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Nomophobia in teenagers: digital lifestyle, social networking and smartphone abuse

Abstract

Smartphone use influences teenagers' behaviors and lifestyles, not always in a positive way. Abuse and dependence on the use of this device is what has led to the study of nomophobia. The objective of this research is to measure the level of nomophobia in adolescents, and to study their digital consumption habits. The study seeks to analyze the relationships between risk of nomophobia, digital behavior, age and smartphone use. A structured questionnaire has been applied to a sample of 850 students aged 12 to 16. The data has been analyzed with SPSS and SPAD. Multivariate statistical characterization, one of the most recent data mining techniques, has been used to study differences in teenagers' behaviors according to their risk of nomophobia, and to find related explanatory variables. Teenagers' nomophobia risk ranges from mild to moderate, showing a relation with age, academic performance and intensity of use of mobile social networking apps. The risk of nomophobia responds to differences in students' digital, social, relational and educational behaviors, and exhibits differences according to academic performance, age, gender, motivation and self-perception.

Keywords
Nomophobia, teenagers, digital lifestyle, smartphone, Internet, social networking.

1. Introduction

Technological advances and the Internet have brought about big changes in different aspects of our day-to-day lives. People's professional, economic and social relations have adopted new behavioral patterns that have been encouraged, in part, by the wide variety of devices that facilitate information access, generation and dissemination, thanks to the Internet (King, Valença, Nardi, 2010; Bragazzi, Simona & Zerbetto, 2019; Kneidinger-Mueller, 2019). Virtually all individuals, whatever their age, have been immersed in these changes. However, teenagers are the most vulnerable and influenceable group when it comes to the use of technologies and their possibilities. As Vidales-Bolaños and Sábada-Chalezquer point out: "Digital technology has become very important among teen audiences and is part of their daily practices in different areas such as family, school and friends" (2017, p. 20).

According to the 2019 Survey on Equipment and Use of Information and Communication Technologies in Households (INE, 2020), 89.7% of 10 to 15 years old had used a computer in the last three months; 92.9% had used the Internet; and 66% owned a mobile phone. The use of mobile phone in Spain increases significantly from the age of 10, reaching 94.8% among 15

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years old. Its use brings users immediate benefits, such real-time connection with peers, a sense of belonging and the ability to receive feedback and share content, among others. Therefore, the mobile phone has become an essential resource for the social, personal, and professional development of adolescents. The capacity of the smartphone to generate pleasant feelings such as freedom, independence, constant connectivity, and a sense of a high social status, have contributed to its excessive, dependent, and problematic use (Ahmed & Perji, 2011; Buchinger, Kriglstein, Brandt & Hlavacs, 2011; Simó Sanz, Martínez Sabater, Ballester Tarín & Domínguez Romero, 2017). Young people with relationship problems may use the smartphone in excess as a strategy to solve their lack of social skills (Bian &Leung, 2015). According to Jiménez-Iglesias, Garmendia-Larrañaga and Casado del Río (2015), neither parents nor teachers respond to the expectations of young people regarding the Internet. When children "enter adolescence, their network of friends and classmates is perceived as the main source of information..." Likewise, when teenagers become older, "it is their membership to and knowledge of social media what is assimilated, shared and expanded, based on what their peers do or prefer" (Bian &Leung, 2015, p. 59). In this context, parents and teachers seem to be outside teenagers' personal universe.

