Comunicar
Media Education Research Journal
ISSN: 1134-3478 | e-ISSN: 1988-3293 PREPRINT

**ID**: 111216
**Received**: 2020-01-21
**Reviewed**: 2020-03-10
**Accepted**: 2020-04-28
**Preprint**: 2020-06-15
**Published**: 2020-10-01

**DOI:** https://doi.org/10.3916/C65-2020-08

# Video game usage time in adolescents' academic performance

## El tiempo de uso de los videojuegos en el rendimiento académico de los adolescentes

**Dr. Fernando Gómez-Gonzalvo**
Assistant Professor, Department of Education, University CEU Cardenal Herrera, Valencia (Spain)

**Dr. José Devís-Devís**
Full Professor of Physical and Sports Education, Department of Physical and Sports Education, University of Valencia, Valencia (Spain)

**Dr. Pere Molina-Alventosa**
Professor, Department of Physical and Sports Education, University of Valencia, Valencia (Spain)

## Abstract
Video game usage among young people has generated great concern due to its possible negative effects on their health, socialization and academic performance. Regarding this last aspect, there are studies that point out that video games have negative consequences for academic performance while others emphasize their positive effects. Therefore, the present study deals with the relationship between the video game usage time and the academic performance in adolescent schoolchildren from the Valencian Autonomous Community. An ad hoc questionnaire was used and validated through expert judgment (0.8 validity and reliability) to develop this cross-sectional and ex post facto study. A stratified and proportional representative sample was designed for the ESO student population of this autonomous community and 1,502 questionnaires were collected. Adolescents spend an average of 47.23 minutes a day playing video games, with less time spent during the week than at the weekend. Those who devote more time to videogames during the week fail more subjects and those who spend more time on weekends get better school grades. In addition, frequent, moderate and many of the occasional players obtain good academic results, while the opposite happens to the intensive players. As many of the occasional players achieve good academic performance, a moderate time devoted to video games seems not to affect academic performance.

## Resumen
El uso de los videojuegos entre los jóvenes ha generado una gran preocupación por sus posibles efectos negativos para su salud, socialización y rendimiento académico. Respecto a este último aspecto, existen estudios que apuntan a que los videojuegos son negativos para el rendimiento académico mientras que en otras investigaciones se encuentran efectos positivos. Por esto, el presente trabajo se ocupa de las relaciones entre el tiempo de uso de videojuegos y el rendimiento académico de los escolares adolescentes de la Comunidad Valenciana. Se utilizó un cuestionario ad hoc, validado a través de juicio de expertos (0,8 validez y confiabilidad) para realizar este estudio transversal ex post facto. Se diseñó una muestra representativa estratificada y proporcional a la población de alumnado de ESO de dicha comunidad autónoma y se recogieron 1.502 cuestionarios. Los adolescentes dedican una media de 47,23 minutos al día a jugar a videojuegos, menos entre semana que en fin de semana. Aquellos que dedican más tiempo a los videojuegos entre semana suspenden más asignaturas y los que dedican más tiempo los fines de semana sacan mejores notas escolares. Además, los jugadores frecuentes, moderados y muchos de los ocasionales obtienen buenos resultados académicos, mientras que les ocurre lo contrario a los jugadores intensivos. Muchos de los jugadores ocasionales obtienen buen rendimiento, por lo que la dedicación de un tiempo moderado a los videojuegos no parece afectar al rendimiento académico.

## Keywords / Palabras clave
Video games, academic performance, gamers, secondary education, adolescents, survey, ICT, digital leisure.
Videojuegos, rendimiento académico, videojugadores, educación secundaria, adolescentes, encuesta, TIC, ocio tecnológico.

## 1. Introduction

Today, leisure and free time activities have been greatly diversified allowing us to invest our time in multiple ways. One of them is the so-called digital leisure, which includes new leisure possibilities involving digital technology (Internet, consoles, mobile phones, digital platforms, etc.). The arrival of this type of entertainment in today's society is modifying interpersonal relationships and is also causing a transformation in people's leisure habits, especially among young people (Valdemoros-San-Emeterio et al., 2017).

Video games, in particular, have become the leading industry in sales and growth in the global leisure and entertainment market (Newzoo, 2018). According to the latest report published by the Spanish Video Game Association, in Spain they are the number one choice for audiovisual leisure, with a turnover of 1.35 billion euros in 2017 and ranking 9th in the world video game market. According to the data in this report, there are 15.8 million players in Spain, 75.94% of whom play every week (AEVI, 2018). Consumers spend more time than ever with video games, and this is especially true among young people (AEVI, 2018; Newzoo, 2018). The report of Youth in Spain 2016 states that 8 out of 10 young people play video games (Benedicto et al.,2017).

The vast amount of time adolescents spends playing video games has become a concern among educators, parents and administrations (Gonzálvez et al., 2017). It seems necessary to explore the effects that dedicating a large part of their time to video games can have on adolescents. In the first place, because it is a sensitive stage for the construction of their identity, since a large part of the behavior established at this stage conditions life in adulthood (Pedrero-Pérez et al., 2018). Secondly, knowing how adolescents invest their time is convenient as certain activities are incompatible with others due to mere time constraints, i.e. playing video games takes time away from other activities that may be of greater interest to adolescents (Aguilar et al., 2010).

