



Problematic Internet use in primary school: time of use, family supervision and video problematic game use as predictors differentiating by gender

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KEYWORDS

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ABSTRACT

Internet use time and problematic use has increased at early ages, and family supervision is socially promoted. Thus, it is common for households to allow more time at the weekend to use the Internet for various forms of leisure activities. On the other hand, among the frequent activities is the use of video games, and there is evidence of problematic use; however, it is not known to what extent all these factors may influence the prediction of problematic Internet use in primary school students. Therefore, the aim of this study is to analyze whether time spent using the Internet during the week and on weekends, family supervision and problematic use of video games predict problematic Internet use. Additionally, gender differences are examined. A total of 319 Spanish students of 5th-6th grade of Primary Education (52.4% boys) and mean age of 10.58 years participated in the study. By means of linear regressions, the results show that the greatest predictor is the problematic use of video games in both genders and somewhat higher in boys. Likewise, it is relevant that connection time during the week is the second risk factor and greater than weekend use time. Regarding family supervision, only girls benefit from their protective factor. The importance of family and school supervision in the use of the Internet by minors is discussed.

Uso problemático de Internet en Educación Primaria: tiempo de uso, supervisión familiar y uso problemático de videojuegos como predictores diferenciando según el género

PALABRAS CLAVE

Redes sociales
Mediación
Familia
Niños y niñas
Preadolescentes

RESUMEN

El tiempo de uso de Internet y su uso problemático ha aumentado en edades tempranas, por lo que socialmente se promueve la supervisión familiar. Así, en los hogares es frecuente que el fin de semana se permita utilizar Internet durante más tiempo para diversas formas de ocio. Por otro lado, entre las actividades frecuentes está el uso de los videojuegos, existiendo evidencias de su uso problemático; sin embargo, no se conoce en qué medida pueden influir todos estos factores en la predicción del uso problemático de Internet en estudiantes de Educación Primaria. Por ello, el objetivo de este estudio es analizar si el tiempo de uso de Internet entre semana y el fin de semana, la supervisión familiar y el uso problemático de videojuegos predicen el uso problemático de Internet. De forma adicional se examinan las diferencias según el género. Participan 319 estudiantes españoles de 5º y 6º de Educación Primaria (52.4% chicos) y edad media de 10.58 años. A través de regresiones lineales, los resultados muestran que el mayor predictor es el uso problemático de videojuegos en ambos géneros y algo mayor en los chicos. Así mismo, es relevante que el tiempo de conexión entre semana sea el segundo factor de riesgo, mayor al tiempo de uso del fin de semana. En lo que respecta a la supervisión familiar, solamente las chicas se benefician de su factor protector. Se discute la importancia de la supervisión familiar y de los centros educativos en el uso de Internet de los menores.

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The use and problematic use of the Internet

According to Spanish Institute for Statistics (INE) (2022), 94.9% of minors between 10 and 15 years of age are Internet users. In most European countries, including Spain, 9-to-11-year-olds use the internet two hours per day, increasing to four hours per day among 12-to-16-year-olds (Smahel et al., 2020). Similarly, as indicated by Andrade et al. (2021), the percentage of minors aged 11-17 who spend more than 5 hours online increases significantly at weekends (50% at weekends compared to 31.6% during the week). While the Internet can provide them with both information and learning, it can also pose a serious threat and lead to risky situations (Castaño-Pulgarín et al., 2021), such as problematic internet use. Although the DSM-5 does not consider it an addictive disorder, it has negative effects as it involves the recurrent need to connect to the Internet, deficiencies in self-regulation, and problems in daily life such as diminished family and social relationships (Caplan, 2010).