The activities that teenagers do the most on their smartphones are watching videos, surfing the Internet and social networking (Ditrendia, 2018). The current reality is that social networks are a clear source of communication and socialization for young people (Echeburúa & de Corral, 2010; Ayar, Özalp, Özdemir & Bekta¸s, 2018), influencing their relationships to the point of generating addictive behaviors. According to Guedes *et al.* (2016), it is of paramount importance to investigate the risks involved in the use of the Internet and social networks on the physical and psychological dimensions, like their excessive and inappropriate use, which is one of the most worrying aspects that needs to be carefully analyzed (Arpaci, Balo ˘glu, Özteke & Kesici, 2017; Ayar, Özalp, Özdemir & Bekta¸s, 2018; Betoncu & Ozdamli, 2019; Rodríguez-García, Moreno-Guerrero & López Belmonte, 2020). Beyond these virtual environments, it is the use and abuse of the smartphone, as device of access and mediator between teenagers and social networks, what concerns the research community. As Simó Sanz *et al.* (2017) point out in relation to the use of the smartphone, it is increasingly common, for young people to feel the urge to use it or have it close to them to stay calm, and to become anxious whenever they cannot use it, which would bring us closer to terms related to addictions, such as tolerance and withdrawal. Therefore, the ease of young people and teenagers to be permanently connected is what leads them to feel highly dependent on mobile devices (Rojas-Jara, Henríquez, Sanhueza, Núñez, Inostroza, Solís & Contreras, 2018). This dependence is what allows us to talk about nomophobia, which King, Valença and Nardi have defined as "a fear of being technologically disconnected, detached from mobile phone connectivity or disconnected from the web" (2010, p. 58). For its part, SecurEnvoy (2012) conceives nomophobia as "the fear of being out of mobile phone contact." In any case, following Bragazzi and del Puente (2014), it could be said that individuals who suffer from nomophobia exhibit an irrational fear of leaving the house without their smartphones, becoming anxious when they lose it or run out of battery or have no coverage (Santos, Da Silva, Abbas, De Souza & De Sá, 2017; Al-Balhan, Khabbache, Watfa, Re, Zerbetto & Bragazzi, 2018; Sandeep, 2018; Farooqui & Pore, 2018; Ahmed, Pokhrel, Roy & Samuel, 2019). However, despite the importance of these behaviors among young people, research into the use and abuse of these technologies has not reached consensus on diagnostic criteria, as the so-called social addictions are not identified or defined given the difficulty to differentiate between normal and pathological behaviors (Echeburúa, Labrador & Becoña, 2009; Karim & Chaudhri, 2012; García del Castillo, 2013; Machimbarrena, González-Cabrera, Ortega-Barón, Beranuy-Fargues, Álvarez-Bardón & Tejero, 2019). In this sense, "behavioral addictions, with the exception of gambling, are not recognized in the Diagnostic and Statistical Manual of Mental Disorders (DSM-5)" (Simó Sanz *et al.*, 2017, p. 5).

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The use of smartphones brings many benefits to teenagers, such as high productivity, information access, social interaction, relaxation and entertainment (Cho, 2015; Elhai, Dvorak, Levine, van Deursen, Bolle, Hegner & Kommers, 2015; Hall, 2017), but it also generates problems like poor time management, stress and nervousness (Lin, Lin, Lee, Lin, Lin, Chang *et al.*, 2015; González-Cabrera, León-Mejía, Pérez-Sancho & Calvete, 2017), sleep disorders (Yogesh, Abha & Priyanka, 2016; Gentina, Li-Ping & Dancoine, 2018), drug use (Sampasa-Kanyinga, Hamilton & Chaput, 2018), eating disorders (Restrepo & Castañeda, 2018), psychological and emotional discomfort such as low self-esteem, anxiety, depression, anger and aggression (Gutiérrez-Puertas, Márquez-Hernández & Aguilera-Manrique, 2016; Argumosa-Villar, Boada-Grau & Vigil-Colet, 2017; Ramos-Soler, López-Sánchez & Quiles-Soler, 2017; Ozdemir, Cakir & Hussain, 2018; Darvishi, Noori, Nazer, Sheikholeslami & Karimi, 2019) and mental and personality disorders such as depression (Gil, Del Valle, Oberst & Chamarro, 2015; Lee, Kim, Mendoza & McDonough, 2018; Darvishi, Noori, Nazer, Sheikholeslami & Karimi, 2019), general health problems (Raudsepp & Kais, 2019), as well as low productivity and academic performance (Duke & Montag, 2017; Lanaj, Johnson & Barnes, 2014 ; Montag & Walla, 2016; Samaha & Hawi, 2016; Dasgupta, Bhattacherjee, Dasgupta, Roy, Mukherjee & Biswas, 2017; Aguilera-Manrique, Márquez-Hernández, Alcaraz-Córdoba, Granados-Gámez, Gutiérrez-Puertas & Gutiérrez-Puertas, 2018; Gutiérrez-Puertas, Márquez-Hernández, São-Romão-Preto, Granados-Gámez, Gutiérrez-Puertas & Aguilera-Manrique, 2019). In this sense, different authors (Ayar, Özalp, Özdemir & Bektaş, 2018; Rodríguez-García, Moreno-Guerrero & López Belmonte, 2020) claim that nomophobia is directly related to dependence on social media and anxiety, and consider it, to some extent, a digital disease because, as we have mentioned, it can cause biopsychosocial alterations (De la Villa Moral & Suárez, 2016). According to social cognitive theory, it has been assumed that individuals can use technology excessively as a means to relieve the stress in their life, low self-esteem and negative emotions related to low academic performance. In this sense, Yildiz (2019) proposes that teenagers who have negative attitudes towards education and a poor academic performance, tend to use the smartphone more often. This confirms the results of several studies (Jackson, von Eye, Witt, Zhao & Fitzgerald, 2011; Jacobsen & Forste, 2011; Lepp, Barkley & Karpinski, 2014; Wentworth & Middleton, 2014) on the relationship between academic performance and problematic smartphone use. The relationship between smartphone addiction and academic performance is bidirectional (Mendoza, Pody, Lee, Kim & McDonough, 2018): dependence on this device can affect academic performance while addiction can be motivated by perceived pressure from exams. Other authors such as Ruiz-Palmero, Sánchez-Rodríguez and Trujillo-Torres (2016) claim that adolescence is the most sensitive age range for suffering from nomophobia and that technologies are affecting teenagers' relationships with peers, by encouraging digital over personal contact.

