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Review Article

Typology of young people in digital environments: Identifying vulnerability patterns

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ABSTRACT

Young people have naturally transferred a large part of their daily activities to the digital environment, a space that contributes to the construction of their identity and personal maturity. Despite the intensive use that young people make of the Internet and social networks, they are not aware of the dangers that can be found on the network, which makes them a vulnerable audience that must be protected. To improve their knowledge of these issues, it is important to address young people with an understanding of their specific characteristics. The aim of this study is to identify a typology of young people according to sociodemographic criteria, behaviors, self-perception of risk and self-protection mechanisms used in the digital context, to determine their level of vulnerability in this environment. For this purpose, a quantitative study is carried out through an online survey of a representative sample of 300 Spanish young people between 14 and 16 years old. The results of the research locate four segments of young users: "cautious connected" (50.3 %), "regular and exposed in social networks" (25.8 %), "sporadic beginners" (12.1 %), "active in shopping and digital entertainment" (11.8 %)". The findings show that age, frequency of use of social networks and the Internet, the number and type of applications used, and the perception of online risks, discriminate the digital vulnerability of young people and influence their maturity and the self-protection mechanisms they use.

1. Introduction

The use of the Internet is practically universal among young people. Thus, 98 % of young people between 10 and 15 years of age use the Internet on a regular basis in their daily lives (ONTSI. National Observatory of Technology and Society. Ministry of Economic Affairs and Digital Transformation, 2024). This ever-increasing use of the Internet among the young people together with the low perception of risk associated with the use of digital technologies (Altuna et al., 2020), makes them more exposed to the dangers of the Internet (Rodríguez de Dios et al., 2018) and more prone to suffer some risks such as addiction, cyberbullying, sexting or grooming, among many others (Da Silva, 2020; Marinoni et al., 2023). According to the latest study conducted by the ONTSI. National Observatory of Technology and Society. Ministry of Economic Affairs and Digital Transformation, 2024, 33 % of the Internet user population between 12 and 16 years old is at high risk of making compulsive use of digital services. Age constitutes an important variable regarding the most problematic use of the Internet since the greatest conflicts associated with such use occur particularly in early adolescence (Cabello-Hutt et al., 2018; Lu & Gu, 2024). As young people move closer to adulthood, their use of the Internet becomes normalized and more appropriate (Boniel-Nissim et al., 2022; Koch et al., 2024).

Many of the digital dangers young people face are sometimes imperceptible to them due to their inexperience (Vissenberg et al., 2022; Cowling et al., 2024). This makes them a particularly vulnerable audience in the online environment. Further, the COVID-19 pandemic significantly altered young people's online behaviors, with notable shifts in Internet usage patterns and the prevalence of problematic behaviors (Bäker & Schütz-Wilke, 2023). Previous research indicates that young people experienced increased engagement in online activities, leading to varying degrees of Internet addiction (Theopilus et al., 2024) and behavioral changes before, during, and after the pandemic. In particular, usage patterns changed by increasing screen time (Chen et al., 2021) and problematic Internet use, with higher rates among male

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and older young people (Kamasak et al., 2022). There was a rise in at-risk online sexual activities, such as sexting, indicating a shift towards more risky online interactions (Morelli et al., 2023). While the pandemic has led to increased online engagement and associated risks, it also highlights the need for ongoing monitoring and support for young people's Internet behaviors.

Understanding the differences between different groups of young people would enable a better approach to be taken to increase their digital literacy, but there are few studies that classify young people based on their digital vulnerability (Díaz-López et al., 2020; Ramos Soler et al., 2018). The concept of digital vulnerability is associated with the probability of experiencing harm because of poor or ineffective adaptation to or coping with online risks (Kalmus et al., 2024). It is 'the risk that a specific person or group may face either within the virtual world or because of it' (García-Jiménez et al., 2013, p. 11).

Despite the existing body of theoretical knowledge, the complexity of measuring this phenomenon requires a multidimensional approach. This will allow for the incorporation of factors such as self-perception of the risks to which young people are exposed and the self-protection mechanisms they use, which are related to their maturity, in addition to sociodemographic patterns and digital behavior patterns. These factors have evolved following the COVID-19 pandemic, which led to significant behavioral changes in these age groups (Tercova & Šmahel, 2025) making an updated study of the subject necessary.

Based on the aforementioned antecedents, the purpose of this study is to identify a typology of young people discriminated by their digital vulnerability based on their patterns of behavior and exposure on the Internet and social networks, their personal and family sociodemographic characteristics, as well as the perception of their exposure to possible risks on the Internet and the self-protection mechanisms used.

The central aim of this paper is to answer the following research questions:

RQ1. Does the degree of digital vulnerability determine young people's digital behaviors?
RQ2. Are the age of young people and their digital behaviors influential factors in differentiating them from other groups?
RQ3. Does exposure to potential digital risks allow for the identification of different segments of young people with different degrees of vulnerability?
RQ4. Do the self-protection mechanisms used based on their exposure to risks allow young people to combat/face their vulnerability in different ways?

Knowing the answers to these questions will enable us to identify distinct population segments that can serve as a basis for tailored literacy strategies. We will also be able to ascertain whether the profile of young people has changed as a result of the pandemic.

In the following sections 2 and 3, a literature review is conducted on the most important factors associated with digital vulnerability of young people, as well as how they self-protect themselves from the risks they face in the online environment. Section 4 describes the methodology used for the investigation. Section 5 presents the main results. Finally, in sections 6 and 7 the main contributions of the study for both academics and professionals are presented and in section 8 presents the limitations of the study.

2. Factors related to digital vulnerability of young people

Younger teenagers report fewer negative consequences from Internet use (in Spain, the average age for owning a mobile phone is 11, Andrade et al., 2021). They are in the early years of adolescence, and their mobile phone use is more limited (Pastor et al., 2022). In addition, parents tend to implement more rules and restrictions on younger people, which they gradually remove as they grow older (Koch et al., 2024).

As the age of young people increases, the time spent using the Internet and Social Networks and the number of online activities performed increases (Pastor et al., 2022), as well as the probability of experiencing and facing certain online risks (Martínez et al., 2020).

