

ORIGINAL

## Problematic use of WhatsApp and adolescents: What educational role do parents play?

### *Uso problemático de WhatsApp entre adolescentes: ¿Qué papel educativo juegan los padres y las madres?*

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#### Abstract

The goal of this study is to understand the relationship between the problematic use of WhatsApp among young adolescents and parental mediation. The rise of mobile phone use among young people is a cause for concern, especially among parents themselves. The literature suggests that parents have a certain amount of room for maneuver through different parental strategies (parental mediation) to maximize the benefits of technology and reduce its possible risks, although this has not been sufficiently analyzed in the case of problematic use of the mobile phone and its applications. This study therefore examined three different parental mediation strategies (restrictive, modeling and stimulation) and their possible impact on the problematic use of WhatsApp. The sample comprised 1,144 13- and 14-year-old students during three academic years (2015-2018) in 17 schools in 7 Spanish provinces. One of the novelties of the study was the use of adolescent voices to understand the parental mediation of their parents. The results showed a direct relationship between the level of restrictive mediation and a problematic use of WhatsApp. In addition, the number of mobile phones that students have enjoyed, as well as whether parents use their mobile phone during dinner, also has a positive relationship with the problematic use of WhatsApp. These results are useful for understanding a responsible use of the mobile phone, as well as to guide parents about the problematic use of WhatsApp among adolescents.

**Keywords:** problematic use, WhatsApp, mobile phone, parental mediation, adolescence

#### Resumen

El objetivo del presente estudio es comprender la relación entre el uso problemático del WhatsApp entre jóvenes adolescentes y la mediación parental. El auge del uso del teléfono móvil entre los jóvenes es motivo de preocupación, especialmente entre los propios padres y madres. La literatura sugiere que los progenitores disponen de cierto margen de maniobra a partir de distintas estrategias parentales (mediación parental) para maximizar los beneficios de la tecnología, y reducir sus posibles riesgos, sin ser suficientemente analizadas en el caso del uso problemático del móvil y sus aplicaciones. Por este motivo, este estudio examina tres distintas estrategias de mediación parental (restrictiva, modelado y estimulación) y su posible impacto en el uso problemático del WhatsApp. Para ello, se empleó una muestra de 1.144 estudiantes de 13 y 14 años durante tres cursos académicos (2015-2018) en 17 colegios de 7 provincias españolas. Una de las novedades del estudio es el uso de las voces de los adolescentes para comprender la mediación parental de sus padres. Los resultados muestran una relación entre el nivel de mediación restrictiva y un uso problemático de WhatsApp. Además, el número de móviles que han gozado los estudiantes, así como si los padres cenan con el móvil durante la cena también tiene una relación positiva con el uso problemático de WhatsApp. Estos resultados son útiles para entender un uso responsable del teléfono móvil, así como para orientar a padres sobre el uso problemático de WhatsApp entre adolescentes.

**Palabras clave:** uso problemático, WhatsApp, teléfono móvil, mediación parental, adolescencia

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The irruption of technology is claimed by 93.7% of Spaniards to have affected their family routines (Centro de Investigaciones Sociológicas, 2015), resulting in poorer communication between parents and children (67.9%) and between partners (49.4%), and increasing family conflict (51.5%). Five decades after Martin Cooper's first call from a modern mobile phone, most people in post-industrial society have a mobile phone of their own. Teenagers are no exception.

According to recent data, 69.5% of Spanish adolescents have a mobile phone, rising to 95.7% at 15 years of age (Instituto Nacional de Estadística, 2020), with the rite of passage taking place between the age of 12 and 13 years. Among adolescents, 40% of boys and almost 30% of girls say they touch their mobile phone between 50 and 100 times a day, which implies an active contact every 15 or 20 minutes (Masip & Balagué, 2015).

Such intensive use of the mobile phone invites reflection on possible problematic use (Chóliz, Villanueva & Chóliz, 2009; Pedrero Pérez, Morales Alonso & Ruíz Sánchez de León, 2021; Pedrero Pérez, Rodríguez Monje & Ruíz Sánchez De León, 2012; Ruiz-Ruano García, López-Salmerón & López Puga, 2020; Sánchez-Romero & Álvarez-González, 2018). Although some studies use the term addiction, the American Psychiatric Association (APA) does not consider this suitable for referring to dependent use of mobile phones. According to different authors, the most appropriate term to refer to this dependent use seems to be *problematic use* (Panova & Carbonell, 2018). Thus, different studies present levels of problematic mobile phones use among Spanish adolescents ranging from 2.8% to 26% (Besolí, Palomas & Chamarro, 2018; Carbonell, Fúster, Chamarro & Oberst, 2012; Golpe Ferreiro, Gómez Salgado, Kim Harris, Braña Tobío & Rial Boubeta, 2017; López-Fernández, 2017).