The relationship between nomophobia, the excessive use of smartphones and social networks, and school anxiety has been mainly studied in young university students. However, there are fewer academic studies on the prevalence of nomophobia in teenagers, as an age group at higher risk. This leaves room to raise relevant questions within this work to understand this problem better and more deeply, contextualizing this contemporary phobia within teenagers' different ways of being and living. What is the risk of nomophobia among adolescents? Is there a relationship between the risk of nomophobia in teenagers and the intensive use of mobile social networks via smartphone? Does the risk of nomophobia in teenagers increase with age? What motivates teenagers to make intensive use of mobile social networks? Is the risk of nomophobia related to academic performance? This research aims to answer these questions. The main objectives of this research are to measure the level of nomophobia risk among adolescents aged 12 to 16 years and analyze their different behavioral and lifestyle profiles in relation to nomophobia risk levels. The study is guided by the following hypotheses:

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H1. The risk of high nomophobia among adolescents is characterized by low academic performance.

H2. The risk of high nomophobia among adolescents is characterized by intensive use of social networks through the Smartphone.

H3. Gender influences the level of risk of nomophobia.

H4. Age influences the level of risk of nomophobia.

2. Methods

2.1. *Design, instrument, and participants Displayed equation Heading 3: use this style for level three headings*

The population under study is young Spaniards between the ages of 12 and 16 (N=93095), enrolled in the secondary schools of an autonomous community located in south-east Spain (Alicante). For a margin of error of ± 3% at a 95% confidence level, and under the assumption of p=q=0.50, the resulting sample size was 850 participants. The provinces that constitute this Spanish region have been considered as clusters, so the sample was randomly selected from 4 secondary schools from 4 different municipalities of one of these provinces. The sampling units within each school were randomly selected, including the two groups of students chosen from each educational level and school. Heading 4: create the heading in italics. Run the text on after a punctuation mark.

Regarding the composition of the final sample, 48% are girls and 52% are boys. The distribution by age is as follows: 22.5% are 12 years old; 25.5%, 13 years old; 25.2%, 14 years old; 16.7%, 15 years old; and 10%, 16 years old.