The maturity acquired by the child, typical of their evolution with age, together with their experience in the network and the acquisition of digital skills, usually has a positive effect on self-regulation in the use of the Internet (Vissenberg et al., 2022; Tercova & Šmahel, 2025). These experiences prepare them and give them a greater number of protection strategies to face such dangers (Lu & Gu, 2024). In the work carried out by Mýlek et al. (2023) it is pointed out that for young people previous experiences are perceived as more credible and reliable sources of information. Specifically, the fact that an individual has this first-hand experience on his or her own is an aspect that has a greater impact on the perception of risk among female than among male young people.

In general, there is a relationship between age and risk behavior, with young people in their early teens being more subject to parental control, spending less time on the Internet and having more limited use than older young people (Romero Rodríguez et al., 2024).

Different studies point to a greater tendency of female towards problematic use of the Internet and social networks (Marinoni et al., 2023). In general, they tend to make greater use of cell phones than male and use them more as a psychological and social tool, while in the case of male it is more of a device linked to leisure and entertainment (Chen et al., 2021). Therefore, they are the ones who report experiencing more negative emotions related to insecurity, social pressure, helplessness, feeling empty or anxiety (Carcelén-García et al., 2023) and, therefore, are more likely to develop addictive behaviors with the use of their device (Theopilus et al., 2024a).

In addition, sex is also considered an important variable with respect to self-perceived ICT skills and expertise, with male tending to rate themselves as more expert and having more technical or advanced skills in handling technology (Morelli et al., 2023).

There are few studies that classify young people based on their perception of risk, digital consumption habits and protective factors. The study by Ramos Soler et al. (2018) identified six groups of young people between the ages of 11 and 17 who provided a typology focused on describing their digital behavior through their perception of risk and associated family variables. The groups were named based on these criteria as: 'prudent', 'social and self-confident', "controlled", 'connected and independent', 'hooked on mobile phones', 'players and trusting' and 'always connected with their friends'. In the study by Díaz-López et al. (2020), three groups of young people were identified based on their use of ICT, distinguishing between a segment that did make 'adaptive use of ICT' and two other groups, one that clearly showed 'maladaptive use' and another that had 'signs of maladaptive use of ICT'.

These studies highlighted a behavioral trend among young people that was affected by the COVID-19 pandemic, which brought about digital acceleration and changes in young people's relationships with technology and with each other (Cowling et al., 2024) that require in-depth study.

3. Mechanisms to protect young people from the dangers of the digital environment

To have perception of risk is an important preventive element that makes people more or less able to take protective measures facing a risk situation (Romero Rodríguez et al., 2024). For this reason, it is becoming increasingly important to acquire self-regulation skills.

In the work carried out by Ramos Soler et al. (2018) it is observed that there is a significant relationship between their perception of digital dangers and other family and behavioral variables. Thus, young people with a higher perception of online risk have a greater ability to protect themselves from online dangers and are the ones with the healthiest practices in this environment.

In the case of young people, despite being recognized as digital natives and being at the forefront of digital technologies (Da Silva, 2020), several studies have revealed that they have problems in managing their self-regulatory capacity regarding the use of the Internet and social networks and especially in ensuring their online privacy (Shandilya et al., 2024; Lu & Gu, 2024).

Thus, sometimes it is necessary and advisable that adults act as external agents guiding young people on how to regulate appropriate Internet use through specific parental mediation strategies (Bertrandias et al., 2023), which are increased in the case of those who acquire parental status, as their perception of risk on the Internet increases (Altuna et al., 2020).

The acquisition of digital skills among young people is a fundamental tool for protecting young people from the online risks (Koch et al., 2024). Having protection tools, will allow them to enjoy more of the opportunities and benefits of technology (Rodríguez de Dios et al., 2018).

4. Procedure and methods

To conduct this study, a descriptive cross-sectional non-experimental research design is carried out. The cluster analysis technique is applied. The main advantage of this technique for identifying segments is that it does not require pre-established criteria for segmentation, as it is an unsupervised procedure. In this sense, the segments obtained are the direct result of the empirical analysis carried out, which places this technique within the segmentation by optimization approach (Santesmases, 1992). The variables that act as partitioning criteria and those that are merely descriptive of the segments obtained are identified *a posteriori*.

Unlike supervised or a priori segmentation techniques based on explanatory models, which require prior classification of cases into groups and often assume linear relationships between variables, cluster analysis (as an unsupervised technique) allows the underlying structure of the data to be explored without imposing prior assumptions (Malhotra, 2008; Santesmases, 1992). This feature makes it particularly suitable for complex contexts such as the study of child vulnerability, where the high multidimensionality of the phenomenon and the difficulty of establishing a reliable prior classification, can limit the effectiveness of supervised approaches. In this sense, cluster analysis facilitates the reduction of dimensionality and the identification of latent patterns of behavior, risk perception and self-protection mechanisms that might not be evident through traditional approaches.

• Participants

The study population is made up of young people residing in Spain, aged between 14 and 16 years. For this purpose, a sample of 300 young people was selected, with quotas for sex and age, representative of the Spanish population (INE. Instituto Nacional de Estadística – INE Base, 2022). The sample size used has an indicative error of ±5.6 % for a confidence level of 95.5 % (P = Q = 50 % and 2 sigma), assuming simple random sampling and estimation of proportions.

Data collection was carried out through the company Análisis e Investigación[1] and the sample selection was obtained from an online panel called "CINT" (https://es.cint.com/) in which all participants gave their assent for inclusion. Parental consent was necessary for recruitment. The fieldwork was carried out in June 2023.

The distribution of the sample by sex was 51.3 % male and 48.7 % female. By age group: 33.7 % were 14 year olds, 33.3 % were 15 year olds, and the remaining 30 % were 16 year olds. Ratio checks were carried out on the sample to avoid the potential self-selection bias associated with the use of an online panel and to control the participation linked to the affinity for digital technologies. These ratio checks were also carried out to verify that the different socioeconomic levels, geographical areas, and the presence of public and private schools were represented.

• Instrument

Information from primary sources was obtained through the CAWI (Computer Assisted Web Interview) an online survey technique by applying a structured questionnaire based on the EU Kids Online survey on online activities, mediation, opportunities and risks of young people in the era of media convergence (Garmendia Larrañaga et al., 2019), as well as on the results obtained in 3 focus groups previously conducted with a sample of 18 people between 14 and 16 years of age.

In response to the questions and research hypotheses raised, different observable variables of interest are grouped into five thematic blocks (Table 1).