It is interesting to break daily mobile phone usage down in order to better understand its possible implications. Of the total daily use (165 minutes on average according to some studies), a fifth is dedicated to WhatsApp (Montag et al., 2015), an instant messaging application that 90.6% of young people confirm to have (Golpe Ferreiro et al., 2017), and 83.3% report using it daily (García-Jiménez, López-de-Ayala López & Montes-Vozmediano, 2020). However, and although its use is daily and widespread, WhatsApp has been paid very little academic attention. This study therefore aims to understand the problematic use of WhatsApp among adolescents, and its relationship with the educational role of their parents, examining the voice of 1,144 13- to 14-year-old Spanish adolescents themselves. Given this situation, and knowing that most Internet use takes place in the home, and more precisely in the rooms of adolescents, in *bedroom culture*, (Livingstone, Haddon,

Görzig & Ólafsson, 2011), reflection on the educational role of parents is urgently needed.

A possible approach to encouraging good mobile phone and WhatsApp use among adolescents is parental mediation. By parental mediation, we mean the strategies that parents can use to reduce and minimize the risks of technology for their children and, in turn, enhance the benefits (Berríos, Buxarrais & Garcés, 2015; Chng, Li, Liao & Khoo, 2015; López de Ayala & Ponte, 2016).

Each great technological irruption in the home has been accompanied by new strategies of adults to educate, limit, or restrict access and content available to minors. First it was television, then video games and computers, and now it is smartphones. There were basically three parental mediation strategies for television: *active* (explaining and discussing the benefits of responsible consumption/use); *restrictive* (limiting hours and prohibiting certain content); and *shared viewing* (watching TV together) (Nathanson, 1999, 2001). For video games, mediation strategies were very similar to those for television: active, restrictive, and shared play (Shin & Huh, 2011).

With the appearance of mobile phones, however, the complexity and difficulty perceived by parents in managing the use of these devices by their sons and daughters has grown. This increase in complexity is due to the nature of the device itself, since its complete portability and individual use, alongside other obstacles such as lack of time or lack of knowledge about the multiplicity of uses these mobile devices offer, make it difficult to control and manage (Besolí et al., 2018; Symons, Ponnet, Walrave & Heirman, 2017).

Here, the academic literature presents a series of parental strategies that may be classified as *active mediation*, parental efforts to talk and discuss the risks; *restrictive mediation*, parental efforts to limit the time and availability of use; *shared mediation*, parental efforts to observe active use of devices; and *technological mediation*, parental efforts to limit and control the use of technology and access to devices (Livingstone & Helsper, 2008). In Spain, the most used parenting strategies are active and restrictive, with 90% of parents using one of the two strategies, and technological mediation being the least used (Garmendia Larrañaga, Casado del Río & Martínez Fernández, 2015). Nevertheless, parents prefer to use active mediation above restrictive or technological mediation if possible (Martínez, Casado & Garitaonandia, 2020).

Of the four strategies, some studies suggest that the most effective is the restrictive (Kirwil, Garmendia, Garitaonandia & Martínez Fernández, 2009). In a study with more than 40,000 adolescents, 51.1% reported that their parents limited their use of the Internet, and 47.9% the use of their mobile phone (Golpe Ferreiro et al., 2017). This is the reason why our study aimed to understand the relationship between restrictive parental mediation and the problematic use of WhatsApp; and the first research

question guiding this study: To what extent is there a relationship between restrictive parental strategies and adolescents' problematic use of WhatsApp?

Other studies, however, present a more marginal role of parents (Malvini Redden & Way, 2016) in the control and management of the use of the internet and mobile devices of their children. Symons et al. (2017) called this type of parent 'watchdogs' because their role is minimal, but they step in when needed. Such parents justify their passive role by the need to offer their children some privacy and space, together with the perception that online life is part of the social life in which adolescents must be able to develop autonomously. This typology of parents resembles the *worried absent* families that emerged from the analysis by Torrecillas-Lacave et al. (Torrecillas-Lacave, Encina Morales de Vega & Vázquez-Barrio, 2017).