In this sense, video games have occupied part of the scientific and public debate due to several concerns emerging around them. These concerns have focused on several aspects, among which the cultural scarcity of their contents, their relationship with addictions (Toker & Baturay, 2016), sedentarism and its negative health outcomes (Valencia-Peris et al., 2014), the perpetuation of gender disparities (Gómez-Gonzalvo et al., 2020) or the development of skills (Gros, 2007) stand out. In this paper, we focus on the relationship between time of video game use and the academic performance of adolescent students.

According to data from the Ministry of Education, Spain has a high rate of early school dropouts which, in 2017, accounted for 18.3% of students in Compulsory Education (Primary and Secondary) (MEFP, 2018). This percentage places us at the end of the line of most European Union countries, only ahead of Malta (18.6%) and far from the European average (10.6%). According to various studies, behind these numbers lies the time students spend on technological leisure. The vast majority of these studies indicate that there is an inverse relationship between time spent using video games and academic performance, so that those adolescents who spend the most time playing are those who obtain the worst academic results (Badía et al. 2015; Schmitt & Livingston, 2015; Adelantado-Renau et al., 2019). In a recent study, it was found that the higher the academic performance, the less time spent on technological activities such as video games (Lizandra et al., 2016). In another study, it was noted that the inverse relationship between time spent playing video games and academic performance was only found when the time spent playing video games was more than two hours a day (Valencia-Peris et al., 2016). Others suggest that science, mathematics or language subjects are not negatively affected by the use of video games (Drummond & Sauer, 2014). Other authors indicate that young people who play during the week have worse academic results than their peers who only play on weekends and, furthermore, they point out that the context of the game has a great influence on academic results (Hartanto et al., 2018). In this sense, Drummond and Sauer (2020) indicate that the time of day in which they play is fundamental, highlighting that the worst academic results are those of young people who play during the week before going to school.

Meanwhile, Jackson et al. (2011), through a longitudinal study, suggest that adolescents who perform well academically maintain their performance over time, regardless of the time they spend using video games. In other words, previous academic performance is the best predictor of future academic performance, so the emergence of video games is not a determining factor in school success.

There are a number of studies that indicate the existence of positive relationships between the use of video games and academic performance. For example, Badia et al. (2015) point out that students who play video games longer have better academic performance compared to those who spend time in other technological leisure activities (cinema, television, mobile phone, etc.). Gros (2008) indicates that video games can improve academic performance because both video games and classrooms use problem-solving strategies to approach the challenges faced by adolescents. These strategies, due to their cross-cutting nature, can be

examined from different areas and video game designers use them to develop games stories. This requires adolescents to search for online tutorials, ask for help from peers, review books for extra information and use creative and divergent thinking to solve the problem posed in the same way as in educational contexts (Harlem, 2014). In this sense, it has been shown that through video games, skills such as reading and writing, psychomotor skills, social skills, cognitive and metacognitive skills are developed (Rosas et al., 2003; Gee, 2004; Gros, 2007; 2008).

Time spent on video games and its relation to academic performance has yielded both positive and negative results that converge in a paradox (Ventura at al., 2013). A negative interaction has been found between video game use and academic performance, but at the same time, there is a positive interaction between moderate video game use and general knowledge testing (Anand, 2007). Other authors indicate that positive relationships are shown for academic performance with moderate video game use, between 10-50 hours per week (approx. 86-429 minutes per day), compared to students who played less or played excessively and obtained worse academic performance than the former (Ventura et al., 2012). In this sense, the informal learning that young people undertake through technological interaction has been shown to be related to academic performance, despite the differences that exist between informal and academic learning (Pereira et al, 2019).

Despite the fact that there is evidence on the educational capabilities of video games, even in formal educational settings (Gros, 2008; Young et al., 2012; Badia et al., 2015), it is not clear how they affect academic performance, since the scientific literature offers contradictory results. In view of these contradictions between the use of video games and academic performance, it is necessary to delve deeper into these relationships. Therefore, the purpose of this article is to find out the relationship between these variables, the variation in time of use according to the type of day (weekday or weekend) and academic performance, as well as the differences in the temporal usage profiles of school adolescents according to academic performance.

## 2. Methodology

### 2.1. Design and sample

This ex post facto study was carried out through a survey of a sample of students in Compulsory Secondary Education (ESO) in the Valencian Community. For the calculation of the sample, a proportional and stratified sampling strategy was followed, according to sex, academic year, province and type of center from the population indicated by the National Institute of Statistics (2014) for the academic year 2012-13, the latest data available. The sample size was set at 1060 students, based on a <95% confidence level and a ±3% sampling error. However, a total of 1502 questionnaires were obtained, after discarding 12 of them during the screening process.