From the parental perspective, problematic Internet use in minors has increased after confinement (Ponce-Gómez et al., 2023) and the prevalence of this type of use among Spanish adolescents is 33% (Andrade et al., 2021), so there is great social concern to prevent this risk due to the problems derived from it such as cyberbullying (Bautista et al., 2022; Kowalski et al., 2019). Problematic internet use affects not only their social and communication skills but also the academic ones, as well as their emotional well-being and mental health (Yaycı, 2021). Specifically, a recent meta-analysis concludes that it is associated with depression, anxiety, and loneliness symptoms, as well as with other mental health issues (Cai et al., 2023).

Gender may play an important role in the study of problematic Internet use among adolescents and adults, however, with no conclusive results. Some papers argue that adolescent boys are the ones who show higher levels of problematic use. (Fumero et al., 2018; Su et al., 2019). However, others conclude that girls are more likely to have this problem (Díaz-López et al., 2020) aggravated by the imminent consequences of such synergy. In order to deepen understanding of this relationship, the following research objectives were formulated: a. There is evidence that the motivations for internet use predict its problematic use depending on the gender (Cebollero-Salinas et al., 2021). Specifically, boys use it as a source of amusement and in order to experience a sense of accomplishment, while girls use it as a way to escape, engage in social interactions and seek academic support (Su et al., 2020).

The evidence of the prevalence of problematic internet use and its negative impact on adolescents, as well as the extensive use of the internet in primary education, makes it necessary to study such behavior at this stage in order to address its early prevention.

Problematic use of video games

Just as the use of the internet can produce benefits, video games have been linked to improved intelligence, memory, the ability to solve problems, and to develop social skills (Griffiths, 2019). Cooperation in video games shows psychological and

well-being benefits (Shoshani et al., 2021), increases motivation, and promotes sharing, collaboration, and healthy relationships in childhood (Alanko, 2023; Carras et al., 2017). However, these benefits seem to be reduced or even eliminated when the gamer transforms this entertainment into an obsession or a way to escape from reality (Griffiths, 2019).

So far, most studies have focused on adolescence. When gaming becomes problematic, studies show higher levels of depression, anxiety, poor school performance, and behavioral problems, such as aggression or impulsivity, as well as a tendency to displace educational and social activities (Shoshani et al., 2021). Regarding its relationship with problematic internet use, to the authors' knowledge there are only studies on adolescents where the relation between both problematic uses is evidenced and where they act as mutual predictors (Tas, 2019; Tras, 2019), so it is reasonable to hypothesize that it could be similar in the primary stage.

Studies on primary education students are scarce and mostly descriptive. In Spain, a very large study of minors aged 11-18 found that 26.4% of boys and 6.6% of girls use videogames problematically (Andrade et al., 2021), which gives an idea of the extent of this risk among minors. Moreover, it is directly associated with higher levels of overt aggression and relational victimization in primary education students (Chacón-Chuberos et al., 2018). Therefore, at this stage, it may be a relevant problem and requires further study.

The relevance of family supervision in the use of the Internet

Families are the first mediators between their children and digital tools, as well as the key to their healthy use (Benedetto & Ingrassia, 2020). In this sense, the parenting styles at home could influence such use, i.e., excessive control or excessive laxity do not seem to reinforce children's positive internet activities, so a parenting style focused on support, teaching appropriate internet use, and enforcing relevant rules ultimately provides greater benefits for their digital development (Sasson & Mesch, 2016; Song et al., 2020).

In this regard, Coyne et al. (2017) provides two styles of supervision with great benefits: instructional mediation and shared use. The first focuses on active participation in the use, e.g.: explaining the content of web pages or how to use a device properly; while the second focuses on approaching the internet with the children in order to teach them how to do it in the most appropriate way, e.g.: visiting suitable web pages together or playing video games. Similarly, Sasson and Mesch (2016) have shown that restrictive strategies, such as setting usage rules and schedules and choosing appropriate apps, can promote healthy internet use. Conversely, the absence of parental supervision or an inappropriate use of the internet by parents or guardians negatively affects how their children use it (Benedetto & Ingrassia, 2020). On the other hand, research suggests that the type of advice typically given to households tends to focus on protecting children's privacy and security rather than teaching them how to use technology appropriately for their benefit (Harris & Jacobs, 2022). In any case,

family supervision proves to be a protective factor for online risks such as excessive smartphone use (Chang et al., 2019) and problematic internet use, especially in preadolescents and girls (Cebollero-Salinas et al., 2021).

