the study variables were carried out to ascertain the socio-demographic characteristics of the sample. The IBM SPSS v29.0 statistical program was used. Subsequently, a moderated mediation analysis was carried out using Model 7 through the MACRO of SPSS v29.0 by means of a bootstrapping procedure with 10,000 replications.

Results
Initial analysis
The estimated skewness and kurtosis for all indicators were normal. Next, the mean scores of the variables studied and whether they differed by gender were examined. A one-way (male vs. female) MANOVA was performed and showed a significant effect of gender on the set of variables [Wilks' Lambda = 0.54, $F(6, 863) = 121.4$, $p < 0.001$, $\eta^2 = 0.46$], suggesting that gender has a multivariate impact on the variables under study. In addition, the Box's Test of Equality of Covariance Matrices [$F(21) = 12.5$, $p < 0.001$] was also significant. This result indicates that the covariance structure of the data from the two samples (men and women) were not equivalent. Univariate F test revealed statistically significant gender differences for five of the six variables: Attitudes toward violence among adolescents, [$F(1, 873) = 57.6$, $p < 0.001$]; Degree of attraction to video games [$F(1, 873) = 40.5$, $p < 0.001$]; Interference of video games with other activities, [$F(1, 873) = 15.6$, $p < 0.001$]; Level of discomfort related to video games, [$F(1, 874) = 11.8$, $p < 0.001$]; and, Interference of video games with academic activities [$F(1, 874) = 57$, $p < 0.001$]. There were no group differences for frustration tolerance, $F(1, 872) = 0.001$, $p = 0.92$. As indicated in Table 1, males had higher scores than females on positive attitudes toward violence among adolescents and video game consumption habits.

In view of these results, the consumption habits of video games were included as a mediating variable between gender and violence among adolescents.

	Total		Female ($N=411$)		Male ($N=465$)	
	Mean	SD	Mean	SD	Mean	SD
Dependent variable						
Attitudes towards violence	1.90	0.84	1.57	0.64	2.18	0.89
Mediator variables						
Attraction to video games	3.20	1.29	2.34	1.14	3.96	0.88
Interference with other activities	2.25	0.98	1.76	0.79	2.69	0.92
Discomfort related to video games	2.33	1.22	1.63	0.97	2.95	1.10
Interference with academic activities	2.10	1.20	1.56	0.94	2.57	1.22
Moderator variable						
Frustration tolerance	3.46	0.89	3.36	0.11	3.55	0.90

Table 1. Descriptive statistics by gender.

Variable	1	2	3	4	5	6	7
Gender (1)	1						
Attitudes towards violence (2)	−0.36***	1					
Attraction to video games (3)	−0.62***	0.23***	1				
Interference with other activities (4)	−0.48***	0.34***	0.69***	1			
Discomfort related to video games (5)	−0.53***	0.29***	0.75***	0.74***	1		
Interference with academic activities (6)	−0.42***	0.38***	0.55***	0.74***	0.68***	1	
Frustration tolerance (7)	0.02	0.33***	0.03	0.16***	0.11***	0.18***	1

Table 2. Results by correlational analysis. *$p<0.05$, **$p<0.01$, ***$p<0.001$.

Correlational analysis

Pearson's bivariate correlations between the variables under study revealed several significant effects. Attitudes towards violence was positively related to the degree of attraction to video games, $r=0.23$, $p<0.001$; video game interference with other activities, $r=0.34$, $p<0.001$; level of video game discomfort, $r=0.29$, $p<0.001$; video game interference with academic activities, $r=0.38$, $p<0.001$; and, frustration tolerance, $r=0.33$, $p<0.001$; while negatively related to gender, $r=-0.36$, $p<0.001$. This indicates that greater video game consumption habits increase positive attitudes toward violence among adolescents. On the other hand, being female decreases the score in positive attitudes towards violence among adolescents.