By gender, 49.4% were boys, 49.9% were girls and 0.7% reported as others. In terms of age, we found a range of 11 to 19 years old with an average age of 13.98 years old (SD=1.397 years old). 95.7% of the student body was between 12 and 16 years old, ages that would correspond to the Compulsory Secondary Education level, and 4.3% would correspond to other ages. 29.4% were students in the first year of secondary education, 27.5% in the second year of secondary education, 24.8% in the third year of secondary education and, finally, 18.2% were students in the fourth year of secondary education. By province, 40.24% came from Alicante, 15.02% from Castellón and 44.74% from Valencia. Of the total number of students, 66.11% attended public schools and 33.89% private schools.

### 2.2. Instrument

The instrument used was a survey to collect information on the use of video games in adolescent school children and other psycho-educational variables. The survey was developed especially for this study based on previous work on the subject (Alfageme & Sánchez, 2003; Parra et al., 2009; ADESE, 2011) and was validated through expert assessment (Lynn, 1986). For this purpose, the help of 10 experts (7 men and 3 women) in education, information technologies and video games was requested. Based on a first draft created by the research team, the experts were asked for their opinion. Based on their comments and suggestions, the research team reworked the survey. The survey was then re-sent to the same experts to show their level of agreement/disagreement with the appropriateness of the questions in the instrument to obtain information on the topic of study. Finally, the experts gave their opinion on the survey and showed a level of agreement of 80%, that is, 0.8 agreement out of 1, so the questionnaire was considered valid for use (Polit et al., 2007). Reliability was determined by standardizing the survey administration protocol and limiting its application to a

single researcher to avoid differences in the way it was administered among the different times and groups to which it was applied.
The survey consisted of 24 questions aimed at finding out about the use of video games in leisure time among adolescents in secondary education. The most common types of questions were multiple choice, yes/no, single choice and single entry ("How much money do you spend on video games each month?"; "Do you think that active video games can help you develop any of the following skills/abilities?"). To collect the data on academic performance, a simple answer question was asked in which young people had to indicate, among the 4 options offered, the one that was most suitable for their academic performance ("With respect to the last year, which of the following statements is closest to your academic level? I have failed 4 or more subjects; I have failed between 1 and 3 subjects; I have passed everything and have an average of adequate or good; I have passed everything and have an average of notable or outstanding). For the question of usage time, young people had to indicate the time they spent on video games in a typical week by providing the value in 15-minute intervals ("In a typical week, how much time do you usually spend playing video games? Indicate it in fractions of 15 minutes. For example: 15', 30', 45', 1h., 1h15',1h30', etc.").

### 2.3. Procedure

Ten schools in the Community of Valencia participated in the study. Prior to contacting them, the corresponding official permit was requested from the Regional Ministry of Education, which is required by regional regulations. Prior to the survey, informed consent was sent to the parents and legal guardians of the students, informing them of the objectives of the study. It was also explained to them that the study respected the principles of the Declaration of Helsinki and the Spanish laws on data protection, throughout the process and the possible subsequent publications that derived from it.
The survey was administered during one of the school hours that the students had in their schedule, trying to avoid interrupting the dynamics of the school. The teachers in charge were always present in the classroom where the questionnaires were administered. The students were told what the objectives of the study were and how they had to fill in the questionnaire. The data were collected between January and June 2015.

### 2.4. Analysis

The descriptive analysis of video game usage time involved providing the averages, maximum and minimum values, and standard deviation. A two-factor ANOVA was performed, 4 (academic performance) by 2 (weekday/ weekend) with repeated measures in this last variable for the comparison of means of usage time according to the mentioned factors, followed by post hoc tests with HSD Tukey. In addition, a Spearman correlation was performed to explore the relationship between both variables. Finally, a Chi-square analysis was performed to see if there were significant differences in player profiles (non-gamer 0h/day; occasional >0 and <1h/day; moderate 1-3h/day; frequent 3-5h/day; intensive >5h/day) according to academic performance. Since the sample did not follow a normal distribution, a transformation of the variables was performed using the logarithmic procedure in base 10 and the asymmetry and kurtosis were smoothed out. The significance level to determine if there are significant differences was set at $p < 0.5$.