Given the relevance of the study variables for healthy digital use and the scarce literature analyzing their relationship in primary school children, this paper aims to examine, in a gender differentiated way, whether time spent on the internet on weekdays and weekends, family supervision, and problematic video game use predict problematic internet use.

Method

Participants

A total of 319 Spanish 5th and 6th grade students (47.6% girls and 52.4% boys) aged 10-12 years ($M = 10.58$ and $SD = .703$) from 12 public and private schools in Aragón (Spain) participated. The sample is selected from a non-probability random sample based on the accessibility to the training centers.

Instruments

Questionnaire Problematic Internet Use (Salgado et al., 2014) social isolation, school failure and family problems are some of the consequences of psychological and behavioural impact on teenagers. Taking into account the interest that this issue has generated at many levels, the aim of this paper is to develop a screening tool for early detection of problematic Internet use in teenagers. Method: A survey of Compulsory Secondary School students from Galicia involving a total of 2,339 individuals was carried out. Results: The results obtained allow (1. It quantifies problematic internet use. It consists of 9 items in a single dimension including questions such as "Sometimes I have lost hours of sleep because of using the Internet". It is a 4-point Likert scale (0 = *Never* and 4 = *Very much*). In this sample, Cronbach's alpha coefficient is .82.

Video Game Related Experiences Questionnaire (VGRE) (Chamarro et al., 2014). It assesses the problematic use of video games. It is a 4-point Likert scale (0 = *Never* and 4 = *Almost always*). It consists of 17 items distributed in two dimensions. In this work, authors use the subscale "Psychological dependence and use for escape" that deals with items such as "When you are bored, do you use video games as a form of distraction?". Its Cronbach's alpha coefficient in the participant sample is .86.

Family Supervision Scale (Ortega et al., 2012) is a subscale of the EsCaCiber Questionnaire (Scale of Cyber-behaviour Quality) and assesses family control and support in social networking activities that the family undertake with their children, e.g., "They help me to use the internet appropriately". It consists of 4 items on a 5-point Likert scale (0 = *Never* and 4 = *Always*). Cronbach's alpha coefficient is .87. in the sample.

Internet usage time. There were two ad hoc questions on the amount of time spent using the internet at weekdays and weekends with 4 possible answers: *No internet use*, *Less than 1 hour*, *Between 1 and 2 hours*, or *More than 2 hours*.

Procedure

First, the educational centers were contacted in order to inform them about the research objectives. Those who decide to participate were provided with documents to obtain informed parental consent. The surveys were then given to the students to complete during the agreed school hours in the presence of a researcher. The data were collected between April and May 2021. The research was carried out in accordance with ethical standards and approved by the Ethics Coordinating Committee for Biomedical Research of Aragón.

Statistical procedure

Tables of means, standard deviation, and frequencies are used for the descriptive analysis. The factorial ANOVA statistic is used to test group hypotheses. In cases where it is not possible to use it because it does not meet the assumption of equality of variances, the nonparametric statistic *Brown-Forsythe* was used instead. In cases where the *p value* is significant it is completed with the *eta squared* statistic where $\eta^2 \leq .05$ is considered a small size effect, η^2 between 0.06 and 0.13 moderate and $\eta^2 \geq 0.14$ a large size effect (Brown, 2010).

The reliability index of the instruments used is calculated through Cronbach's alpha. The relationships between the study variables are analyzed using bivariate correlations. Then, the gender subsamples are compared by applying Fisher's Z transformation of the correlation coefficient.