To study teenagers' nomophobia risk as well lifestyles and digital consumption habits, we designed a structured 24-item survey. The entire questionnaire, except for the nomophobia scale, was designed by the authors based on a review of the literature and the objectives set out in the research. The questionnaire was submitted to the judgement of 7 experts from the fields of psychology, sociology and communication whose background in the subject, as qualified experts, provided us with information, evidence, judgements and assessments for the elaboration of the items used. The questionnaire is divided into three sections. The first one of these sections focuses on the psychographic aspects of students' lifestyles, computer equipment and the nomophobia scale of Yildirim and Correia (2015), which Ramos-Soler, López-Sánchez and Quiles-Soler (2017) validated and adapted, linguistically and culturally, to Spain, taking into account the age of the population under study (12 to 16) and reaffirming its reliability and validity as a tool for measuring this behavioral addiction (Cronbach's alpha result is 0.903) (Rodríguez-García, Moreno-Guerrero & López Belmonte, 2020). This scale allows to detect nomophobia problems, and to establish cut-off points between the different levels of risk. According to this adaptation, the scores and levels of the scale are as follows (Table 1):

Table 1: Nomophobia levels.

Score	Interpretation
Up to 21	Absence of nomophobia
21 to 50	Mild risk of nomophobia
51 to 80	Moderate risk of nomophobia
81 and above	Severe risk of nomophobia

Note: Adaptation of the nomophobia scale of Yildirim and Correia (2015) to the Spanish population (2017).

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One of the strengths of this scale is precisely that it is designed and validated for a population of young people between the ages of 12 and 16. Therefore, the results obtained with it give us in-depth information about this vulnerable and easily influenced age group and constitute a reliable framework to support the design of prevention and intervention programs.

The second part of the questionnaire focuses on the study of the digital consumption habits, motivations, and preferences of students regarding their use of social media and messaging apps on their smartphones. The third and final section focused on sociodemographic aspects. Statistical data analysis was conducted using SPSS 26 and SPAD 8.2 (Bisquerra, 1989; Alauja & Morineau, 1999; Bécue & Balls, 2005; Sánchez-Martí & Ruiz-Bueno, 2018).

2.2. *Procedure*

The research design considered the European ethical protocols for research involving minors, which required informed consent from schools, parents/guardians and minors. The cluster sampling randomly selected 4 schools from 4 different municipalities. Official permission to attend these 4 schools was requested from the Autonomous Secretariat of Education and Research, of the Ministry of Education, Research, Culture and Sport of the Government of Valencia. Official Spanish autonomous institution that has the highest authority in education and research. Once the authorization was received, a second authorization was requested from the School Council of the selected schools. Once approved by this school management body, a third authorization was requested, on an individual basis, from the parents so that the students could participate. The parental consent model provided by the political-educational institution of the autonomous community has been used. The consent form ensured the confidentiality of the answers and the protection of data according to the regulations applicable for this purpose.

The application of the questionnaires in the different classrooms was supervised by the research team and tutors from the school center. Students answered the structured questionnaire manually within their classrooms.

3. Results

The population under study suffers from mild risk of nomophobia, with an overall average score of 50.7 (SD=15.83, Mo=46, Me=48.5), which is very close to the moderate risk (51 points). In general, it is observed that more than half of the population (55.3%) has a mild risk of nomophobia, that nearly 40% has a moderate risk, are just over 5% suffers from severe risk of nomophobia.

The following table (Table 2) shows the average scores obtained by participants on the nomophobia scale designed by Yildirim and Correia and adapted by Ramos-Soler, López-Sánchez and Quiles-Soler. As we can see, the Likert scale was reduced from 7 to 5 points to facilitate the data collection from the selected population, whose age range is lower (12-16 years) than the original population, composed of university students over the age of 18.

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Table 2: Descriptive analysis of the nomophobia scale.