As for the perception of the risks to which they have been exposed, for measurement and extrapolation to the population, the original variables have been dichotomized by grouping the categories "often" and "sometimes" in one modality and "Occasionally" together with "never" or "do not know" in another category.

• Data analysis

To identify the existence of a possible typology among young people, the multivariate interdependence technique of agglomerative hierarchical cluster analysis was applied. This technique allows cases to be reduced by classifying them into groups with a high degree of internal homogeneity (similarity) and heterogeneity between clusters (Hair

Table 1
Observable variables of interest.

Conceptual dimension	Variables observed	Response Scale
Sociodemographic characteristics	• Sex • Age • Social Class	• Male/Female • 14-15-16 years • Upper/Upper-Middle/ Middle/Lower-Middle and Lower
Behavior of young people on the Internet	• Use of the mobile device to access the network • Frequency of online activities	• Yes/No • Every day/Every 2–3 days/On weekend/ Occasionally/Never
Behavior of young people in social networks	• Type of account • Type of content published • Frequency of use of social networks	• Public/Private/ Indistinctly • Selfies/With my friends/ With my relatives/ Places and trips/Special Celebrations/Hobbies • Every day/Every 2–3 days/On weekend/ Occasionally/Never
Self-perceived exposure to digital risks	• Presence/absence of different risks in the online environment	• Often/Sometimes/ Occasionally/Never/Do not know
Self-protection factors	• Presence/absence of use of various self-protection measures used in social networks and Internet	• Yes/No

[1] The study was conducted in accordance with the Declaration of Helsinki, the ICC/ESOMAR Code for the practice of Social and Market Research in Spain (https://iccwbo.org/publication/codigo-internacional-iccesomar-para-la-practica-de-la-investigacion-social-y-de-mercados/) and Norma ISO-20252, Norma ISO-27001, Certificate A50/000005, Certificate 21655-ISN-001 and the Sistema IA de Calidad de Captaciones (SACC) (Collection Quality System). All these certifications and standards have allowed the research to be carried out in compliance with all the quality guarantees and ethical standards required when working with young people in social research.

et al., 2009). Since the original variables were categorical, they were recoded into binary indicators.[2] Ward's method with squared Euclidean distance was employed, as it minimizes within-cluster variance and tends to produce relatively balanced groups, while Euclidean distance is suitable given that all variables were placed on the same dichotomous (0/1) scale.

To select the optimal solution, the following selection criteria were used: a) the size of the resulting groups (solutions with 2–8 groups were tested) b) the interpretability of the final segments obtained in the context of the digital vulnerability study and c) the existing distances between the clusters (Malhotra, 2008).

Descriptive and inferential statistical techniques were used to characterize the segments.[3] Contingency tables were prepared with the groups obtained and the original variables. The Chi-square test was applied to identify the descriptor and partition variables, as well as to characterize the segments located.[4]

The corrected waste types were analyzed to identify, with a confidence level of 95.5 %, which types were statistically associated with each segment (Agresti, 2007) and differentiate one segment from another.

In addition, for 2x2 tables, Odds Ratios (OR) were calculated for the associations between the most relevant original dichotomous variables in the definition of the profiles. Specific ORs were estimated for each segment compared to the rest of the groups, based on statistical associations between modalities previously identified through the analysis of significant corrected typified residuals. This set of analyses allowed us to identify key relationships that facilitated the characterization of the segments and the interpretation of differentiated patterns between them.

To validate the segmentation obtained, a discriminant analysis was applied using the Jackknife cross-validation method. This method is suitable for small samples. It consists of excluding one case in each iteration, building the model without that case, and then predicting its membership in the defined groups. This process is repeated for each case in the analyzed database (Malhotra, 2008).

The data obtained were analyzed with the statistical package SPSS version 29.0 (IBM Corp., 2017).

5. Results

The cluster or conglomerate analysis carried out makes it possible to identify four clearly differentiated young people segments. It should be noted that two of these groups (Groups 2 and 3) are relatively small, so their results should be interpreted with caution and considered exploratory, despite the significance of the chi-square tests and the odds ratios reported with 95 % confidence intervals.

The profiles of the identified typology are described below.

5.1. Group 1: connected-cautious

This group is the largest, representing 50.3 % of the data set. Together with segment 3, it is largely made up of young people under 14 years of age (38.9 %), presenting statistically significant differences with respect to the rest of the groups (OR = 1.63; 95 % CI = 1.1, 2.65) for this segment associated only to this age group compared to the rest) and is well above the average percentage of the total sample (33.7 % in this age group). Likewise, this segment also presents a lower presence of young people under 16 years of age than expected (27.1 %) that is statistically significant.

Regarding the rest of the sociodemographic variables, in a purely descriptive way, this segment presents a higher percentage of female (53.9 %) compared to male (46.1 %) young people, differences that are not sufficiently high to be considered statistically significant (Table 2).

In terms of their online behavior patterns statistically significant (Table 3), this segment stands out for using the cell phone indistinctly for both study and leisure activities (51.71 %). It is also the second group, after segment 4, with the highest frequency of daily use of the Internet and social networks in general (81 %, well above the average percentage of the total, which stands at 74.7 %). However, their behavior in the rest of the activities carried out in the digital environment, with also statistically significant differences, is well below the average (being their frequency of use occasional or null), such as: playing video games (21.8 %), online shopping (59.9 %), buying accessories or gadgets within video games (46.3 %), playing online games of chance (90.4 %) and online sports betting (87.3 %), a set of activities considered to be of greater risk for young people.

Regarding behavior on social networks (Table 4), this is the group statistically with the highest use of private accounts for their publications on social networks with 67.95 % of young people (OR = 2.61 times for this modality and segment; 95 % CI = 1.63, 4.18), well above the average percentage for the total (55.9 %). Although it does not present differences regarding the type of content published, it does (in an statistically significant manner) in terms of the frequency of use of social networks, highlighting: WhatsApp (95.9 %), Instagram (74.2 %) and TikTok (68.3 %), in which they indicate having a higher frequency by using them practically daily and You Tube every 2 or 3 days (30,2 %).