## 3. Results

### 3.1. Descriptive results

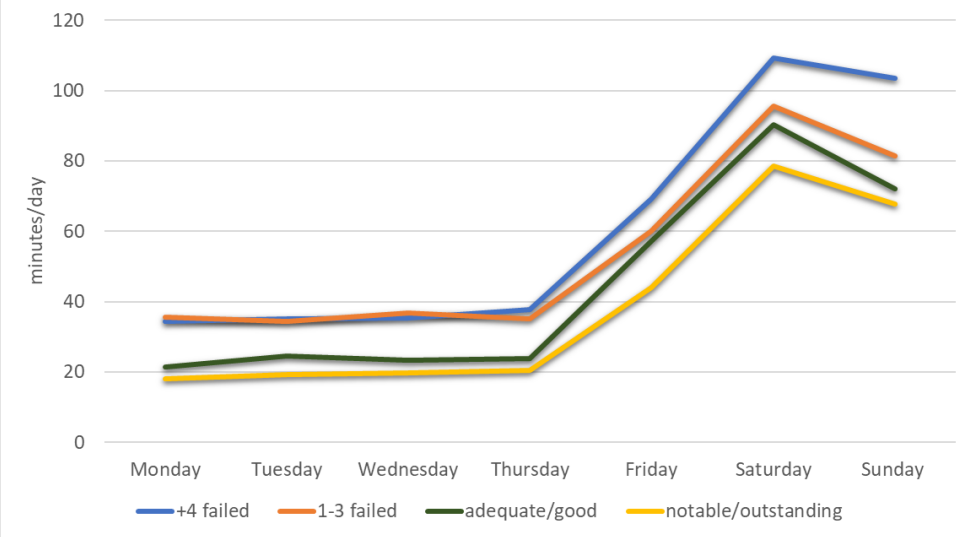
Teenagers play video games for an average of 47.23 minutes a day (DS= 94.945min). The average time on weekdays is 26.83 minutes per day (SD= 52.77min) and on weekends it amounts to 74.34 minutes per day (SD= 102.97min).
Table 1 shows the average values for the use of video games during the week and for the type of day of the week (weekdays and weekends). In this table we can also see that 45 minutes of average weekly use of video games is the maximum time for students to avoid failing all subjects and to obtain at least a passing grade (adequate).

Comunicar
Media Education Research Journal
PREPRINT

| Table 1. Average time of video game use by type of day | | | |
|---|---|---|---|
| | Weekday | Weekend | Weekly mean |
| +4 failed subjects | 42.40 (67.01) | 106.36 (149.40) | 60.68 (83.58) |
| 1-3 failed subjects | 40.38 (72.99) | 88.60 (115.01) | 54.16 (80.37) |
| Adequate/Good | 30.07 (46.07) | 81.25 (114.10) | 44.69 (60.84) |
| Notable / Outstanding | 24.31 (38.11) | 73.19 (102.22) | 38.29 (51.75) |
| * Time shown in minutes. Standard deviation values in parenthesis. | | | |

Figure 1 shows average video game usage by day of the week for each academic performance category. This figure shows a similar pattern for each of the academic performance categories, characterized by an increase in weekend time with the peak on Saturday. It also shows that the higher values of time spent playing video games correspond to the category of academic performance with the highest student failure rate, while the lower values correspond to the category of best academic performance. The differences in usage time between these two categories of academic performance range from 16.48 minutes on Monday to 30.81 minutes on Saturday.

**Figure 1. The average time teens spend playing video games, according to academic performance category and each day of the week**




On the other hand, it was found that 3.2% of adolescents did not play video games, while 74.2% of adolescents played occasionally, 17.7% played moderately, 3.6% played frequently and 1.4% played intensively.

## 3.2. Correlation between playing time and academic performance

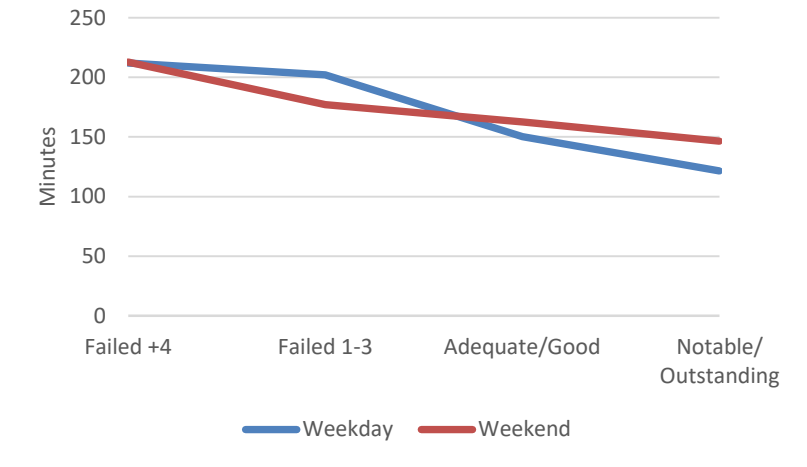
In order to explore the possible linear relationship suggested by the previous tests between the time of video game use and academic performance, a Spearman correlation was performed. This test shows a significant negative relationship between both variables, but with a low correlation and effect size (rs=-0.108; p=0.000), i.e., as the time of video game use increases, academic performance worsens.

## 3.3. Time of video game use according to academic performance and type of day

A 4 x 2 ANOVA test was performed, with repeated measurements on the latter factor, to find out if there were significant differences according to academic performance and type of day (weekday/weekend). A significant difference was found in the main effect by academic performance (F(3)=8.197; p=0.000; η2= 0.017). Post-hoc tests, using Tukey contrast, indicate that differences in video game usage time are obtained between the best performing adolescents (notable and outstanding) and their worst performing peers (more than four failed

subjects and 1-3 failed subjects), with such differences being -78.40 and -55.60 minutes per week respectively. In other words, adolescents who spend less time playing video games perform better academically.

**Figure 2. Effect of the interaction of academic performance and type of day on the time-dependent variable of video game use**




The above ANOVA also indicates that there is a significant interaction effect on the time of video game use between the type of day and academic performance ($F(3)=4.688$; $p=0.003$; $\eta 2=0.010$). In other words, it can be seen that the time of use of video games by adolescents with lower academic performance is similar or greater on weekdays than on weekends, while for adolescents with higher academic performance it is precisely the opposite, they play longer on weekends than on weekdays (Figure 2).