Nomophobia scale items	Men		Women		Total			
	Mean	SD	Mean	SD	Mean	SD	Min	Max
1. I get furious when my smartphone doesn't have a Wi-Fi connection.	2,2	1,3	2,5	1,3	2,4	1,3	1	5
2. I get upset when I want to search for something on my phone and cannot do it.	2,6	1,3	3,1	1,2	2,9	1,2	1	5
3. Sometimes I think my smartphone is running out of battery and I get anxious.	2,4	1,4	2,8	1,4	2,6	1,4	1	5
4. If I don't have Wi-Fi connection on my phone, I immediately look for a signal to connect to.	2,2	1,4	2.5	1,4	2,4	1,4	1	5
5. I'm very afraid to run out of data on my smartphone.	1,9	1,2	2,2	1,4	2	1,3	1	5
6. I feel safe if I don't have my cell phone with me.	3,4	1,5	3,7	1,4	3,6	1,4	1	5
7. I need to check my smartphone continuously for any new messages.	2,3	1,3	2,7	1,4	2,5	1,4	1	5
8. I get really upset if I don't have my smartphone and think someone wants to communicate with me.	2,4	1,4	2,8	1,4	2,6	1,4	1	5
9. When I don't have my smartphone with me, I don't know what to do.	2	1,2	2,3	1,4	2,1	1,3	1	5
10. The use of my smartphone makes me neglect schoolwork.	2,5	1,4	2,6	1,4	2,5	1,4	1	5
11. Even if I wanted to, I couldn't stand without my smartphone. If my parents took it away, I'd be furious.	2,4	1,4	2,6	1,4	2,5	1,4	1	5
12. When I feel bad, I start using my smartphone and I feel much better.	2,4	1,4	2,5	1,4	2,5	1,4	1	5
13. I sleep less because I use my smartphone too much.	2,5	1,4	2,5	1,5	2,5	1,4	1	5
14. If I get a call or a message on my smartphone, I reply immediately, even if I'm with my family or friends.	2,5	1,3	2,8	1,3	2,6	1,3	1	5
15. I'm usually looking at my smartphone even if I'm with people, family or friends.	2,5	1,3	2,8	1,2	2,6	1,3	1	5
16. I can't go outside without my smartphone, so if I forget it at home, I go back and get it.	2,4	1,4	3	1,5	2,7	1,5	1	5
17. I don't like having to turn off my smartphone in class, at the table, in social events, cinema, etc.	1,8	1,1	2,1	1,2	1,9	1,2	1	5
18. I feel happier when I'm using my smartphone.	2,3	1,2	2,4	1,2	2,4	1,2	1	5
19. I'd be the happiest person in the world if I got a next-generation smartphone.	2,7	1,5	2,8	1,5	2,7	1,5	1	5
20. Older people get mad at me because I pay more attention to my smartphone than to them.	2,4	1,4	2,6	1,3	2,5	1,3	1	5
21. My friends get mad at me because I pay more attention to my smartphone than to them.	1,5	0,9	1,6	0,9	1,5	0,9	1	5

Source: Own elaboration.

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A mean comparison test was subsequently conducted to determine whether the gender variable had an influence on nomophobia levels. The results of the ANOVA test (Table 3) yielded a significance level below 0.05, which indicates that there are differences between boys and girls, between the ages of 12 and 16, regarding their level of nomophobia. The female gender has a moderate level of nomophobia, while the male gender has a mild level.

Table 3: Statistical testing by gender.

	Men		**Women**		**Total**		**ANOVA**	
	Mean	SD	Mean	SD	Mean	SD	F	Sig.
Level of nomophobia	48,2	15,1	53,4	16,2	50,7	15,8	23,436	,000

Source: Own elaboration.

The Chi-Square test was used to study the possible correlation between nomophobia and academic performance. The data (Table 4) show an association between the two variables (sig. <0.05). However, only 70% of the items yielded expected values greater than 5, so the Fisher's exact test had to be applied, yielding a p-value that indicates an association between a mild level of nomophobia and very high academic performance (p-0.000), and between a severe level of nomophobia and very high academic performance (p-0.000).

Table 4: Chi-Square test between nomophobia and academic performance.

	Value	**gl**	**Bilateral asymptotic significance**
Pearson's chi-square test	50,617(a)	12	,000
Likelihood ratio test	51,375	12	,000
Linear-by-linear association test	27,368	1	,000
Number of valid cases	850		

(a) 6 items (30.0%) have an expected frequency of less than 5. The minimum expected frequency is .30.

Source: Own elaboration.

An ANOVA mean contrast test (Table 5) was performed to check whether the age variable is associated with the nomophobia level. The results show that there is a correlation between these two variables, which means that there are differences in the levels of nomophobia by age. However, the F value indicates that these differences are not very significant.