This segment stands out for its low self-perception of exposure to the digital risks about which they have been asked, since in all of them (except for being forced to accept cookies with 73 %) the percentage of individuals who acknowledge having perceived them is much lower than the average profile (although somewhat behind segment 3, which still acknowledges having been even less exposed) and well below segments 2 and 4 with higher levels of exposure, presenting statistically significant differences. Despite their young age and lack of experience, this segment is statistically associated with, on the one hand to self-protection mechanisms related to their closest circle of coexistence such as: talking to their parents (78.9 %; OR = 2.11; 95 % CI = 1.26, 3.56), to trusted relatives (83 %; OR = 2.65; 95 % CI =), to friends (92.9 %; OR = 2.42; 95 % CI = 1.54, 4.55). On the other hand, to mechanisms more related to their protection in the management of the network such as: having a private account (83.9 % OR = 2.07; 95 % CI = 1.17, 3.65), thinking about the comments they are going to make (82.5 %, OR = 2.48; 95 % CI = 1.44, 4.26), and not interacting with strangers (79.5 %; OR = 2.33; 95 % CI = 1.39, 3.9) (Table 5).

5.2. Group 2: active in shopping and digital entertainment

This is the smallest group, representing 11.8 % of the total group studied.

For descriptive purposes only, it is mainly made up of males (65.5 %) and has a high percentage of subjects aged 16 (44.9 %), but these characteristics are not statistically significant. However, this segment is statistically associated with a higher belonging to wealthy upper middle class households (36.5 %, well above the average percentage of 19.8 %;

[2] Prior to dichotomization, categories representing less than approximately 10 % of the sample were grouped when necessary, setting a minimum size threshold to ensure that the resulting clusters allowed for meaningful interpretation.

[3] Post-stratification weights were applied to align the sample with the target population. Therefore, the descriptive analyses and reported percentages are based on weighted data, which may result in slight discrepances with the absolute frequencies observed in the sample.

[4] Categories were grouped when necessary to ensure that the conclusions could be extrapolated to the population, considering the percentage of cells with an expected frequency of less than 5. To this end, when necessary, categories have been grouped and the CHAID (Chi Square Automatic Interaction Detector) analysis technique has been used to identify interactions between modalities that, when grouped, minimize the p value and/or maximise the value of the Chi-square statistic.

Table 2
Sociodemographic and educational characterization of the segmentation.

Sociodemographic and academic factors		Typology of young Internet and SN users						
		Group 1 %column (n = 151)	Group 2 %column (n = 35)	Group 3 %column (n = 36)	Group 4 %column (n = 78)	Total % column	Statistics Chi-square	Significance P value
Sex	Male	46,1 %	65,5 %	56,2 %	52,8 %	51,3 %	4698	0,195
	Female	53,9 %	34,5 %	43,8 %	47,2 %	48,7 %		
Age	14	38,9 %	20,0 %	50,4 %	21,9 %	33,7 %	19,707	0,003**
	15	34,0 %	35,2 %	32,4 %	31,7 %	33,3 %		
	16	27,1 %	44,9 %	17,3 %	46,4 %	33,0 %		
Social class	Upper	17,3 %	36,5 %	7,5 %	22,6 %	19,8 %	21,429	0,011*
	Upper-Middle	33,3 %	27,5 %	21,7 %	34,8 %	31,6 %		
	Middle	36,8 %	28,5 %	65,1 %	30,0 %	37,5 %		
	Lower-Middle and Lower	12,5 %	7,5 %	5,8 %	12,5 %	11,1 %		

* significant at 5 %.
** significant at 1 %.

Table 3
Behaviors on the Internet of the typologies identified.

Behaviors on the Internet		Identified segmentation						
		Group 1 % column (n = 151)	Group 2 % column (n = 35)	Group 3 % column (n = 36)	Group 4 % column (n = 78)	Total % column	Statistics Chi-square	Significance P value
Uses of devices								
Mobile	Study	3,2 %	30,3 %	12,2 %	10,2 %	9,3 %	36,404	0,000**
	Leisure	45,1 %	43,0 %	63,7 %	37,6 %	45,2 %		
	Indistinctly	51,7 %	26,8 %	24,0 %	52,2 %	45,6 %		
Frequency of Internet activities								
Connect and interact on the Internet	Every day	81,0 %	37,9 %	41,1 %	95,2 %	74,7 %	95,992	0,000**
	Every 2–3 days/ weekends	15,5 %	47,9 %	21,4 %	4,0 %	17,1 %		
	On time/never	3,5 %	14,2 %	37,5 %	0,8 %	8,2 %		
Play videogames	Every day	31,9 %	18,3 %	21,4 %	57,8 %	35,7 %	45,154	0,000**
	Every 2–3 days	25,9 %	51,1 %	24,9 %	31,1 %	30,1 %		
	On weekend	20,3 %	22,4 %	27,9 %	10,4 %	18,9 %		
	Occasionally/never	21,8 %	8,3 %	25,9 %	0,7 %	15,2 %		
Watch videos on YouTube	Every day	57,7 %	18,7 %	40,8 %	76,0 %	55,8 %	47.380	0,000**
	Every 2–3 days	32,3 %	45,9 %	27,8 %	18,4 %	29,8 %		
	On weekend/ Occasionally/never	10,0 %	35,3 %	31,4 %	5,6 %	14,4 %		
View web pages of brands/ stores	Every day	27,9 %	10,8 %	2,9 %	44,6 %	27,1 %	86,309	0,000**
	Every 2–3 days	37,6 %	51,0 %	15,6 %	39,4 %	37,0 %		
	On weekend	17,8 %	30,9 %	13,7 %	5,2 %	15,6 %		
	Occasionally/never	16,7 %	7,3 %	67,8 %	10,9 %	20,3 %		
Make purchases online	Every day/Every 2–3 days	3,6 %	39,5 %	6,1 %	28,1 %	14,5 %	106,869	0,000**
	On weekend	11,2 %	24,9 %	1,7 %	16,8 %	13,1 %		
	Occasionally	59,9 %	32,5 %	20,9 %	47,1 %	48,6 %		
	Never	25,3 %	3,0 %	71,3 %	8,0 %	23,8 %		
Buy gadgets or accessories that are offered in video games	Every day/Every 2–3 days	5,1 %	36,2 %	10,9 %	24,3 %	14,4 %	57.771	0,000**
	On weekend	9,5 %	17,4 %	5,7 %	20,1 %	12,7 %		
	Occasionally	39,0 %	41,7 %	30,4 %	38,2 %	38,1 %		
	Never	46,3 %	4,7 %	53,0 %	17,5 %	34,8 %		
Play gambling (like online casino, bingo, and roulette)	Every day	2,7 %	11,1 %	0,0 %	11,5 %	5,7 %	70,442	0,000**
	Every 2–3/On weekend	6,7 %	52,8 %	2,8 %	23,1 %	16,0 %		
	Occasionally/never	90,7 %	36,1 %	97,2 %	65,4 %	78,3 %		
I make sports bets online	Every day/Every 2–3 days	2,0 %	40,1 %	0,0 %	16,3 %	10,0 %	84,170	0,000**
	On weekend/ Occasionally	10,7 %	31,3 %	4,8 %	28,4 %	17,0 %		
	Never	87,3 %	28,7 %	95,2 %	55,2 %	73,1 %		
	Total	50,3 %	11,8 %	12,1 %	25,8 %	100,0 %		

* significant at 5 %.
** significant at 1 %.