In addition, gender was negatively related to the degree of attraction to video games, $r=-0.62$, $p<0.001$; interference of video games with other activities, $r=-0.48$, $p<0.001$; level of discomfort related to video games, $r=-0.53$, $p<0.001$; and, to interference of video games with academic activities, $r=-0.42$, $p<0.001$. This means that being female decreases video game consumption habits. In general, frustration tolerance was positively related to the different video game consumption habits, except for the degree of attraction to video games, as can be seen in Table 2.

Mediation effects of video game consumption habits in the relationship between gender and attitudes towards violence

The present study used the moderated mediation PROCESS Model 7[102] to assess whether the relationship between the dependent variable (*X*: gender) and the mediating variables on video game habits (*M1*: Attraction; *M2*: Discomfort; *M3*: Activity interference; and, *M4*: Academic interference) are moderated by the moderator (*W*: Frustration tolerance), and how this influences the dependent variable (*Y*: Attitudes towards violence). The R^2 coefficient indicated that the model explained 31% of the variance in attitudes toward violence among adolescents, which corresponds to a large effect size (Cohen, 1988). The model is shown in Fig. 2.

Direct effect of gender on attitudes toward violence

The analysis revealed a significant direct effect of gender attitudes toward violence among adolescents ($\beta=-0.53$, $SE=0.07$, $t=-0.17$ $p<0.001$). The coefficient of the direct effect was negative. This indicates that females reported less acceptance of violence compared to males, regardless of video game consumption habits or frustration tolerance.

Indirect effect of gender on attitudes toward violence through tolerance frustation

Indirect effects of gender on attitudes toward violence among adolescents through video game consumption habits had three significant effects in relation to Hypothesis 1. Bootstrapping analysis with 10. 000 samples revealed an indirect effect through interference of games with other activities ($\beta=-0.13$, $SE=0.06$, 95% CI [−0.25, −0.02]), interference of video games with other academic activities ($\beta=-0.17$, $SE=0.04$, 95% CI [−0.25, −0.09]), and attraction to video games ($\beta=0.22$, $SE=0.05$, 95% CI [0.11, 0.32]). The variable discomfort with video