The predictive ability of problematic Internet use in relation to the other variables considered is examined using multiple linear regression analysis. This procedure is done, in a differentiated way, with groups of boys and girls. To perform this regression, a block inclusion method is used for the groups of variables: block 1: Problematic use of video games; block 2: Time spent using the Internet during the week, and block 3: Time spent using the Internet at weekends.

To analyze the improvement of the different blocks, assess the contribution of new variables, and avoid possible multicollinearity problems, the stepwise method is used within each block. Indicators of compliance with the assumptions of multiple regression are taken into account: independence with Durbin-Watson values between 1.5-2.5, indicators of absence of collinearity with variance ratios < 0.5 , low tolerances and VIF somewhat higher than 1, normality, homoscedasticity, and linearity diagrams (Pardo and Ruiz, 2007). Data analysis is performed with SPSS version 22.0 statistical software.

Results

Table 1 shows the descriptive analyses of the study variables in which significant differences between boys and girls are found for all variables, except time spent using the Internet during the week. Thus, boys reach higher values, although with a small effect size in problematic Internet use and time spent using the Internet on the weekend, and a larger effect size in problematic video game use.

Table 1*Descriptive data of the study variables according to gender*

		<i>N</i>	<i>M</i>	<i>SD</i>	<i>F</i>	η^2
Problematic Internet use	Girl	152	9.85	7.76	5.961*	.018
	Boy	167	12	7.91		
Family supervision	Girl	152	11.37	4.38	4.534*	.034
	Boy	167	10.38	4.14		
Problematic use video games	Girl	152	13.66	4.69	33.278*	.093
	Boy	167	17.06	5.82		
Time of use weekdays	Girl	152	1.53	0.84	1.496	.05
	Boy	167	1.65	0.92		
Time of use weekend	Girl	152	2.23	0.78	6.854*	.021
	Boy	167	2.45	0.72		

* $p < .05$.**Table 2***Correlations between variables according to gender*

Girls					
	Problematic internet use	Family supervision	Problematic use of video games	Weekday Internet use time	Weekend Internet use time
Problematic Internet use		-.17*	.59**	.47**	.53**
Family supervision	-.05		-.16*	-.17*	-.16*
Problematic use of video games	.7**	-.01		.2**	.33**
Weekday Internet use time	.59**	-.04	.38**		.49*
Weekend Internet use time	.52**	-.02	.41**	.5**	
Boys					

* $p < .05$; ** $p < .01$.

Regarding the correlations between variables (Table 2), both in girls and boys problematic Internet use correlates significantly and positively with the rest of the variables, reaching medium and high values. The largest gender differences are found in the relationship between problematic use of video games and problematic use of the Internet (.7 boys vs .59 girls), problematic Internet use and weekday internet use time (.47 boys vs .59 girls), and between problematic video game use and weekday internet use time (.38 boys vs .21 girls). All of them are higher for boys, but the difference is not significant. On the other hand, family supervision is significantly associated with and inversely proportional to the other variables, but only for girls.

Tables 3 and 4 show the results of the multiple regression equations for girls and boys, respectively. The value of the Durbin-Watson statistic is 1.901, low tolerances and VIF somewhat greater than 1, eigenvalues not close to 0, condition index below 20, variance ratios below 0.5.

The variables that have been introduced into the model explain a large variability of students' problematic Internet use. In the case of girls, the model explains 50.4% and in the case of boys, 62.5% of the variability. The variables that have been included in both regression equations are the same except in the case of family supervision, which is only found for girls and

as a protective factor. The other variables have positive coefficients and are therefore reported as risk factors. In addition to problematic video game use, it is time spent on the Internet on weekdays that accounts for the greatest variability in problematic Internet use compared to time spent on the Internet at weekends (e.g., .105 weekdays .019 weekends for boys). In addition, there are some differences in the values of the coefficients for each of the models. On the one hand, boys had higher coefficient values of problematic video game use (.451 girls vs. .534 boys) and weekday Internet use (.255 girls vs. .284 boys). However, with respect to weekend Internet use, these values are somewhat higher for girls.