OR = 2.67; 95 % CI = 1.26, 5.67).

Unlike the rest of the segments, it is the group that uses the cell phone the most when studying (30.3 %, well above the average percentage of the total of 9.3 %). Regarding their behavior in the online environment, (with statistically significant differences) their frequency of connection to the Internet and social networks is not particularly high (47.9 % report doing so every 2–3 days or on weekends) mainly to watch videos on YouTube (45,9 % every 2 or 3 days and 35,3 % occasionally or

Table 4
Behavior of the identified typology on social networks.

Behaviors in Social Networks		Identified segmentation						
		Group 1 % column (n = 151)	Group 2 % column (n = 35)	Group 3 % column (n = 36)	Group 4 % column (n = 78)	Total % column	Statics Chi-square	Significanc P value
Type of account you post to								
Graphic or audiovisual content	Public	21,0 %	36,5 %	30,8 %	36,1 %	27,9 %	28,949	0,000**
	Private	67,5 %	50,6 %	59,7 %	33,9 %	55,9 %		
	Indistinctly	11,5 %	12,9 %	9,5 %	30,0 %	16,2 %		
Type of content uploaded								
Of myself	Yes	58,9 %	21,4 %	49,4 %	72,3 %	56,8 %	26,487	0,000**
Of my friends	Yes	59,2 %	49,3 %	36,4 %	69,8 %	58,0 %	13,049	0,005**
Of my relatives	Yes	32,6 %	42,9 %	21,1 %	47,4 %	36,2 %	9258	0,026*
Of places/ landscapes/trips	Yes	54,6 %	31,3 %	38,7 %	60,9 %	51,5 %	11,218	0,011*
Of special celebrations	Yes	38,3 %	26,4 %	33,0 %	55,7 %	40,8 %	11,701	0,008**
Of my hobbies	Yes	38,8 %	21,0 %	34,0 %	50,2 %	39,0 %	9765	0,021*
Social Networks usage frequency								
Twitch	Every day	4,6 %	12,7 %	0,0 %	34,7 %	12,8 %	129,951	0,000**
	Every 2–3 days	10,6 %	43,5 %	10,7 %	38,3 %	21,7 %		
	On weekend/ punctually	30,0 %	38,4 %	9,1 %	13,4 %	24,2 %		
	Never	54,8 %	5,5 %	80,2 %	13,5 %	41,4 %		
Discord	Every day	1,4 %	2,8 %	10,8 %	13,9 %	5,9 %	118,669	0,000**
	Every 2–3 days	2,1 %	39,7 %	2,7 %	24,5 %	12,4 %		
	On weekend/ punctually	19,5 %	50,3 %	10,4 %	34,0 %	25,8 %		
	Never	76,9 %	7,2 %	76,2 %	27,6 %	55,9 %		
YouTube	Every day	60,7 %	18,7 %	37,9 %	78,1 %	57,5 %	62,258	0,000**
	Every 2–3 days	30,2 %	32,3 %	22,9 %	14,3 %	25,5 %		
	Rest	9,1 %	49,0 %	39,2 %	7,6 %	17,1 %		
WhatsApp	Every day	95,9 %	42,1 %	74,3 %	97,1 %	87,2 %	90,190	0,000**
	Rest	4,1 %	57,9 %	25,7 %	2,9 %	12,8 %		
Instagram	Every day	74,2 %	13,9 %	26,9 %	93,2 %	66,3 %	129,109	0,000**
	Every 2–3 days/On weekend	12,9 %	52,5 %	17,3 %	4,0 %	15,8 %		
	Never	4,8 %	0,0 %	27,8 %	0,7 %	5,9 %		
Pinterest	Every day	9,0 %	8,5 %	0,0 %	19,0 %	10,4 %	90.551	0,000**
	Every 2–3 days	8,6 %	29,7 %	0,0 %	40,9 %	18,4 %		
	On weekend/ punctually	33,1 %	50,7 %	25,7 %	26,7 %	32,6 %		
	Never	49,3 %	11,1 %	74,3 %	13,5 %	38,5 %		
Snapchat	Every day	10,6 %	8,4 %	2,6 %	23,8 %	12,8 %	79,455	0,000**
	Every 2–3 days	11,4 %	36,7 %	1,4 %	29,2 %	17,8 %		
	On weekend/ punctually	26,3 %	46,5 %	17,1 %	31,3 %	28,8 %		
	Never	51,7 %	8,4 %	79,0 %	15,6 %	40,6 %		
X	Every day	14,7 %	20,9 %	1,7 %	49,3 %	22,8 %	122,605	0,000**
	Every 2–3 days	8,5 %	27,2 %	12,7 %	31,5 %	17,1 %		
	On weekend/ punctually	27,8 %	51,9 %	12,9 %	14,1 %	25,3 %		
	Never	49,1 %	0,0 %	72,7 %	5,1 %	34,8 %		
TikTok	Every day	68,3 %	19,4 %	14,3 %	85,7 %	60,5 %	163.98	0,000**
	Every 2–3 days/On weekend	26,0 %	80,6 %	23,6 %	9,2 %	27,8 %		
	Never	5,7 %	0,0 %	62,1 %	5,1 %	11,7 %		
Facebook	Every day	20,4 %	29,4 %	5,3 %	55,6 %	28,7 %	59,696	0,000**
	Every 2–3 days	17,7 %	25,9 %	11,8 %	17,8 %	18,0 %		
	On weekend/ punctually	22,3 %	31,3 %	21,4 %	13,6 %	21,0 %		
	Never	39,7 %	13,4 %	61,5 %	13,0 %	32,3 %		
	Total	50,3 %	11,8 %	12,1 %	25,8 %	100,0 %		