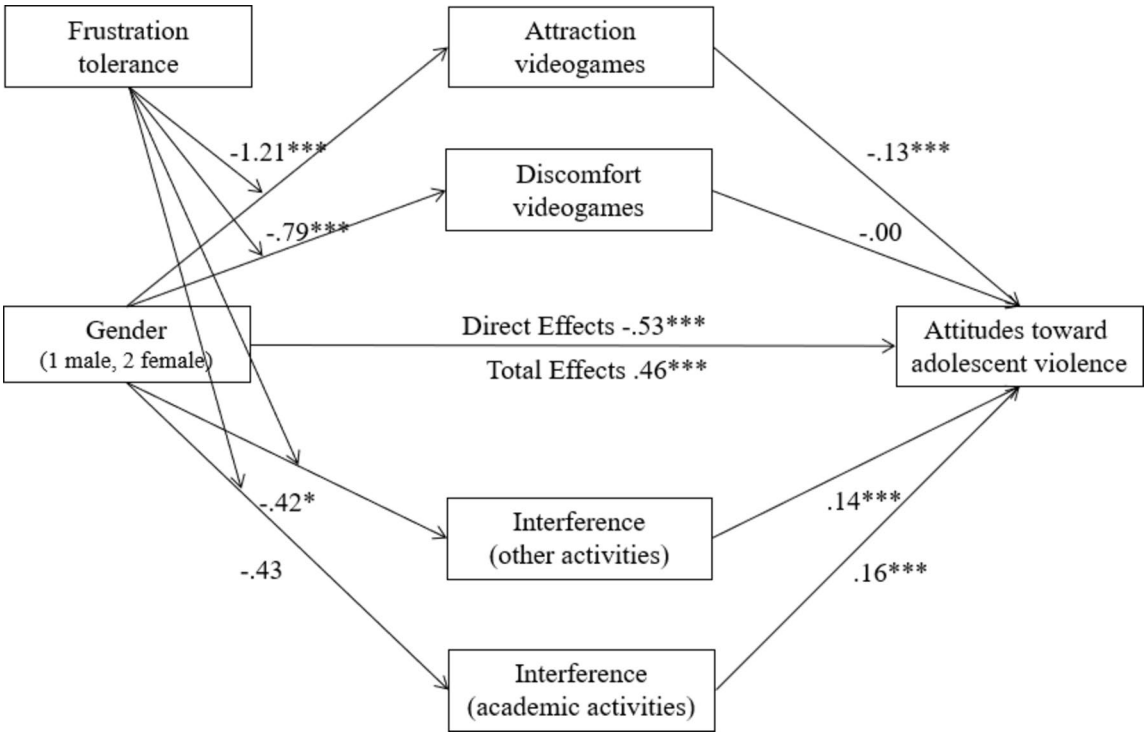

Fig. 2. Moderated Mediation Model Tested. Moderated mediation model in which the effect of gender on attitudes through video game consumption habits is moderated by frustration tolerance. The underestimated coefficients are reported. * $p < 0.05$. *** $p < 0.001$.

games did not have a significant value like the other dimensions of video game consumption habits, which could lead us to several interpretations that do not affect the relationships found. On the one hand, it could indicate that this variable in our study is not a determining factor due to the factor of normalization to the medium; that is, its consumption generates normalization towards the consumption of video games[103]. On the other hand, video games have become a widely accepted activity in the adolescent population nowadays, so that the levels of discomfort have decreased, reducing their impact on individual differences in consumption[104]. Finally, adaptation to a video game may lead to a lack of intrinsic motivation for the game, leading to abandonment and discomfort[105]. These interpretations can be taken with caution, advocating other factors inherent to video game consumption habits that may well be taken into account in future studies.

These results suggest that females (compared to males) tend to be less affected by (1) the interference caused by video games with other activities (H1a) and, (2) the interference caused by video games in academic activities (H1b), which in turn reduces positive attitudes toward violence among adolescents, confirming the mediating role of two types of video game consumption habits in this relationship. This could also mean that interference affects males more in terms of increasing the acceptance of violent attitudes among adolescents.

On the other hand, the results show that being male is related to a greater 3) degree of attraction to video games (H1c), and that this greater attraction increases positive attitudes towards violence among adolescents. Nevertheless, no significant results were found for the degree of discomfort related to video games (H1d). These results are independent of the level of frustration tolerance.

Moderation of the effect of gender on video game consumption habits (interaction gender × frustration tolerance)
The analysis showed four significant interactions between gender and frustration tolerance in predicting video game consumption habits, in accordance with Hypothesis 2. Specifically, when the level of frustration tolerance is high the impact of interference in other activities ($\beta = -0.18$, $SE = 0.06$, $t = -2.79$ $p < 0.01$) and academic activities ($\beta = -0.21$, $SE = 0.08$, $t = -2.52$ $p < 0.05$), attraction ($\beta = -0.14$, $SE = 0.08$, $t = -1.75$ $p < 0.001$) and discomfort ($\beta = -0.19$, $SE = 0.08$, $t = -2.34$ $p < 0.05$) that video games produce in women is further reduced. Thus, males report higher levels of video game attraction, video game-related discomfort, and interference with other activities and academic activities than females. At higher levels of tolerance, these habits increase. Furthermore, the differences between men and women in the degree of attraction to video games and video game-related discomfort are greater at low levels of frustration tolerance, while the differences between both genders in the two types of interference generated by video games are greater at high levels of frustration tolerance.