Table 5: Statistical testing by age.

Non nomophobic		**Mild**		**Moderate**		**Severe**		**ANOVA**	
Mean	SD	Mean	SD	Mean	SD	Mean	SD	F	Sig.
13	1	13,6	1,4	13,8	1,3	14,2	1,6	3,307	,020

Source: Own elaboration.

The chi-square test was performed to determine whether there is a relationship between the level of nomophobia and the intensive use of social networks. In all cases, the results showed an association between these two variables (sig. <0.05). However, the percentage of items with

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an expected value greater than 5 is less than 80%, so the Fisher's exact test had to be performed again. The results showed that there is a correlation between a mild level of nomophobia and a low daily use (less than one hour) of WhatsApp (p-0.000), Instagram (p-0.000) and YouTube (p-0.000). The moderate level of nomophobia is correlated with a higher daily use (more than 5 hours) of more social networks: Instagram (p.0.000), WhatsApp (p-0.000) and YouTube (p-0.000); with a lower daily use (of 1 to 2 hours) of TikTok (p-0.003); and an even lower daily use (less than an hour) of Twitter (p-0.002) and Snapchat (p-0.003). Lastly, a severe level of nomophobia is associated with a more intense daily use (more than 5 hours) of more social networks: WhatsApp (p-0.000), Instagram (p-0.000), TikTok (p-0.000), YouTube (p-0.000) and Snapchat (p-0.000).

Multivariate statistical characterization was performed with SPAD 8.2 to study the relationship between different levels of risk of nomophobia in adolescents and variables of lifestyle, age, academic performance and intensive use of social media. SPAD offers an original and little-known method to characterize a response variable from a set of explanatory variables. This response variable can be either categorical or continuous. It applies an algorithm that performs multiple comparison tests between means and/or proportions to find the related explanatory variables, depending on whether the variable to be characterized is continuous or nominal. This method allows us, for example, to know what characteristics differentiate students according to their level of risk of nomophobia, taking as explanations age, academic results, use of social networks, daily activities. In the case that the variable is continuous, it would allow us to find the differences between individuals with high values and low values of the response variable. These multiple comparisons are performed with a statistical test of hypothesis of the type:

$$Ho: p_{ij}=P_j$$
$$Ha: p_{ij}<>P_j$$
$$with\ i=1,...,n\ and\ j=1,...,m$$

where n is the number of categories of the response variable; m is the number of categories of the explanatory variable; P_j is the total proportion of the characteristic of the explanatory variable in our sample; and p_{ij} is the proportion of the characteristic j of the explanatory variable for category i of the response variable.

To detect the categories with the greatest characterizing power, SPAD software calculates the appropriate contrast statistic and the p-value corresponding to the null hypothesis that there are no differences in the sample and in the group for each of the categories. SPAD arranges the influential characteristics by the p-value associated with the statistical test and also incorporates a new element, the test value. The smaller the p-value the greater the characterizing power of the category (Grande & Abascal, 2009).

3.1. *Mild risk of nomophobia (55.29% of the sample, 470 students)*

The results of the test-values that best characterize this category show that students with a mild risk of nomophobia are predominantly male and enrolled in their first year of secondary school (students aged 12 to 13 years). They define themselves as creative and imaginative, reaching in this regard a score higher than the overall average of the sample. Students with a mild risk of nomophobia are strongly characterized by a very high academic performance (76.47%).

They always read in their free time. The use the computer very often, but only for school activities. Other activities they do occasionally in their spare time are going out with friends and watching series and movies on different platforms. They use social networks every day but with a low intensity (less than one hour a day), mostly at home and during the afternoon and after lunch. Social networks are used for entertainment purposes.