* significant at 5 %.
** significant at 1 %.

never), play video games every 2 or 3 days (51.1 %), or visit commercial pages on weekends (30.9 %). The other activities they report doing with greater assiduity with statistical association (almost daily or every 2–3 days) are those considered of greater risk due to their addictive power among young people, above the rest of the groups, such as: making online purchases (39.5 %; OR = 5.4; 95 % CI = 2.78, 11.76), buying gadgets or accessories for video games (36.2 %; OR = 4.4; 95 % CI = 2.02, 9.6), placing sports bets (40.1 %, OR = 10.37), or participating in online gambling (52.8 %; OR = 10.68; 95 % CI = 4.93, 23.15).

This segment has a slightly higher percentage in the use of public accounts when publishing content (36.5 % compared to an average percentage of 27.9 % of the total, without being significant differences, as well as not being distinguished by the type of content they upload. However, they differ, significantly compared to other segments, from the average profile in the type and more sporadic frequency of use of their networks every 2–3 days or on weekends, such as: Pinterest (29.7 % and 50.7 % respectively), TikTok (49.3 % and 31.3 %), WhatsApp (19 % and 29.1 %), Instagram (52.5 % and 33.6 %) and YouTube (49 % use

Table 5
Self-perception of exposure to digital risks and self-protection mechanisms.

		Identified segmentation						
		Group 1 % column (n = 151)	Group 2 % column (n = 35)	Group 3 % column (n = 36)	Group 4 % column (n = 77)	Total % column	Statics Chi-square	Significance P value
Self-perception/risk exposure online[a]								
Harassment (cyberbullying)	Yes	7,5 %	29,4 %	9,9 %	20,0 %	13,6 %	14,535	0,002**
Tricks/scams	Yes	15,7 %	39,1 %	2,8 %	32,7 %	21,3 %	22,347	0,000**
Blackmail/threats	Yes	11,6 %	37,4 %	4,9 %	23,1 %	16,8 %	19,094	0,000**
Insults, criticism, disrespect	Yes	15,0 %	25,6 %	19,9 %	33,7 %	21,7 %	10,742	0,013*
Contact with strangers	Yes	21,0 %	33,8 %	11,3 %	47,0 %	28,0 %	22,636	0,000**
Access to dangerous or inappropriate content	Yes	29,4 %	52,5 %	9,5 %	51,4 %	35,4 %	27,539	0,000**
Misuse of personal data or content	Yes	17,9 %	42,7 %	9,8 %	45,5 %	27,0 %	29,061	0,000**
Obligation to accept cookies to view content	Yes	73,0 %	50,6 %	59,7 %	74,0 %	69,0 %	9559	0,023*
Disrespectful or offensive comments to other people	Yes	29,6 %	49,7 %	20,1 %	54,2 %	37,1 %	20,805	0,000**
Witness fights between other people	Yes	34,7 %	44,3 %	25,7 %	56,6 %	40,4 %	14,342	0,002**
Hacking my account	Yes	23,4 %	32,5 %	7,8 %	46,6 %	28,6 %	22,204	0,000**
Feelings of inferiority in front of other people	Yes	18,8 %	40,9 %	11,4 %	39,1 %	25,8 %	19,997	0,000**
Intimidation/lack of freedom to say what I really feel	Yes	21,2 %	42,9 %	13,7 %	29,8 %	25,1 %	10,440	0,015*
Doubts about the veracity of the information (fake news)	Yes	52,7 %	46,3 %	44,1 %	66,8 %	54,6 %	7355	0,061
Loss of control of published content	Yes	14,7 %	28,9 %	12,6 %	24,0 %	18,5 %	6258	0,100
Incorrect propositions of strangers	Yes	21,6 %	40,2 %	4,7 %	28,6 %	23,6 %	12,974	0,005**
Self-protection mechanisms[a]								
Talk to my parents	Yes	78,9 %	56,9 %	74,0 %	61,6 %	71,2 %	11,468	0,009**
Talk to my older brothers/sisters	Yes	55,8 %	54,2 %	34,7 %	55,3 %	52,9 %	5319	0,150
Talk to another family member in whom I have trust	Yes	83,0 %	46,9 %	64,1 %	72,7 %	73,8 %	21,254	0,000**
Talk to my friends	Yes	92,9 %	73,4 %	69,7 %	96,0 %	88,6 %	27,062	0,000**
Block the person or that person's account	Yes	86,8 %	68,0 %	74,6 %	88,4 %	83,5 %	10,057	0,018*
Have a private account	Yes	83,9 %	56,6 %	81,6 %	77,8 %	78,8 %	12,602	0,006**
Share information and content only with people I know	Yes	81,5 %	65,0 %	79,7 %	74,0 %	77,4 %	4882	0,181
Think and review the information (photos/videos) before uploading to an RRSS to avoid possible negative comments	Yes	79,9 %	54,8 %	72,9 %	78,2 %	75,6 %	10,830	0,013*
Think about the comments that I am going to make to avoid offending other people	Yes	82,5 %	61,4 %	53,9 %	73,5 %	74,2 %	16,684	0,001**
Do not upload content and personal or private information	Yes	72,8 %	67,3 %	65,6 %	67,9 %	70,0 %	1121	0,772
Check if the recipient of the message is someone unknown	Yes	82,0 %	75,1 %	71,2 %	86,3 %	81,0 %	3992	0,262
Not talking/interacting with people I do not know	Yes	79,5 %	50,6 %	66,3 %	65,6 %	70,9 %	14,418	0,002**
Speaking personally with the person involved if there has been a problem/misunderstanding	Yes	63,5 %	49,7 %	40,6 %	59,9 %	58,2 %	7604	0,055
Change passwords frequently	Yes	65,2 %	53,5 %	56,7 %	78,3 %	66,2 %	8784	0,032**
I have not done anything, I have not known what to do, and I have been blocked	Yes	21,3 %	38,9 %	25,7 %	33,9 %	27,2 %	7028	0,071

* significant at 5 %.
** significant at 1 %.
[a] Only the affirmative answer is shown.

it on weekends).