## 3.4. Play profiles according to academic performance

A Chi-square test was performed to find out how the use profiles of the players (non-gamers, occasional, moderate, frequent and intensive) varied according to academic performance and significant differences were observed ($\chi 2(12)=29.742$; $p=0.003$; $V=0.082$). The corrected standard residuals indicate (see Table 2) that non-gamers are distributed in significant percentages between those who fail more than four subjects (34.8%) and those who obtain scores of notable-plus (26.1%). In contrast, there is a higher percentage of occasional players (42.3%) with high grades (notable and outstanding) than occasional players (16.1%) with very low grades (failing more than four subjects). These percentages are reversed with intensive players, as the highest percentage (38.1%) is among those who fail more than four subjects and the lowest percentage (14.3%) among those who achieve the notable-plus. No significant differences were found for the moderate and frequent type of player.

**Table 2. Video game player profiles according to academic performance**

| | +4 failed | 1-3 failed | Adequate - good | Notable - outstanding |
|---|---|---|---|---|
| Non-gamers | 34.8%* | 19.6% | 19.6% | 26.1%* |
| | 3.0* | -0.7 | 0.4 | -2.0* |
| Occasional | 16.1%* | 23.6% | 18% | 42.3%* |
| | -3.6* | -0.8 | 0.9 | 2.8* |
| Moderate | 22.1% | 24.7% | 14.8% | 38.4% |
| | 1.8 | 0.2 | -1.2 | -0.7 |
| Frequent | 20.8% | 32.1% | 18.9% | 28.3% |
| | 0.5 | 1.4 | 0.3 | -1.8 |
| Intensive | 38.1%* | 33.3% | 14.3% | 14.3%* |
| | 2.4* | 1.0 | -0.4 | -2.4* |

Note. * show groups where the classified residuals are ±1.96.

## 4. Discussion

The results of this study indicate that teenagers spend an average of 47.23 minutes a day playing video games. These values are somewhat higher than those found by other Spanish studies indicating substantially lower average values of use when giving values of 24 and 27 minutes (Callejo, 2016; Valencia-Peris et al., 2014). In contrast, other studies have reported much higher mean values, such as 73.2 minutes per day for American youth (Lucas & Sherry, 2004), 125.1 minutes per day for American adolescents (Phan et al., 2012), or even 280 minutes per day for Australian adolescents (Forrest et al., 2015). This variation in the means of the aforementioned studies may be due to several contextual and methodological factors such as the way in which young people are asked about the time and the order of the questions, as indicated by Sierra (2003). In addition, we must consider that video games have not developed and expanded uniformly, in fact they have been more accelerated in highly industrialized countries with a significant consumption system (Newzoo, 2018). In any case, the 47.23 minutes represent a considerable amount of time if we take into account that young people also spend, as part of their lifestyle and social identity (Buckingham, 2008), more time on other technological media available to them, including television, computers and mobile phones. This would presumably exceed the maximum time of two hours per day beyond which the overall health risks to the young segment of the population increase, as suggested by various associations (Barnett et al., 2018; Devís-Devís et al., 2015; OMS, 2019).

There is also an inverse relationship between academic performance and time spent playing video games whereby teenagers with less playing time get the best grades while those who play heavily underperform academically. These results are in line with what previous studies indicating that participants were young people from Spain, the UK and the US (Callejo, 2016; Peiró-Velert et al., 2014; Schmitt & Livingston, 2015), and also with studies comparing samples from various countries (Borgonovi, 2016). Despite this, there are other authors who find no relationship between time spent playing video games and academic performance (Jackson et al., 2011). However, these data offer very general information for a complex and nuanced issue (Ventura et al., 2012; Ventura et al., 2013). For this reason, this paper delves into video game usage time according to academic performance and type of day, as well as usage time profiles according to academic performance.

In particular, the results of this study show a pattern of video game use characterized by less weekday time and a considerable increase in usage time during the weekend. In other words, teens who play video games substantially increase their use in the weekend, regardless of their academic performance. This circumstance may be due, as pointed out by other authors (Peiró-Velert, et al., 2014), to the fact that during the weekend adolescents have more free time and that some of them invest it in both academic and leisure activities, with no negative relationship between these activities. Since teenagers do not attend schools on weekends, it seems likely that the time spent on video games will increase, as this type of leisure is prevalent among teenagers worldwide (Newzoo, 2018).

On the other hand, teenagers who spend the longest time playing video games are those who fail 1-3 subjects and more than four school subjects, while those who spend the shortest time playing video games get notable and outstanding grades. In other words, by comparing the averages of various groups or categories of grades, the results obtained by correlating the time spent playing video games with academic performance are reaffirmed, thus confirming the studies that abound in this same result (Callejo, 2016; Peiró-Velert et al., 2014; Schmitt & Livingston, 2015). Depending on the type of day, we find that teens who fail more subjects spend more time playing video games on weekdays than on weekends, and those who get better grades spend more time on weekends. This result is key because it shows that an increased dedication to video games on weekdays, coinciding with school days could affect the academic time that ultimately results in lower performance, as indicated by other studies (Drummond & Sauer, 2020; Hartanto et al., 2018). However, as Lizandra et al. (2016) suggest, it could be the other way around, i.e., that low academic performance is what affects the greater dedication to video games precisely on school days. In this case, Jackson et al. (2011) would be right because academic success would not depend on the time dedicated to video games and, instead, video games would become an activity where they might be competent, leading adolescents with low academic performance to dedicate more time to this activity.