Along these lines, there are two indirect strategies that are often not considered part of parental mediation by many authors, but which can have a direct impact on the way children act. The first is parental modelling, one of the seven strategies emerging from a study with parents of children in primary education (Bartau-Rojas, Aierbe-Barandiaran & Oregui-González, 2018). Parental modelling is understood as instructing and teaching by example, under the assumption that adolescents will copy everything they see in their parents. We thus assume that the way parents use WhatsApp will affect how their children do so. To better investigate this, a very important moment of the day was chosen: dinner. The literature suggests that families who eat together have many positive psychological, social, or developmental outcomes. For example, although family dinners seem to be declining (Fischler, 2011), they contribute to healthier eating behaviours, as well as greater family cohesion, greater self-regulation of children, among others, and even better financial preparation for the following day (Chatterjee, Palmer & Goetz, 2012; Eisenberg, Olson, Neumark-Sztainer, Story & Bearinger, 2004; Taverns et al., 2005). For this reason, and aware of the direct impact the use of mobile phones has on parent-child relationships, we were interested in understanding the relationship between parental use of WhatsApp precisely during dinner and its problematic use by their children, giving rise to the second question guiding this research: To what extent is there a relationship between parents' use of WhatsApp at dinner and their children's problematic WhatsApp use?

The third parental measurement strategy explored in this study is stimulation. Stimulation is understood as an indirect and possibly unconscious strategy that explains how the number of smartphones 'enjoyed' (in the sense of having the privilege of using them) can lead to greater use, and consequently, to a greater probability of problematic use. Castillo and Ruiz-Olivares (2019) found a positive relationship between enjoying more than two smartphones

with a problematic use of these. The availability of a number of mobile phones bought or used can be understood as an 'invitation' to use them, since parents, as mediators in the number of mobile phones used by their children, can reinforce or limit the relevance of the mobile device via the number of devices provided for their children. In fact, some studies indicate that parents, despite awareness of the harmful consequences of the mobile phone, use it as a source of punishment and reward, where punishment is associated with the limitation of the mobile phone, and reward with the purchase of new devices or more time of use (Condeza, Herrada-Hidalgo & Barros-Friz, 2019). In this study, stimulation through the number of mobiles enjoyed is considered a parental mediation strategy. The third and last question guiding the study is therefore: To what extent does the number of mobiles enjoyed by adolescents have a positive relationship with the problematic use of WhatsApp?

Finally, an interesting literature review carried out by López de Ayala and Ponte (2016) on parental mediation of online practices in Spain highlighted that 1) there has been a slight decrease in the number of investigations examining parental mediation, 2) mediation is a "minor" topic in the studies examined, 3) of the 39 studies published in Spain, 20 of them have been published in an institutional environment, and 4) the informants participating in the studies on parental mediation continue to be the parents rather than the children.

Therefore, given the need to reflect on and understand the educational role of parents in the digital age, together with considerable problematic WhatsApp use among adolescents, and insufficient literature exploring the relationship between the two, this study aimed to contribute to advancing the research on parental mediation and the problematic use of new technologies among adolescents. To understand the relationship between the problematic use of WhatsApp and its educational role, a sample of 1,144 Spanish adolescents was selected.

The novelty of the study is threefold. First, it examined the problematic use of an application that despite accounting for a fifth of daily online time is still to receive adequate academic attention: WhatsApp (Montag et al., 2015; Tresáncoras, García Oliva & Piqueras Rodríguez, 2017). Second, the study connected the problematic use of WhatsApp with three parental mediation strategies (restrictive, modelling and stimulation), the last two rarely being examined (Bartau-Rojas et al., 2018; Condeza et al., 2019). Finally, the study used the "voices" of the adolescents themselves to understand parental mediation and avoid a possible overestimation reported by the parents (Martínez et al., 2020).

## Method

### Participants

To explore the relationship between parental mediation and problematic WhatsApp use among adolescents, this study was based on a sample of 1,144 students aged 13 and 14 from 64 different classes in 17 secondary schools in Spain over a period of three academic years: 2015/2016, 2016/2017 and 2017/2018. The 17 schools are located between the Balearic Islands (N = 59), Barcelona (N = 565), Gerona (N = 149), Guipúzcoa (N = 23), Lérida (N = 47), Madrid (N = 149) and Tarragona (N = 152). The secondary schools deciding to participate in the study, carried out by a Foundation, had twin goals: to promote responsible use of mobile phones among their students, and to discover the state of play in their classrooms. All participating schools were state-run (concertado), and all students were in their second year of compulsory secondary education (ESO). The global sample comprised over 20,000 students, from which a final sample of 1,144 students was selected by simple random sampling with a 5% margin of error and a 99% confidence level.