The members of this group express (in statistical association) having been exposed to a greater number of risks than the rest of the groups (well above the average percentage over the total), such as: cyberbullying (29.4 %), deception or scams (39.1 %), blackmail (37.4 %), access to dangerous content (52.5 %), incorrect use of personal data (42.7 %), feelings of inferiority (40.9 %), lack of freedom to express oneself (42.9 %); and, finally, incorrect propositions from strangers (40.2 %). In spite of declaring having been exposed to a large number of risks, it is striking that they are the ones who declare or show the least application and use of self-protection mechanisms to avoid precisely these risk situations (well below the rest of the groups with frequencies observed much lower than the theoretical ones under independence and with significant differences). Thus, 56.9 % reported talking to parents, another trusted family member (46.9 %) or friends (73.4 %). Regardint other protection systems, they appear confident. Only 56.6 % had a private account, 68 % blocked an account, 54,8 % reviewed the information before uploading it and 50.6 % do not usually interact with strangers. In all cases in a lower proportion than expected and with statistically significant differences.

5.3. Group 3: sporadic beginners

This segment comprised 12.1 % of the study population, descriptively presents a slight predominance of male (56.2 %) compared to female young people (Table 2). In terms of age, this segment is statistically associated (as was segment 1) with the highest number of 14-year-olds (50.4 %; OR = 2.18; 95 % CI = 1.1, 4.4) well above the average percentage of 33.7 % at this age). They also stand out for belonging to middle-middle class households (65.1 %; OR = 3.6; 95 % CI = 1.76, 7.47) with statistically significant differences compared to the rest of the groups.

As for their behavior in the online environment, and with statistically significant differences, they are characterized by mainly using their cell phone in their leisure time (63.7 %). It is also the segment whose frequency of connection is the lowest compared to the rest of the groups

(37.5 % do it occasionally or almost never compared to the average percentage of 8.2 % with this frequency). In addition to its low exposure in the digital environment, it is also the group that stands out for being the least frequent (never or almost never) in some of the most dangerous online activities such as: online shopping (71.3 % never), sports betting (95.2 %), playing gambling (97.2 %), buying video game gadgets (53 %), and watching videos on YouTube (34.6 % do so at the weekend, occasionally or never).

In addition to their low connection to the network, this group stands out for having private accounts (59.7 %, although this characteristic does not differentiate this segment from the rest of the groups). At the same time, it is the group that publishes the least content related to its social activity (only 36.4 % of respondents reported uploading what they do with their friends) or family (21.1 %) with significant differences. Regarding the frequency of social media use, this group is statistically associated mainly with using to a lesser extent: WhatsApp (74.3 % on a daily basis, a percentage well below the average profile which stands at 87.2 %) followed by YouTube (39.2 % on weekends, occasionally or never) along with Instagram, although not very regularly (on weekends or occasionally with 17.3 % or never 27.8 %). Likewise, belonging to this segment is also statistically significantly related with the low or null use of other popular social networks widely used among the young public such as: Twitch (80.2 % say they never connect), Pinterest (74.3 %), Snapchat (72.7 %), TikTok (62.1 %), or Facebook (61.5 %).

On the other hand, in line with their low online activity with respect to the rest of the groups, the majority say they have not experienced many of the dangers that exist on the Net (below the average profile and with statistically significant differences) such as: having suffered deception or scams (2.8 %), threats or blackmail (4.9 %), having been contacted by strangers (11.3 %), accessing dangerous/inappropriate content (9.5 %), feeling that their personal data has been misused (9.8 %), being exposed to offensive comments (20.1 %), witnessing fights (25.7 %), having their account hacked (7.8 %), feeling inferior (11.4 %), or being propositioned by strangers (4.7 %). Finally, stand out for not using self-protection mechanisms in a significant way compared to the rest of the groups, perhaps because of their low degree of exposure to digital risks combined with their reduced participation in social networks. With frequencies observed much lower than expected and statistically significant differences, they stand out because they talk less than the rest of the segments with their friends (69.7 %; OR = 0.21; 95 % CI = 0.09,0.49), which means that the probability is almost five times lower in this segment compared to the others (1/0.21 = 4.76). In turn, they think less about the comments they are going to make before posting them (53.9 %; OR = 0.354; 95 % CI = 0.17, 0.71, i.e. 64.65 less likely) and talk less with the people involved when there is a problem (40.6 %; OR = 0.44; 95 % CI = 0.22, 0.89).

5.4. Group 4: regular and exposed to social networks

Comprising 25.8 % of young people, it is the second segment in terms of size. In this case, the distribution by sex is homogeneous, with a slight predominance of male (52.8 %) compared to female (48.7 %). This is the oldest group of young users, with statistically significant differences, with 46.4 % of 16-year-olds (OR = 2.33; 95 % CI = 1.27, 3.68; well above the average percentage of the total sample, which stands at 33.0 %, and ahead of segment 2). Social class is not a differentiating factor in this segment, although descriptively, there is a greater presence of individuals belonging to upper middle (34.8 %) and upper middle class households (22.6 %).

Regarding their online behavior, this segment stands out descriptively for being the one that uses the cell phone the most for both leisure and study (52.2 %). Compared to the rest of the groups, they are the most active (statistically significant), as they perform the following activities on a daily basis: connecting and interacting on the Internet and social networks (95.2 %; OR = 8.82; 95 % CI = 3.1, 25.07), playing video games (57.8 %; OR = 3.51; 95 % CI = 2.05,6.01), watching videos on You Tube (76 %; OR = 3.27), visiting commercial websites (44.6 %; OR = 3.04; 95 % CI = 1.75, 5.28).

For the most dangerous digital activities the group also shows statistically significant differences. It is the second group (after segment 2) that most performs online shopping (28.1 % daily; OR = 3.58; 95 % CI = 1.85, 6.95), purchases of accessories or gadgets for video games (24.3 %, OR = 2.55; 95 % CI = 1.31, 4.95, daily or every 2–3 days and 20.1 % only on weekends), plays online gambling games (11.5 % daily; OR = 3.4; 95 % CI = 1.29, 4.71) and participates in online sports betting (daily or every 2–3 days 16.3 %; OR = 2.41; 95 % CI = 1.11, 5.23 and 28.4 % only on weekends or occasionally; OR = 2.67; 95 % CI = 1.42, 5.02).