Discussion

The main objective of this study is to analyze, differentiating by gender, whether problematic video game use, family supervision, as well as time of Internet use on weekdays and weekends, predict problematic Internet use among students in 5th and 6th grades of primary school.

Firstly, the descriptive results show that, among 10-12-year-olds, there are gender differences in problematic Internet use, with boys showing higher levels. These results are consistent with some studies in adolescents, such as Su et al. (2019), and could be

Table 3*Multiple regression of problematic Internet use in girls*

	1 β	2 β	3 β	4 β	R^2	ΔR^2	Change F
Family supervision	-.317	-.145	-.046	-.023	.023	.029	4.497*
Problematic use of video games		.587	.513	.451	.342	.345	78.853*
Weekdays Internet use			.362	.255	.462	.128	36.071*
Weekend Internet use				.251	.504	.045	13.795*

* $p < .01$.**Table 4***Multiple regression of problematic internet use in boys*

	1 β	2 β	3 β	R^2	ΔR^2	Change F
Problematic use of video games		.708	.575	.501	.501	165.449*
Weekday internet use			.35	.606	.105	43.722*
Weekend internet use				.165	.625	8.233*

* $p < .01$.

due to the different motivations girls and boys have when using the Internet, with girls more likely to use it for escape and boys more likely to use it for entertainment or personal achievement (Cebollero-Salinas et al., 2021; Griffiths, 2019; Su et al., 2020).

In terms of predicting problematic Internet use, the results show that problematic use of video games is the most important risk factor for both girls and boys, although to a greater extent for boys. Given the existing lack of studies analyzing the relationship between both problematic uses in primary school students, this result would be novel and would highlight that problematic use of video games is also relevant at these ages, as is the case in studies with adolescents (Tas, 2019; Tras, 2019). Playing video games is one of the main sources of leisure for minors aged 9 to 11, especially boys (Smahel et al., 2020). Given that studies show that minors with problematic video game use are more likely to be aggressive (Chacón-Chuberos et al., 2018), impulsive (Irles et al., 2016), have higher levels of anxiety, depression, and poor school performance (Shoshani et al., 2021), training programs are needed for proper family mediation, both in terms of time spent and video game content. In fact, the rates of possible problematic use are tripled among those who play PEGI 18 video games and among those who connect to the Internet or use the cell phone or game console after midnight (Andrade et al., 2021).

The second risk factor that influences the prediction of problematic Internet use is the time spent using the internet during the week, i.e., during school days. This is important for both genders and seems reasonable given that weekend use is higher for both genders (Andrade et al., 2021), so whether or not they use the Internet during the week could be more discriminative in predicting problematic Internet use.

A third risk factor in predicting problematic Internet use, although weaker than in the previous case, is the time spent using the internet during the weekend, for both girls and boys. This result could be related to girls and boys using the internet for leisure and free time, although they do so differently

(Malo-Cerrato et al., 2018; Park & Lee, 2014). According to these lines, the study conducted by Marcos et al. (2021) found that the average age of opening a first account in social networks is exactly in the range of students between 10 and 12 years old, the average time of using these social networks is between 2 and 3 hours for girls and 1-2 hours for boys. However, the main use is to play video games. This usage could indicate that today's children have learned to entertain themselves primarily through digital devices, with little ability to be bored or to seek out other activities away from the screens. Although it should not be forgotten that its good use can bring great benefits (Shoshani et al., 2021), it would be necessary to promote digital balance in leisure time from an early age. Similarly, the lack of rules within the family and the absence of family members at home for part of the day could encourage children to seek new sensations on the Internet, to escape boredom, to feel recognized, and to reaffirm their self-esteem, for example through video games (Díaz-López et al., 2020; Gómez et al., 2022).