### Instruments

An ad hoc exploratory questionnaire was developed using an ex-post facto methodology, not generalizable, to collect information on the problematic use of mobile phones and WhatsApp. The questionnaire comprised 36 items, and was distributed in Spanish and Catalan, depending on the school. The items were developed by the Foundation promoting the project, and the data from the questionnaire related to problematic WhatsApp use were transferred to the researchers of this study for analysis. The data transferred were completely anonymized making it impossible to identify any student.

The main variable of this study was problematic WhatsApp use. To analyse it, the following question (answers: 1 = yes, 0 = no) was used: In view of your answers on this questionnaire, do you think you are addicted to WhatsApp?

To understand the restrictive mediation strategy, seven questions were used (see Table 1). Based on the responses of the participants, three levels of restrictive mediation were generated: strict (when the child answers 1 on no or one occasion), moderate (when the child answers 1 between two and three times), lax (when the child answers 1 between four and seven times). In conjunction with the young person's response to the self-reported problematic use item, these questions can help to confirm whether or not use of the instant messaging application is really problematic.

To understand the effect of the parents' own example (modelling), a single question was analysed: students were asked if their parents had the mobile next to them during dinner and checked it, with two possible answers 1 = yes, 0 = no.

Item 14 was used to understand the number of mobile phones (stimulation) that the analysed students enjoyed: How many different cell phones have you had? To facilitate the analysis, a new *dummy* variable was created with the options 1 = three or more mobiles, 0 = fewer than three mobiles.

### Procedure

All school management teams were informed of the aim of the program, and permission was requested to distribute questionnaires. Once the school agreed to participate in the program, consent was requested from the parents of the students, given their status as minors. All students were informed of the anonymous and confidential nature of the study. The questionnaire was distributed to the whole class by their teachers, always during class time, in most cases taking advantage of sessions with the class teacher. The time for answering the questionnaire was 15-20 minutes.

### Analysis

Questionnaire data were entered into the statistical program STATA version 12. The analysis carried out included the study of descriptive statistics for each of the selected variables (totals, frequencies, and the chi-square

**Table 1**  
*Questionnaire items for restrictive strategy*

Question	Answers
1) When you wake up, is the first thing you do to look at WhatsApp?	1 = yes; 0 = no
2) What time do you send the first WhatsApp message of the day?	Possible answers 6 (a)
3) Do you carry your mobile with you everywhere, even at home?	1 = yes; 0 = no
4) At lunch and dinner, do you have your mobile next to you and do you look at it?	1 = yes; 0 = no
5) At what time do you send the last WhatsApp message of the day?	Possible answers 6 (b)
6) Do you turn off your mobile at night?	1 = no; 0 = yes
7) Do you sleep with your mobile under the pillow or on the bedside table so that it is within reach?	1 = yes; 0 = no

Note. (a) Dummy variable 1 = before 8 a.m.; 0 = after 8 a.m. (b) Dummy variable 1 = after 10 p.m.; 0 = before 10 p.m.

and Spearman’s Rho tests), and the table of correlations between the variables examined. To estimate parental mediation in the problematic use of WhatsApp, logistic regressions (logit) were used with the dichotomous variables defining the variables under analysis.

## Results

The aim of the study was to understand the relationship between parental mediation strategies and the problematic use of WhatsApp among 13- and 14-year-old adolescents. To this end, we analysed an initial sample of 1,547 students in their second year of secondary education in 64 classes from 17 schools for three years. As shown in Table 2, 79% of students analysed had a mobile phone, with a

slight increase observed in the proportion of students with a mobile from the 2015/16 academic year (75%) to the 2017/18 academic year (82%). In relation to WhatsApp, 74% stated that they had this instant messaging application on their mobile. Once again, an increase was found in the number of students with WhatsApp, rising from 68% in 2015/16 to 78% in 2017/18. Since the purpose of this study was to understand the relationship between different parenting strategies and the problematic use of WhatsApp, the final sample was composed only of students who had WhatsApp (N = 1,144 students).