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3.2. *Moderate risk of nomophobia (39.29% of the sample, 334 students)*

The p-value show that this category is strongly characterized by what students do in their spare and leisure time, marked by the intensive use of the smartphone, going out with friends or just doing nothing. It is very characteristic of students with moderate risk of nomophobia to not play sports, read or perform cultural activities as a form of entertainment. A greater presence of the female gender is also observed. Students recognize a certain degree of dependence on their mobile phones and acknowledge that in order for them to feel good, they need to be connected at all times and use their phone constantly, so they are always looking for a WiFi signal and have to go back home to get their mobile phone whenever they forget it. They also show some awareness of the negative effects of this intensive use, such as getting insufficient sleep, neglecting schoolwork, and angering family members.

As shown by its p-value and the comparison of means test, WhatsApp is the preferred app within this category, followed by Instagram, Snapchat and TikTok. Students who have a moderate risk of nomophobia use these social networks throughout the day for 1 to 5 hours. They do it anywhere, including school. They use it to gossip, avoid boredom, for fun, to meet people, to discover new things and be happy. They also state as usage motivations of these social networks the need to look "cool," talk to friends and feel socially integrated.

3.3. *Severe risk of nomophobia (5.06% of the sample, 43 students)*

This is the second smallest category, barely exceeding 5% of the total sample. However, the results of the contrast and test values show a very well characterized category, which reflects a fairly homogeneous behavior. The average age that best defines this category is 14.1 years. Students in this group have a very low academic performance and recognize that their use of the smartphone makes them sleep less and neglect schoolwork.

In their free time they always go out with their friends, visit shopping malls and use their smartphones intensively. They claim they do not know what to do when they do not have their mobile phone with them. Its use makes them feel better and not being able to do it makes them feel angry and upset. They recognize that their elders (parents, grandparents, teachers) tend to get very angry at them for paying too much attention to their mobile phones.

They never read or perform artistic activities as a form of entertainment. Every now and then, they like to do nothing in their spare time. They consider themselves to be very sociable, funny and amusing, as well as quite attractive, important and popular. Their favorite mobile social apps are WhatsApp, Instagram, TikTok and Snapchat. Teenagers use the first three apps everywhere, including school, throughout the day (for more than 5 hours) to talk to friends, gossip, nose around, meet people, discover new things and avoid boredom. Using these apps makes teenagers feel good, happier, more integrated, fashionable and cool.

4. Discussion

The effects of smartphone use and abuse on people's behavior is a matter of great concern among researchers (Samaha & Hawi, 2016; Echeburúa & de Corral, 2010; Lanaj, Johnson & Barnes, 2014; Guedes, Sancassiani, Carta, Campos, Machado, King & Nardi, 2016; Gutiérrez-Puertas, Márquez-Hernández & Aguilera-Manrique, 2016; Montag & Walla, 2016; Duke & Montag, 2017; Ramos-Soler, López-Sánchez & Quiles-Soler, 2017; Simó Sanz *et al.*, 2017; Rojas-Jara, Henríquez, Sanhueza, Núñez, Inostroza, Solís & Contreras, 2018; Lee, Kim, Mendoza & McDonough, 2018; Ozdemir, Cakir & Hussain, 2018), especially when it involves minors. It is important to note that most studies on nomophobia have focused on more mature populations, mainly on university students. In our research, we have chosen to study the adolescent population, which is the least explored age group. It has been found that Spanish teenagers between the ages of 12 and 16 have generally a risk from a more moderate than mild nomophobia, make intensive use of mobile phone apps, actively participate in them and are continuously connected to their peers. In fact, the risk of nomophobia, academic performance

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and use of mobile messaging and social apps are related in the adolescent population, which confirmed the two first hypothesis. Low academic performances characterize very well the severe risk level, and very high performances the mild risk nomophobia These results are in line with the evidence provided by several international research works (Sandeep, 2018; Oksman & Turtiainen, 2004; Chóliz, 2010; Jackson, von Eye, Witt, Zhao & Fitzgerald, 2011; Jacobsen & Forste, 2011; Krajewska-Kułak, Kułak, Stryzhak, Szpakow, Prokopowicz & Marcinkowski, 2012; Lepp, Barkley & Karpinski, 2014; Wentworth & Middleton, 2014; Quesada Varela & Carballo Pintos, 2017; Adawi, M., Bragazzi, Argumosa-Villar, Boada-Grau, Vigil-Colet, Yildirim, Del Puente & Watad, 2018; Mertkan, Burcin, Sezen-Gultekin & Gemikonakli, 2018; Olivencia-Carrión, Ferri-García, Rueda, Jiménez-Torres & López-Torrecillas, 2018) that have confirmed that nomophobia is widespread worldwide.