When the time dedicated to video games is transformed into game profiles (non-gamer, occasional, moderate, frequent and intensive), we can obtain results that help to deepen their complex connection with academic performance. In this way, an important group of occasional gamers are not prevented from obtaining good academic results because, as with those who spend more than two hours on technological leisure in other studies (Valencia-Peris et al., 2016), it seems that they do not spend much time on video games to undermine

the time they spend on academic tasks, with a lower percentage obtaining poor results. On the other hand, the opposite is true for many of the intensive players who may have difficulties with the time they have available because, as Lizandra et al. (2016) point out, in those cases playing time seems to compete with study time which ultimately results in poor academic performance. The fact that non-gamers are divided between those with low and high academic performance is an indication that they are not affected by video games and therefore their academic performance is impacted by other factors.

## 5. Conclusions and limitations of the study

Secondary school teenagers in the Valencian Community spend an average of 47.23 minutes a day playing video games. They show a pattern in the use of video games characterized by a decrease in the time spent on weekdays and a considerable increase in the time spent on weekends. Teenagers who spend more time playing video games on weekdays, compared to the weekend, fail more subjects and those who spend more time playing on weekends get better grades in school.

There is also an inverse relationship between academic performance and time spent playing video games, i.e. the longer the time spent playing, the poorer the academic performance. In general, teenagers who spend more time playing video games are those who fail more school subjects, while those who spend less time playing video games are those who get the best grades. In addition, many of the casual gamers appear to be doing well academically because they don't seem to be spending much time on video games to detract from the time they spend on homework. In contrast, the opposite is true for many of the intensive gamers because game time seems to compete with study time which ultimately results in poor academic performance.

As limitations, we found that the measures of academic performance of the students who participated in the study were obtained from self-reports because it was not possible to access their official grades. This is a concern because of the possible lack of precision in the data collected that may be derived from the participants' recall. However, this is a global approach to the collection of academic performance data, covering the whole school curriculum and not just a few subjects or indicators taken from other studies. This is the case of the Pisa Report, which only considers reading comprehension, mathematics and science, and excludes the arts, social sciences and humanities (Silió, 2014). On the other hand, we must point out that the sample is only representative of secondary education students, which means that we must take the results with caution, since other educational levels may display a different relationship between the variables in our study, given that they cannot be generalized to all educational levels.

In future studies dealing with the subject, it would be interesting to look more closely at the time of day when video games are played during the week, since it seems that this may be a determining factor, as Drummond and Sauer (2020) point out, in order to understand the relationship between these variables.

Finally, we must point out that this is a cross-sectional, correlational study, which indicates the existence of possible interactions of extraneous variables in the study. Therefore, it is important to continue working on this issue through more sophisticated designs, whether quantitative (longitudinal or experimental) or qualitative, carried out from a more ecological and global epistemology. It is also important to focus on the study of time according to the type of video game, since it has important socio-educational consequences for its practitioners.

## References

Adelantado-Renau, M., Moliner-Urdiales, D., Cavero-Redondo, I., Beltran-Valls, M., Martínez-Vizcaíno, V., & Álvarez-Bueno, C. (2019). Association between screen media use and academic performance among children and adolescents. A systematic review and meta-analysis. *JAMA Pediatrics*, *173*(11), 1058-1067 https://doi.org/10.1001/jamapediatrics.2019.3176

Aguilar, J., Cumbá, C., Cortés, A., Collado, A.M., García, R., & Pérez, D. (2010). Habits or inappropriate behaviors and poor academic results in students of secondary school. *Revista Cubana de Higiene y Epidemiología, 48*(3), 280-290. https://bit.ly/2RbTDvs

Alfageme, B., & Sánchez, P. (2003). Un instrumento para evaluar el uso y las actitudes hacia los videojuegos. *Pixel-Bit*, *20*, 17-32. https://bit.ly/2Rdes9A

Anand, V. (2007). A study of time management: The correlation between video game usage and academic performance markers. *Cyberpsychology & Behavior*, *10*(4), 552-559. https://doi.org/10.1089/cpb.2007.9991

Asociación Española de Distribuidores y Editores de Software de Entretenimiento (Ed.) (2011). *El videojugador español: Perfil, hábitos e inquietudes de nuestros gamers*. https://bit.ly/2Rvvmza

Asociación Española de Videojuegos (Ed.) (2018). *Anuario de la industria del videojuego, 2017*. https://bit.ly/2RB7Xwz