As shown in Table 2, 24.8% of the second-year students in our sample admitted to having problematic use of WhatsApp. A second question, with a similar but not identical focus, asked students to assess whether

**Table 2**  
*Totals, frequencies and chi square test of WhatsApp use and restrictive mediation*

		2015/16	2016/17	2017/18	Total	Chi	p	
Students with a mobile phone	n	301	382	539	1.222			
	%	74.9	78.4	81.9	79.0	7.58	0.02	
	Total	402	487	658	1.547			
Students with WhatsApp	n	275	353	516	1.144			
	%	68.4	72.5	78.4	73.9	13.75	0.00	
	Total	402	487	658	1.547			
Problematic WhatsApp use	According to adolescents themselves	n	64	102	118	284		
		%	23.3	28.9	22.9	24.8	4.55	0.10
		Total	275	353	516	1.144		
	According to environment (self-report)	n	71	100	138	309		
		%	25.8	28.3	26.7	27.0	0.53	0.77
		Total	275	353	516	1.144		
Restrictive mediation	First action is checking WhatsApp	n	89	120	130	339	9.08	0.01
		%	32.4	34.0	25.2	29.6		
	First message before 8 a.m.	n	98	158	241	497	9.31	0.01
		%	35.6	44.8	46.7	43.4		
	Carrying phone at home	n	137	182	261	580	0.19	0.91
		%	49.8	51.6	50.6	50.7		
	Lunch and dinner with phone	n	41	55	65	161	1.75	0.42
		%	14.9	15.6	12.6	14.1		
	Last WhatsApp after 10 p.m.	n	165	198	285	648	1.72	0.42
		%	60.0	56.1	55.2	56.6		
	Phone not turned off at night	n	178	215	297	690	3.93	0.14
		%	64.7	60.9	57.6	60.3		
	Sleeping with phone	n	128	168	235	531	0.36	0.84
		%	46.5	47.6	45.5	46.4		
	Total	n	275	353	516	1.144	-	-
	More than 3 mobiles	n	116	142	186	444		
		%	42.2	40.2	36.0	38.8	3.27	0.19
		Total	275	353	516	1.144		

people close to them told them that they were hooked on their smartphones. Here, the results show that 27% stated that people in their environment considered them to have problematic use; thus, according to the sample, self-perception was lower than the perception by their environment.

Table 2 shows the seven items making up restrictive mediation by parents, since the study assumes that parents have some room for manoeuvre in the use and management of their adolescent children's mobile phones and WhatsApp when they are at home. The results of the study reveal that 30% admitted that the first thing they did on waking up was to look at WhatsApp, and 43% sent their first message before 8 in the morning. More than half of the students (51%) stated that they always had the phone with them when they were at home, and 14% reported using the mobile during lunch and dinner. At night, rather lax parental control of WhatsApp use was observed, with more than half (57%) of adolescents sending the last WhatsApp later than 10 at night, 60% confirming that they did not turn off the phone during the night, and 46% sleeping with it, leaving it either under the pillow or on the bedside table. Table 2 also shows slight variations across the three academic years.

Using the seven variables examined in Table 2, three possible levels of restrictive mediation (strict, moderate, and lax) were created based on the children's responses, as detailed in the Methodology section. This categorization (Table 3) shows a quarter of the fathers and/or mothers (25.5%) using a strict strategy, with clear rules on when and

how to use the mobile and WhatsApp, and this group is the one reporting the lowest level of problematic WhatsApp use (7.5%). At the other extreme, a third of the parents used a lax strategy, that is, very low control over the use and management of their children's mobile and WhatsApp, with this group having the highest percentage of students reporting problematic WhatsApp use (45%). In between these two strategies, 41% of participants used moderate restrictive mediation, with problematic WhatsApp use reported by an average of 20.1%.

A second parenting skill examined in the study is the example of the parents themselves (modelling). As shown in Table 3, 17% of the sample confirmed that their parents used their mobile phones during dinner, with these adolescents reporting a higher problematic use of WhatsApp (29.0%) than the children of parents who do not use the phone during the evening meal (23.9%).

Finally, the last parental skill analysed is stimulation, which refers to the number of mobiles enjoyed by adolescents between 13 and 14 years of age. As shown in Table 3, 39% have had more than three mobile phones in their life, although the results show a slight decline in the number of phones used.

Table 3 shows the relationship between the number of mobiles enjoyed and the reported problematic WhatsApp use. While adolescents who have had only one mobile reported an average of 13% problematic use, the percentage soared to 41.5% among those students who have had six mobiles. Classifying the students into just two groups, those who have had three mobiles or fewer, and