Gender and age influence the level of nomophobia. Girls have higher levels of nomophobia than boys, and there are differences between teenagers according to age, which confirms the last two hypotheses. As it has been shown, the motivations for the use of mobile phone apps are individual and relational in nature and are located within users' personal and social spheres. On the other hand, this use is related to the emotional dimension of teenagers, who turn social networks into virtual spaces that gratify their emotional needs and allow them to express their feelings and shape the perception that others have of them. Students with a high risk of nomophobia claim to feel happier and more integrated despite their academic performance. Their social relationships are strongly marked by the use of digital social networks, which in turn conditions their offline life.

This habit grows with age, as does the risk of nomophobia and the social and personal value that social media have for teenagers, which is likely related to a lower parental control and a lower perception of risk. These results are in line with the findings of Ramos-Soler, López-Sánchez and Torrecillas-Lacave, who point out that "age is a significant variable, not only in the perception of risk but also in the face of family and behavioral variables" (2018, p. 78). These authors claim that this perception progressively declines with age, and that it is linked to the increasingly reduced and remote presence and intervention of parents and educators in the real and digital life of adolescents. Despite authors like Mendoza *et al.* (2018) point out that the effects of excessive use of smartphones is not always negative and harmful to learning, there is a relationship between low academic performance and a higher risk of nomophobia, as the results have shown.

The risk of nomophobia among teenagers is generally mild or moderate. As shown here, teenagers use their mobile phones whenever and wherever they can. Considering their age, there is no comprehensive control over how long students are exposed to their smartphones, at school and at home. Teenagers spend more time in the digital than in the real world, with the dangers that come with it. As Ramos-Soler, López-Sánchez and Quiles-Soler (2017) have argued, teenagers' intensive use of mobile social networking is normalized and socially accepted within the age group studied. As Jiang and Li (2018) point out, concern about the negative consequences of the overuse of these devices is widespread worldwide. Along this line and based on the controversy generated by the unanimously adoption of the criterion of addiction by researchers, it is considered that the use of smartphones for online social networking involves in itself the pursuit of a socialization goal, but by means of an automatic and habitual action. In this sense, Seo and Ray (2019) differentiate between habit and addiction, observing the transformation of a behavior controlled by users (habit) into a compulsive behavior (addiction) associated with gratifications.

5. Conclusions

Based on the results obtained, it can be said that the prevalence of some degree of nomophobia's risk in teenagers exceeds 90%, demonstrating the high degree of vulnerability of this age group to the excessive use of smartphones. This Internet-enabled device is mostly

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used for social networking and instant messaging. This result confirms the existence of a correlation between nomophobia in teenagers and their almost compulsive habit of using mobile social networking apps, on a daily and constant basis. There is some awareness among teenagers about the negative effects that nomophobia and the excessive use of smartphones have on their lives, affecting their social and personal relationships, academic performance, mood and sleep habits.

We consider that a term that can help us understand this new phenomenon and its consequences is "digital lifestyle," to characterize the current ways of being and living of an important group of teenagers, whose life revolves around smartphones and social networks, which provide unlimited interconnectivity in space and time, which in turns mediates, structures and conditions teenagers' day-to-day life. However, this digital lifestyle is not only marked by the use of social networks, but also by content, that is, what is shared. Having a socially desirable image among peers would determine the generation and consumption of certain types of products, services and activities for the ultimate purpose of being shared and go viral. It is believed that this type of abusive behaviors in the mobile digital environment could lead the scientific community to agree to classify them as non-chemical addictive behaviors. In any case, there is evidence of the need to design, develop and implement educational, family and social protection strategies that advocate for a more rational and adequate use of digital technology, especially of the smartphone. One limitation of the study is the evaluation instrument itself, whose self-administration in schools could have, in some cases, led participants to provide socially acceptable responses, even though the process was thoroughly monitored.

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