Moderate indirect effects (conditional)
The results showed that the indirect effect of gender on attitudes towards violence among adolescents through video game consumption habits was conditional on the level of frustration tolerance, which supports Hypothesis 3. Bootstrapping analysis showed that, at high levels of frustration tolerance, the indirect effect was significant

and negative (activity interference, $\beta = -0.16$, $SE = 0.07$, 95% CI [−0.31, −0.03]; academic interference, $\beta = -0.19$, $SE = 0.05$, 95% CI [−0.30, −0.10]). This indicates that, when frustration tolerance is high, being female is associated with a greater reduction in video game interference with activities, which in turn decreases positive attitudes towards violence. For males, frustration tolerance does not reduce activity interference as much as it does for females, leading to positive attitudes toward violence among adolescents.

At low levels of frustration tolerance, the indirect effect was also negative, but smaller in magnitude (activity interference, $\beta = -0.11$, $SE = 0.05$, 95% CI [−0.22, −0.02]; academic interference, $\beta = -0.13$, $SE = 0.03$, 95% CI [−0.21, −0.07]). This suggests that, when frustration tolerance is low, being female is still associated with less video game interference with activities, but the reduction in positive attitudes towards violence is less pronounced. Males with lower frustration tolerance do not experience a noticeable decrease in positive attitudes towards violence through video game interference.

Discussion

The main objective of the research was to examine how video game consumption habits mediated the relationship between gender and attitudes towards violence among adolescents, as well as to test whether this mediation was moderated by the level of frustration tolerance.

Regarding the first hypothesis, the results show that gaming habits (interference with other activities, interference with academic activities, and attraction) play a mediating role in the relationship between gender and attitudes towards violence, except for discomfort related to video games. This indicates that females report lower positive attitudes toward violence among adolescents when interference with other activities and academics is low. In addition, greater attraction to video games increased more acceptance of violence among males. The analysis of how game dynamics influence the construction of perceptions and behaviors associated with violence is evident. These findings, apart from highlighting the need to design educational strategies that promote healthy play habits, highlights the importance of incorporating the gender perspective in these analyses, ensuring that pedagogical initiatives address differences in socialization and exposure to play experiences that may reinforce stereotypes or normalize aggressive behaviors[106].

Therefore, the scientific literature offers hardly any studies that directly relate the constructs of our research. First, the mediating role of video game consumption habits is reflected in their impact on other variables such as emotion dysregulation, low levels of attachment and feelings of frustration[107]. Coyne et al.[41] link video game use to increased anxiety, depression and even nervous disorders in adolescents. Finally, Kircaburun et al.[108] note the influence of video game consumption in adolescents with lower levels of emotional intelligence, a trait that is maintained in the consumption of video games in adulthood. Secondly, the female gender experienced less interference in the consumption of video games than the male gender. Lui et al.[109] manifest these results by denoting other interests and motivations in females predicting the effect of gender on their consumption. André et al.[110] note the negative social and emotional consequences of video game consumption in males compared to females. Dong & Potenza[111] propose a model highlighting gender differences in the modulation of behavioural and neural systems in the consumption of video games. Finally, we found some studies that could help to explain the negative attitudes towards violence in the consumption of adolescent video games in the female gender as opposed to the male gender. Leonhardt & Overå[112] report lower social acceptance and motivation towards the consumption of video games in the female gender. Ferguson & Colwell[113]relate sexist behaviour and lower empathy in males. Gelūnas[114] states that males are more likely to be at risk of pathologisation and violent behaviour than females.

Due to the negative consequences associated with consumption habits according to the scientific literature, it seems logical to think that those who report a high consumption of video games report higher attitudes towards violence among adolescents, as shown in the results obtained, especially among males. For this reason, it is important that families and educational centers receive adequate training on the use of video games and their typology, since many of them can lead to foster pejorative behaviors in and outside the classroom, leading to widespread violent attitudes[115].

The second research hypothesis expected that the level of frustration tolerance will moderate the relationship between gender and video game playing habits. The hypothesis was fully satisfied; that is, the research results showed that higher levels of frustration tolerance among females reduced video game playing habits to a greater extent than among their male counterparts.