**Table 3**  
*Totals, frequencies and chi square test of strategies, modelling and number of mobiles*

		N	%	Problematic WhatsApp use	Chi	p
Strategy adopted	Strict	292	25.5%	7.5%	129.51	0.00
	Moderate	473	41.4%	20.1%		
	Lax	379	33.1%	44.1%		
	Total	1,44		24.8%		
Modelling	Parents at dinner without mobile	944	82.5%	23.9%	2.26	0.13
	Parents at dinner with mobile	200	17.5%	29.0%		
	Total	1,144		24.8%		
Number of mobiles	Less than three mobiles	700	61.2%	19.0%	3.84	1.01
	1 mobile	46	4.0%	13.0%		
	2 mobiles	301	26.3%	16.9%		
	3 mobiles	353	30.9%	21.5%		
	More than three mobiles	444	38.8%	34.0%		
	4 mobiles	208	18.2%	29.3%		
	5 mobiles	106	9.3%	34.0%		
	6 mobiles	130	11.4%	41.5%		
Total	1,144		24.8%			

**Table 4**  
*Spearman's Rho between habits and problematic WhatsApp use*

Variable	Spearman's rho	Problematic WhatsApp use
1. Primer action of the morning	Correlation coefficient	0.372(**)
	Sig. (bilateral)	0.000
	N	1,144
2. Message before 8 a.m.	Correlation coefficient	0.182(**)
	Sig. (bilateral)	0.000
	N	1,144
3. Dinner with phone	Correlation coefficient	0.163(**)
	Sig. (bilateral)	0.000
	N	1,144
4. Phone always carried	Correlation coefficient	0.340(**)
	Sig. (bilateral)	0.000
	N	1,144
5. Message after 10 p.m.	Correlation coefficient	0.262(**)
	Sig. (bilateral)	0.000
	N	1,144
6. Phone not turned off	Correlation coefficient	0.119(**)
	Sig. (bilateral)	0.000
	N	1,144
7. Sleeping with phone	Correlation coefficient	0.127(**)
	Sig. (bilateral)	0.000
	N	1,144
8. Parents at dinner with phone	Correlation coefficient	0.044
	Sig. (bilateral)	0.133
	N	1,144
9. More than three phones	Correlation coefficient	0.169(**)
	Sig. (bilateral)	0.000
	N	1,144

Note. \*\* Correlation is significant at 0.01 (bilateral).

those who have had more, we observe that the problematic use of WhatsApp is 19% in the first case, and 34% in the second.

Regarding the reliability of the data presented, it should be noted that, after carrying out the chi-square tests in each of the variables analysed, the level of significance value was greater than 0.05 in all cases, with the exception of these variables, related to restrictive mediation (see Table

**Table 5**  
*Estimated parameters of problematic WhatsApp use model*

Variable	Usos problemático WhatsApp		
	(modelo 1)	(modelo 2)	(modelo 3)
<i>Stimulation: number of phones</i>	0,15009*** (0,02585)	0,14753*** (0,02601)	0,02816 (0,02522)
<i>Modelling: parents have phone at dinner</i>		0,02969 (0,03338)	-0,00343 (0,03083)
<i>ET strategy: First action</i>			0,23700*** (0,02738)
Message before 8 a.m.			0,09270*** (0,02345)
Phone always carried			0,16437*** (0,02564)
Dinner with phone			0,04426 (0,03510)
Message after 10 p.m.			0,11520*** (0,02468)
Not turning phone off			-0,01007 (0,02542)
Sleeping with phone			-0,00931 (0,02529)
Constant	0,19*** (0,01611)	0,18580*** (0,01679)	-0,01701 (0,02361)
R2	0,0287	0,0293	0,2201
Observations	1.144	1.144	1.144

Note. \*  $p < .1$ ; \*\*  $p < .05$ ; \*\*\*  $p < .01$ .

2); checking WhatsApp first thing ( $p = 0.01$ ) and sending the first message before 8 a.m. ( $p = 0.01$ ); the same applies to the strategies adopted, as reflected in Table 3 ( $p = 0.00$ ).

Table 4 shows the results obtained in the analysis of the relationship between the variables using the Spearman's Rho test. In the case of problematic WhatsApp use, the results showed a significant Spearman correlation at the 0.01 level with all the variables except for whether the parents use the mobile phone during dinner.

To understand the size and relationship between the variables presented above and the main variable in this study (the problematic use of WhatsApp among young people in the second year of secondary education), a logistic regression analysis was carried out. Because the variables are dichotomous, the logistic regression model used for this study was the logit model.

Table 5 shows three models. The first shows a positive and significant relationship between stimulation (having enjoyed more than three mobiles) and problematic WhatsApp use. The second model examines the size and relationship of stimulation (number of cell phones enjoyed) and modelling (example of the parents themselves) with problematic WhatsApp use. As the table shows, the two variables have a positive and significant relationship with the level of problematic use reported among students. Finally, the third model presents all the independent variables to be studied, hence the restrictive strategy comprising the seven variables presented is added to stimulation and modelling. Of these seven variables, four have a positive and significant relationship. These are: checking WhatsApp first thing in the morning, sending the first message before 8 a.m., always carrying the mobile, and sending the last WhatsApp message after 10 at night. According to this model, there was an association between the level of restrictive mediation by parents and adolescents' problematic WhatsApp use.