Badía, M.M., Clariana, M., Gotzens, C., Cladellas, R., & Dezcallar, T. (2015). Videojuegos, televisión y rendimiento académico en alumnos de primaria. *Pixel-Bit*, *46*, 25-38. https://doi.org/10.12795/pixelbit.2015.i46.02
Barnett, T.A., Kelly, A.S., Young, D.R., Perry, C.K., Pratt, C.A., Edwards, N.M., Rao, G., & Vos, M.B. (2018). Sedentary behaviors in today's youth: Approaches to the prevention and management of childhood obesity. A scientific statement from the American Heart Association. *Circulation, 138,* e142-e159. https://doi.org/10.1161/CIR.0000000000000591
Benedicto, J., Echaves, A., Jurado, T., Ramos, M., & Tejerina, B. (2017). *Informe Juventud 2016*. Instituto de la Juventud. https://bit.ly/2NNvvND
Borgonovi, F. (2016). Video gaming and gender differences in digital and printed reading performance among 15-year-olds students in 26 countries. *Journal of Adolescence, 48,* 45-61. https://doi.org/10.1016/j.adolescence.2016.01.004
Buckingham, D. (2008). *Youth, identity, and digital media*. MIT Press. https://bit.ly/3diPspD
Callejo, M.J. (2016). Variables explicativas de la audiencia de videojuegos entre los españoles menores de 25 años. *Comunicación y Sociedad*, *25,* 43-69. https://doi.org/10.32870/cys.v0i25.4421
Devís-Devís, J., Beltrán-Carrillo, V., & Peiró-Velert, C. (2015). Exploring socio-ecological factors influencing active and inactive Spanish students in years 12 and 13. *Sport, Education and Societ*y, *20*(3), 361-380. https://doi.org/10.1080/13573322.2012.754753
Drummond, A., & Sauer, J.D. (2014) Video-games do not negatively impact adolescent academic performance in science, mathematics or reading. *PLoS One, 9*(4). https://doi.org/10.1371/journal.pone.0087943
Drummond, A., & Sauer, J.D. (2020). Timesplitters: Playing video games before (but not after) school on weekdays is associated with poorer adolescent academic performance. A test of competing theoretical accounts. *Computers & Education*, *144*. https://doi.org/10.1016/j.compedu.2019.103704
Forrest, C.J., King, D.L., & Delfabbro, P.H. (2015). The gambling preferences and behaviors of a community sample of Australian regular video game players. *Journal of Gambling Studies*, *32*(2), 409-420. https://doi.org/10.1007/s10899-015-9535-0
Gee, P. (2004). *Lo que nos enseñan los videojuegos sobre el aprendizaje y el alfabetismo*. Aljibe.
Gómez-Gonzalvo, F., Molina, P., & Devís-Devís, J. (2020). Which are the patterns of video game use in Spanish school adolescents? Gender as a key factor. *Entertainment Computing*, *34*. https://doi.org/10.1016/j.entcom.2020.100366
Gonzálvez, M.T., Espada, J.P., & Tejeiro, R. (2017). El uso problemático de videojuegos está relacionado con problemas emocionales en adolescentes. *Adicciones*, *29*(3), 180-185. https://doi.org/10.20882/adicciones.745
Gros, B. (2007). Digital games in education: The design of game-based learning environments. *Journal of Research on Technology in Education*, *40*(1), 23-38. https://doi.org/10.1080/15391523.2007.10782494
Gros, B. (2008). *Videojuegos y aprendizaje*. Graó.
Harlem, K. (2014). Video game strategies as predictors of academic achievement. *Journal Educational Computing Research*, *50*(2), 271-284. https://doi.org/10.2190/EC.50.2.g
Hartanto, A., Toh, W.X., & Yang, H. (2018). Context counts: The different implications of weekday and weekend video gaming for academic performance in mathematics, reading, and science. *Computers & Education*, *120*, 51-63. https://doi.org/10.1016/j.compedu.2017.12.007
Jackson, L., Von-Eye, A., Fitzgerald, H., Witt, E., & Zhao, Y. (2011). Internet use, videogame playing and cell phone use as predictors of children's body mass index (BMI), body weight, academic performance, and social and overall self-esteem. *Computers in Human Behaviour*, *27,* 599-604. https://doi.org/10.1016/j.chb.2010.10.019
Lizandra, J., Devís-Devís, J., Pérez-Gimeno, E, Peiró-Velert, C., & Valencia-Peris, A. (2016). Does sedentary behaviour predict academic performance in adolescents or the other way round? A longitudinal path analysis. *PLoS One, 11*(4). https://doi.org/10.1371/journal.pone.0153272
Lucas, K., & Sherry, J.L. (2004). Sex differences in video game play: a communication-based explanation. *Communication Research*, *31*(5), 499-523. https://doi.org/10.1177/0093650204267930
Lynn, M.R. (1986). Determination and quantification of content validity. *Nursing Research*, *35*, 382-385. https://doi.org/10.1097/00006199-198611000-00017
Ministerio de Educación y Formación Profesional (Ed.) (2018). *Datos y cifras. Curso escolar 2018/19*. Ministerio de Educación y Formación Profesional. https://bit.ly/3c6hjcw
Newzoo (Ed.) (2018). *Global games market report*. Newzoo. https://bit.ly/30Gnor8
Organización Mundial de la Salud (Ed.) (2019). *Guidelines on physical activity, sedentary behaviour and sleep for children under 5 years of age*. World Health Organization. https://bit.ly/2ufOyJr
Parra, D., García-de-Diego, A., & Pérez, J. (2009). Hábitos de uso de los videojuegos en España entre los mayores de 35 años. *Revista Latina de Comunicación Social*, *12*(64), 649-704. https://doi.org/10.4185/rlcs-64-2009-855-694-707
Pedrero-Pérez, E., Ruiz-Sánchez-de-León, J.M., Rojo-Mota, G., Llanero-Luque, M., Pedrero-Aguilar, J., Morales-Alonso, S., & Puerta-García, C. (2018). Tecnologías de la información y la comunicación: Uso problemático de Internet, videojuegos, teléfonos móviles, mensajería instantánea y redes sociales mediante el Multicage-TIC. *Adicciones, 30*(1), 19-32. https://doi.org/10.20882/adicciones.806
Peiró-Velert, C., Valencia-Peris, A., González, L.M., García-Massó, X., Serra-Añó, P., & Devís-Devís, J. (2014). Screen media usage, sleep time and academic performance in adolescents: clustering a self-organizing maps analysis. *PLoS One, 9*(6), e99478. https://doi.org/10.1371/journal.pone.0099478