These results leave us with several connotations. On the one hand, women reported higher frustration tolerance than men. Potard et al.[116] support these findings in a sample of school adolescents related to greater protection against school bullying in the female gender. Chávez[117] maintains the same line where higher levels of resilience also prevail in females compared to males. Meanwhile, Urfa[83] explains the high prevalence of frustration tolerance in females from a model that relates their lower consumption and duration of use of video games compared to males. On the other hand, frustration tolerance acted as a moderating variable between gender and video game consumption. For these reasons, our findings in highlight the importance of studying these variables in the adolescent stage and in the school context[21]. Adolescence is a key period in the development of socioemotional skills, where emotional regulation and the ability to manage frustration play a key role in school and social adaptation and understanding how frustration tolerance influences the relationship between gender and video game consumption allows designing more effective educational strategies to prevent associated problematic behaviors[118].

There are hardly any results that support our findings, although some studies are related in different ways. Walia et al.[119] affirms the influence of frustration tolerance on video game exposure in terms of time spent playing video games. Barrios & Vasquez[120] find significant gender differences in the influence of frustration tolerance with other variables such as family violence in adolescence, assuming greater tolerance in the female

gender. Liu et al.[109] found the influence of the frustration tolerance variable in a sample of adolescents reinforcing its relationship with self-esteem for emotional well-being.

In conclusion, the adolescent females in the research obtained a lower video game consumption habit than males due, in part, to their higher levels of frustration tolerance compared to males. Therefore, frustration tolerance could become a factor in the prevention of video game use. For this reason in the globalized world in which we find ourselves, teaching families and teachers how to resist frustration when adolescents face difficult tasks is one of the key psychological variables in education to train resilient students who know how to cope with situations they face in their daily lives and that will help them to face difficulties in adulthood with guarantees of success[121,122].

The third hypothesis was partially fulfilled. Having a high frustration tolerance was associated with less interference of video games with academic and other activities, which significantly reduced acceptance of violence among adolescents, especially among females. However, no moderately mediated results were found for video game attraction and discomfort related to videogames.

In the scientific literature, we did not find studies directly related to the constructs studied, although several studies were related according to the variables that appeared. The influence of frustration tolerance is evident in the consumption of video games and Internet use in adolescents, where high values of the former lead to a decrease in the latter, acting as a protective factor[123]. Similarly, the effect of frustration tolerance on the reduction of violent attitudes in adolescents is evidenced together with other variables such as emotional intelligence and assertiveness in the adolescent population[122]. Finally, Bonnaire and Conan[87] show the incidence of adaptive behaviours in adolescents in terms of preference for violent video games, highlighting the role of emotional regulation and frustration tolerance.

Hence, the literature shows a negative association between frustration tolerance and attitudes towards violence on the one hand, as well as a positive relationship of frustration tolerance with female gender on the other hand. Due to the above, the research results could improve the understanding of the literature and be interpreted by scientific evidence. Specifically, females with higher frustration tolerance have rejecting attitudes toward violence; however, in males, their levels of frustration tolerance do not significantly reduce attitudes towards violence through the interference of video game consumption.

For all these results frustration tolerance is a fundamental skill for the socioemotional development of adolescents as it influences their ability to face challenges, regulate emotions and maintain motivation in the face of difficulties[124]. Therefore, it is essential to design and implement educational interventions in the classroom that promote adaptive coping strategies, problem solving and the development of resilience[125]. Among the key actions recommended are the incorporation of emotional education programs, the teaching of self-regulation techniques, the implementation of challenge-based learning methodologies and the use of restorative practices for conflict management[126]. Likewise, teacher training in socioemotional skills and the promotion of a positive school climate are fundamental to reinforce these learning processes. These strategies not only improve student well-being, but also favor a more inclusive and equitable school environment, preparing them to successfully face the challenges of the future[127].