## Discussion

The objective of this article was to examine the relationship between problematic WhatsApp use among adolescents and their parents' educational role through three strategies (restrictive mediation, modelling and stimulation), using a sample of 1,144 Spanish adolescents. The article contributes to advancing the literature on parental mediation and the problematic use of new technologies among adolescents, especially the use of WhatsApp, given its importance compared to other social networks (García-Jiménez et al., 2020) and the paradoxically low level of attention paid to it in the literature (Tresáncoras et al., 2017).

In line with previous studies in Spain, which confirmed that between 85.2% and 91.7% of adolescents had their own mobile phone (Besolí et al., 2018; Golpe, Gómez, Braña, Varela & Rial, 2017), this study, with a slightly younger age cut-off, found that on average across the three academic years (2015-2018), 79% of adolescents aged between 13 and 14 years had their own mobile phone, reaching 81.9 % in the 2017/18 academic year. According to the Spanish national office of statistics (INE), in 2018, 86.2% of 13-year-olds had a mobile (Instituto Nacional de Estadística, 2018), not an entirely different result. Regarding the use of WhatsApp, our results show that 73.9% of adolescents had this application. In other Spanish studies, with larger age samples, similar results were found. For example, in a study with 411 students aged between 0 and 18 years, 74.6% reported always or almost always using instant messaging (Besolí et al., 2018). In another study with a sample of 524 adolescents from first to fourth year of compulsory secondary education in the Community of Madrid, 83.3% confirmed using WhatsApp on a daily basis (García-Jiménez et al., 2020).

Finally, a study with more than 40,000 Spanish students aged between 12 and 17 years revealed that 90.6% used WhatsApp (Golpe et al., 2017).

Despite the intensive and massive use of WhatsApp, occupying up to 20% of daily online use (Montag et al., 2015), there has been very little research on implications and problematic use (Tresáncoras et al., 2017). This, however, is not the case with problematic mobile phone and Internet use, where the literature is rich. According to a review of Spanish empirical studies, problematic mobile phone use ranges from 2.8% to 26.1% among adolescents (Carbonell et al., 2012). In other more recent studies, 21.8% of a sample of young Andalusians had a moderate addiction to mobile phones (Castillo & Ruiz-Olivares, 2019). Another study with a Galician sample of 1,709 students aged between 11 and 17 years, 26.6% reported a problematic use of the Internet (Rial Boubeta, Golpe Ferreiro, Gómez Salgado & Barreiro Couto, 2015). Likewise, a study using the problematic internet use scale (EUPI-a) showed 9% with problematic use, although 16% were likely to be considered problematic users (Golpe et al., 2017). These results were similar to those of another study where 15% of adolescents were categorized as having a high risk of problematic mobile use (Besolí et al., 2018).

In relation to the problematic use of WhatsApp, however, the literature has been very scarce, as previously mentioned. Tresáncoras et al. (2017) found that 6% of a sample of 272 adolescents between the ages of 12 and 17 in the province of Alicante suffered from problematic WhatsApp use. In our case, the percentage is considerably higher, approaching 25%, revealing a potential problem that others have already pointed out. For example, a very recent study found that 22.3% of adolescents confessed to being nervous without access to WhatsApp (García-Jiménez et al., 2020). Despite the difficulty in comparing the results with other recent studies, given the different instruments and age cut-offs in the sample, our study suggests that a sizeable percentage of adolescents could be suffering from problematic WhatsApp use.

Furthermore, the results suggest a link between the problematic use of WhatsApp and the mediating role of parents, a crucial role in all preceding great technological eruptions, such as television or video games (Nathanson, 1999; Shin & Huh, 2011). In the case of problematic use of the mobile or any of its applications, there is greater complexity, since the portability of the device, the multiplicity of uses, and solitary and individual use make parental management difficult. For this reason, it is necessary to continue advancing in the research that sheds light on how to improve the management of technology use by adolescents. In our case, the study shows a positive relationship between three types of strategies (restrictive, modelling and stimulation) and problematic WhatsApp use.