Finally, it is relevant that the results show the protective role of family supervision in the face of problematic Internet use, but only in the case of girls. Some previous studies conducted in samples of adolescents and young adults follow the same lines (Cebollero-Salinas et al., 2021; Sasson & Mesch, 2016; Song et al., 2020). A possible explanation for this result could be the fact that the most valued advice in households, regardless of age, is that which focuses on privacy and security issues (Harris & Jacobs, 2022). If so, given that boys spend more time playing video games than girls when they are online (Díaz-López et al., 2020; Su et al., 2020), it may be possible that families do not consider it necessary to accompany their children when they play. Another line of explanation could be related to how far parents feel from their children's use of the Internet (the video games themselves), which makes it difficult for them to give advice, if any at all (Coyne et al., 2017). It may be that families are more protective of girls because they have more control and knowledge about their internet use (Sasson & Mesch, 2016; Song et al., 2020).

In terms of accompanying the responsible and healthy use of the Internet, Shin and Kang (2016) indicate that dialogue, leading, and guiding children through online activities (active mediation) works better than restrictive mediation, so it would be advisable to promote training in homes to learn how to talk about technology and Internet issues. In fact, Benedetto and Ingrassia (2020) point out that family acts as a mediator between children and digital tools, favoring the adaptive use of the Internet. Prevention and education from an early age would be relevant to avoid negative consequences, such as occasional or frequent psychopathological problems (Vicente-Escudero et al., 2019). However, Spain is among the European countries with the lowest levels of family mediation, both in terms of time control and types of use or content consumed (Smahel et al., 2020). This suggests the need to promote collaboration between family and school, as well as other institutions, in order to improve the training of parents in these aspects and incorporate digital guidance habits at home.

Within the educational sphere, these issues shall be addressed in primary education classrooms for prevention in a coordinated manner with families. Thus, different learning methodologies such as gamification can be used to promote the responsible use of the Internet and video games, working on both their virtues and the indicators of their problematic use. Having the necessary skills and support from adults to deal with their approach to digital devices before entering adolescence can improve both the necessary coexistence in the classroom and cybercoexistence within social networks for primary school students (Cebollero-Salinas et al., 2022).

This study is not without limitations. On the one hand, the sample size has been obtained for convenience and is limited to one region of Spain. It would be useful to increase the number of participants and the variety of contexts in future works. On the other hand, the data have been collected through online questionnaires, so it would be desirable to complement them with more qualitative instruments such as interviews. Finally, future studies should integrate other variables related to problematic internet and video game use such as self-esteem, personality, social support from friends (Malo-Cerrato et al., 2018), as well as the need to compete and to escape from reality (Carras et al., 2017) in order to have a more global view at these ages.

Despite its limitations, this study presents novel results, particularly due to the lack of studies relating the variables analyzed in children under 10-12 years of age and using gender as a differential variable. Thus, problematic use of video games is a risk factor for the problematic use of Internet in the case of both genders, although boys are more affected. On the other hand, children who spend more time online on weekdays are more like to develop a problematic internet use than those who are on the internet during the weekend. Finally, with regard to family supervision, only girls benefit from its protective factor. Therefore, this study provides evidence to suggest the need to emphasize the importance of digital balance during primary education, to promote face-to-face leisure as an alternative to video games, and to encourage family supervision.

Author contributions

Conceptualization: A.C.S.
 Data curation: P.B.A., A.C.S.
 Formal analysis: A.C.S.
 Investigation: P.B.A., A.C.S.
 Methodology: A.C.S.
 Project administration: P.B.A.
 Software: P.B.A., A.C.S.
 Supervision: I.P.R., A.C.S.
 Visualization: I.P.R.
 Writing – original draft: P.B.A., I.P.R.
 Writing – review & editing: P.B.A., I.P.R., A.C.S.

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Declaration of interests

The authors declare that there is no conflict of interests.

Data availability statement

Research data are not shared.

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tiempo de uso, supervisión familiar y uso problemático
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**Problematic Internet use in primary school: time of use,
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predictors differentiating by gender**

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