Conclusion

The findings described in the research show the repercussions that the constructs studied may have on the personal and academic development of school-age adolescents. The incidence of video game consumption habits may influence attitudes towards adolescent violence, with differences depending on gender. Male adolescents have higher consumption habits than female adolescents, with a greater impact on their attitudes towards violence. Women obtained lower prevalence in the construct of video game consumption habits compared to men and greater tolerance for frustration, which can act as a protective mechanism against violent attitudes. However, men with a high frustration tolerance do not significantly reduce their positive attitudes toward violence.

Therefore, research is needed to investigate the factors that act as protective mechanisms leading to more adaptive and self-determined behaviors that can lead to an improvement in the integral and academic development of adolescents in the school context.

Limitations of the study

The main limitations lie in the cross-sectional design of the research, taking the data at the same spatiotemporal moment for each educational center. Although the sample is not small in terms of obtaining a large number of responses, the results could be unrepresentative of the adolescent population. The research sample taken in the same city may have biases in terms of the applicability of the results to specific populations, although the results allow the study hypotheses to be contrasted. Furthermore, secondary schools were included in the study without considering possible economic, family and/or educational differences. This leads to a limitation in terms of the generalizability of the results obtained to the adolescent population. On the one hand, the characteristics of adolescents in charter schools may be different from those in public schools, therefore future studies should check whether our results differ according to the type of school. Therefore, the cultural or regional factors of the students in the sample could also affect the generalizability of the results even though they all respond to the same city. Furthermore, there could have been factors beyond the control of the researchers that could influence the results, such as unexpected events in the classroom context or changes in the students' environment.

Future perspectives

Future research could extend the study of different variables that interfere in the attitudes of violence among adolescents being a current problem in many schools, as well as more comparative research in terms of gender and other sociodemographic and academic variables. Some related research investigate in longitudinal studies

about attitudes towards violence in school adolescents and other variables as being necessary to attend to them for the good personal, academic and social development of the students[20,128]. At the same time, the increase in the consumption of video games by adolescents is on the rise, which can lead to addictions or other social or academic problems among students. Therefore, it is necessary to explore the typology of different variables that affect or influence their consumption for correct personal and social development. Finally, we could examine whether there are differences in the results obtained depending on the type of video games consumed. This aspect could vary depending on the characteristics of the video games, exemplified in violent video games that lead to aggressive behavior[129], as well as other intrinsic variables such as time of use, addiction to the smartphone and other elements related to the use of digital technology in the daily lives of adolescents[130].

Practical implications

The results of the research advocate the implementation of pedagogical guidelines and didactic strategies aimed at promoting attitudes against violence. The promotion of adaptive attitudes such as effort, dedication and motivation towards homework and school institutions can lead to the improvement of self-efficacy, self-esteem and school happiness that can serve as a protective factor against student dropout. Additionally, raising awareness by providing intervention programs led by professionals oriented towards the correct functioning of video games in adolescence can have positive consequences on students. For instance, avoiding possible addictions at an early age could have repercussions on the optimal personal and socio-affective development of adolescent schoolchildren.

Data availability

Data will be available upon request to the corresponding author of the article (Pablo Usán Supervía) (pusan@unizar.es).

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Author contributions

Julia Sánchez-García1 and Pablo Usán Supervía2 contributed to the conception and design of the work. Pablo Usán organized the sample collection and data preparation. Julia Sánchez García performed the data collection, analysis, and interpretation. Julia Sánchez García critically reviewed its comprehensive content. Pablo Usán Supevía prepared drafts of the article. The authors read and approved the final manuscript.

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Declarations

Ethics approval and consent to participate

(CEICA) Research Ethics Committee. Project: C.I. PI23/424. All procedures performed in studies involving human participants were in concordance with the ethical standards of the institutional and/or national research committee and with the 2000 Helsinki declaration and its later amendments or comparable ethical standards. Ethical guidelines were approved by the Research Ethics Committee of the Autonomous Community of Aragon (CEICA) (C.I. PI23/424).

Competing interests

The authors declare no competing interests.

Additional information

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