In the Spanish context, 51% of adolescents indicate that parents limit their use of the Internet, and 47.9% control their mobile phone (Golpe et al., 2017). Although the majority of parents prefer active to restrictive or technological mediation (Martínez et al., 2020), restrictive mediation seems to be the most efficient (Kirwil et al., 2009). In our case, we found a link between the level of restriction and the problematic use of WhatsApp, that is, the less strict (for example, sleeping with the mobile), the more likely it is that problematic use of WhatsApp is reported, although causality cannot be determined.

Another novelty of the study is that it examined the relationship between the problematic use of WhatsApp among adolescents and *modelling* (parental example) and *stimulation* (number of mobiles owned). Parental modelling is one of the seven strategies that emerged from a study with parents of children in primary education (Bartau-Rojas et al., 2018) and involves understanding the importance of teaching by example. It is assumed that the way parents use WhatsApp and the mobile phone will affect how their children use them. Although the percentage of parents using their mobile while having dinner was low (17%), there was a positive relationship with the problematic use of WhatsApp by their sons and daughters. Finally, this study examined stimulation, understood to be an indirect and unconscious strategy explaining how the number of mobiles owned can lead to greater use, and consequently to more probabilities of problematic use. Our study confirmed the relationship between the number of phones enjoyed and the problematic use of WhatsApp. Students who have had more mobiles are those who reported more problematic use; once again, causality cannot be discerned. Our results are in line with Castillo and Ruiz-Olivares (2019), who found a positive relationship between having enjoyed more than two phones and their problematic use.

## Limitations and outlook

Despite its threefold contribution to advancing research on the educational role of parents and problematic technology use by adolescents, by firstly examining the relationship between parental mediation and WhatsApp ignored in the literature, secondly adding the two very little explored strategies of modelling and stimulation, and thirdly using the voices of adolescents themselves to understand the educational role of parents, this study is not without limitations.

Among these, the first to be highlighted is the lack of causality. The study does not allow us to know whether parents using a more restrictive strategy is already the result of problematic use by their children, or whether parents who perceive that their children have the ability to control and regulate their use of the Internet impose fewer rules (Padilla-Walker & Coyne, 2011). Therefore,

the study is unable to observe the dynamics of parental mediation, which has very often been presented as a set of preconceived rules or strategies that are implemented or not, but which we think is better defined by a dynamic process based on the daily interaction between parents and adolescents (Symons et al., 2017).

Second, the main variable of the study, problematic WhatsApp use, is based on a single self-reported item. It would be very valuable in future research to be able to use validated scales. One option could be to adapt the already validated scales of problematic mobile phone use (Bianchi & Phillips, 2005; Billieux, Van Der Linden & Rochat, 2008; López-Fernández, Honrubia-Serrano & Freixa-Blanxart, 2012) to the problematic use of WhatsApp.

Third, the study does not examine other sociodemographic variables such as gender or parents' educational level, which could be of great interest (Golpe et al., 2017). Some studies, for example, suggest that being a girl is linked to problematic mobile phone use (Castillo & Ruiz-Olivares, 2019).

Fourth, using the adolescents' own "voices" is one of the novelties of the study, but it can also be a limitation given that while parents tend to overestimate their educational role, adolescents tend to underestimate it (Martínez et al., 2020). Likewise, it should be noted that the same educational style is not usually observed by both parents in a coherent and consistent manner over time, and may in many cases be at the level of anecdotal coincidence.

Fifth, we do not know the potential influence of the classroom teacher at the time of survey completion. Some students may have felt vulnerable by the fact that their class teacher, walking around the room, could see some of their answers.

Despite all these limitations, this research provides new evidence of the importance of the educational role of the family in the management and use of technology by adolescents, pointing to the need to continue investigating the new challenges and the educational role of parents in the digital age.

Future research would ideally analyse the relationship between problematic WhatsApp use and variables such as anxiety and/or day-to-day dysfunction due to using or not being able to use the application. Moreover, it would also be very interesting to understand the influence of gender on problematic WhatsApp use. We also think that a study contrasting the voices of the parents and those of their children in relation to the parental mediation would be very necessary.

While aware of the stated limitations of the study, possible implications for contemporary families can be discerned. Parental mediation seems to be important. It would therefore be interesting to offer tools so that the fathers and mothers themselves can know what their own

parental mediation strategy is and that other alternatives exist.

The problematic use of WhatsApp and mobile phones seems to be a problem among a not insignificant percentage of adolescents. This is a very fragile time of life, and therefore, it would be good to offer young people spaces for reflection on their own use, and where possible, alleviate the distress that it can generate.

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## Conflict of interests

The authors declare no conflict of interest.

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