Pereira, S., Fillol, J., & Moura, P. (2019). Young people learning from digital media outside of school: The informal meets the formal. [El aprendizaje de los jóvenes con medios digitales fuera de la escuela: De lo informal a lo formal]. *Comunicar*, *58*, 41-50. https://doi.org/10.3916/C58-2019-04

Phan, M.H., Jardina, J.R., Hoyle, S., & Chaparro, B.S. (2012). Examining the role of gender in video game usage, preference, and behavior. In *Proceedings of the Human Factors and Ergonomics Society Annual Meeting* (pp. 1496-1500). Sage. https://doi.org/10.1177/1071181312561297

Polit, D.F., Beck, C.T., & Owen, S.V. (2007). Is the CVI an acceptable indicator of content validity? Appraisal and recommendations. *Research in Nursing and Health*, 30, 459-467. https://doi.org/10.1002/nur.20199

Rosas, R., Nussbaum, M., Cumsille, P., Marianov, V., Correa, M., Flores, P., Grau, V., Lagos, F., López, X., López, V., Rodriguez, P., & Salinas, M. (2003). Beyond Nintendo: Design and assessment of educational video games for first and second grade students. *Computers and Education*, *40,* 71-94. https://doi.org/10.1016/S0360-1315(02)00099-4

Schmitt, Z., & Livingston, M. (2015). Video game addiction and college performance among males: Results from a 1 year longitudinal study. *Cyberpsychology, Behavior, and Social Networking*, *18*(1), 25-29. https://doi.org/10.1089/cyber.2014.0403

Sierra, R. (2003). *Técnicas de investigación social. Teoría y ejercicios*. Thompson.

Silió, E. (2014, 8 March). Las tiranías del informe PISA. *El País*. https://bit.ly/2TGTxNQ

Toker, S., & Baturay, M.H. (2016). Antecedents and consequences of game addiction. *Computers and Human Behavior, 55*, 668-679. https://doi.org/10.1016/j.chb.2015.10.002

Valdemoros-San-Emeterio, M.A., Sanz-Arazuri, E, & Ponce-de-León, A. (2017). Ocio digital y ambiente familiar en estudiantes de Postobligatoria. [Digital leisure and perceived family functioning in youth of upper secondary education]. *Comunicar*, *50*, 99-108. https://doi.org/10.3916/C50-2017-09

Valencia-Peris, A., Devís-Devís, J., & Peiró-Velert, C. (2014). El uso sedentario de medios tecnológicos de pantalla: perfil sociodemográfico de los adolescentes españoles. *Retos, 26*, 21-26. https://bit.ly/2RC7fPx

Valencia-Peris, A., Devís-Devís, J., & Peiró-Velert, C. (2016). Involvement in sedentary activities and academic performance in adolescents: Differences according to sociodemographic variables. *Cultura y Educación, 28*(2), 301-327. https://doi.org/10.1080/11356405.2016.1158451

Ventura, M., Shute, V., & Kim, Y.J. (2012). Video gameplay, personality and academic performance. *Computers & Education*, *58*, 1260-1266. https://doi.org/10.1016/j.compedu.2011.11.022

Ventura, M., Shute, V., & Zhao, W. (2013). The relationship between video game use and a performance-based measure of persistence. *Computers and Education*, *60*(1), 52-58. https://doi.org/10.1016/j.compedu.2012.07.003

Young, M.F., Slota, S., Cutter, A.B., Jalette, G., Mullin, G., Lai, B., Simeoni, Z., Tran, M., & Yukhymenko, M. (2012). Our princes is in another castle: a review of trends in serious gaming for education. *Review of Educational Research*, *82*(1), 61-89. https://doi.org/10.3102/0034654312436980