On the other hand, as the most frequent users of the network, they are the group with the highest use of private and/or public accounts indistinctly with significant differences with the rest of the segments (30 %). In addition, this high level of connection and participation on the Internet and social networks leads them, in a statistically significant manner, to be the ones who publish the most content about themselves (72.3 %; OR = 2.52; 95 % CI = 1.43, 4.45), or about themselves and their friends (69.8 %; OR = 2.01; 95 % CI = 1.15, 3.5) and/or their family (47.4 %), as well as about places/landscapes or trips they have been to (60.9 %), special celebrations (55.7 %; OR = 2.28; 95 % CI = 1.35, 3.87) or their hobbies (50.2 %; OR = 1.84; 95 % CI = 1.09, 3.1), compared to the rest of the groups. Regarding the frequency of use of social networks, the segment presents statistical association and it is the most social group in relation to the rest of the segments, as it manifests using practically all the networks on a daily basis: YouTube (78.1 %), WhatsApp (97.1 %), Instagram (93.2 %), Pinterest (19 %), Snapchat (23.8 %), X (49.3 %), TikTok (85.7 %) and finally Facebook (55.6 %).

Consequently to this high exposure and participation in the digital environment, a high self-perception of their exposure to possible digital risks is observed since belonging to this segment is statistically related to recognizing having suffered or experienced many of the dangers that can be produced or encountered on the network such as: cheating (32.7 %, slightly below segment 2), insults or criticism (33.7), contact with strangers (47 %), access to dangerous content (51.4 %), misuse of their personal data (45.5 %), offensive comments (54,2 %), witnessing other people fighting (56.6 %), having the account hacked (46.6 %, well above the other groups) or feelings of inferiority (39.1 %, below group 2). Finally, as for the protection mechanisms used, the belonging to this segment is also statistically associated with preferring to share their experiences and/or problems with their friends, who are the ones to help and advise them (96 %; OR = 4.0; 95 % CI = 1.18, 13.49), rather than with their parents (this is the second group with the least recourse to the family environment, only 61.6 %; OR = 0.54; 95 % CI = 0.31, 0.94, that is, 1.85 times less likely than in other segments). Being the group of young people composed of older youths, they use a greater number of tools related to their digital skills, thus presenting descriptively a higher percentage of members who lock their accounts (88.4 %), and they stand out (statistically significant) from the rest of the groups by changing their passwords frequently (78.3 %; OR = 2.21; 95 % CI = 1.21, 4.03, well above the average percentage of the total, which is 66.2 %).

As a result, the discriminant analysis performed showed an overall correct classification rate of 98.7 % with the original data and 74.4 % using cross-validation. By groups, all segments have correct classification percentages above 61 %, with Group 1 obtaining the highest percentage (79.3 %), followed by Group 4 (72.4 %) and Group 2 (69.8 %), and finally Group 3 (61.4 % of cases correctly classified) (Table 6).

6. Discussion

The research aimed to identify a typology of young people according to sociodemographic criteria, behaviors, self-perception of risk and self-protection mechanisms used in the digital context, in order to determine their level of vulnerability. The main results reveal the existence of four distinct segments of young users: 1) “connected-cautious” (50.3 %) 2)

Table 6
Classification results[a,c].

		Predicted Group Membership				
		Group 1	Group 2	Group 3	Group 4	Total
Original	Group 1	99,0 %	0 %	0 %	1.0 %	100 %
	Group 2	0 %	100 %	0 %	0 %	100 %
	Group 3	4.1 %	0 %	95.9 %	0 %	100 %
	Group 4	1.1 %	0 %	0 %	98.9 %	100 %
Cross-validated[b]	Group 1	79.3 %	2,9 %	8,7 %	9.1 %	100 %
	Group 2	11,0 %	69,8 %	9,0 %	10,2 %	100 %
	Group 3	31.0 %	1,7 %	61.4 %	5,9 %	100 %
	Group 4	17.6 %	5.6 %	3.9 %	72.9 %	100 %

[a] 98,7 % of original grouped cases correctly classified.
[b] Cross validation is done only for those cases in the analysis In cross validation, each case is classified by the functions derived from all cases other than that case.
[c] 74,4 % of cross-validated grouped cases correctly classified.

"active in shopping and digital entertainment" (11.8 %) 3) "sporadic beginners" (12.3 %) and 4) called "regular and exposed to social networks" (25.8 %).

These four clusters can be summarised into two positions of digital vulnerability for minors based on two distinct criteria: digital exposure and protection mechanisms (Table 7). Segments 1 and 3 present a position of low vulnerability ("low exposure/high protection"), grouping the youngest minors (mainly 14 years old), who are characterised by low or moderate exposure to risky activities on the Internet, partly due to their limited digital participation, and who have a high level of protection by actively applying self-protection mechanisms. On the other hand, segments 2 and 4 are highly vulnerable ("high exposure/low protection"), grouping together 15 and 16 year olds with greater experience on the Internet and high exposure to risky activities in the digital environment, without applying or applying very limited protection systems that do not sufficiently protect them from dangerous situations they may encounter online.

The results obtained are relevant mainly for two reasons. First, the identification of types of vulnerability allows for a deeper understanding of young people's digital vulnerability, overcoming a homogeneous view and facilitating the personalisation of strategies. Secondly, the research clearly identifies that age, frequency and type of Internet and social networks use, as well as perception of online risks, are the most discriminating variables of digital vulnerability. This provides a solid basis for future analysis and for the design of digital literacy interventions. Furthermore, the study is particularly relevant because it updates knowledge about young people's digital behavior after the COVID-19 pandemic, a period that led to digital acceleration and significant changes in use and exposure to risks.

Table 7
Classification of young people segments along the axes of exposure to digital risks and self-protection mechanisms.

Segment	Risk Exposure	Protection	Characteristics
1	Low	High	Frequent use of a few basic applications
3	Low	Limited-High	Low online participation; occasional or no use.
2	High	Low	Engages in risky activities; limited application of self-protection strategies.
4	High	Limited-Low	Intensive and varied online use; limited protection mechanisms.

The research is in line with previous studies on the typology of young people and their digital vulnerability but also provides an updated and multidimensional perspective. Specifically, it confirms the same line of research as Ramos Soler et al. (2018) by identifying segments based on digital vulnerability. The present research incorporates not only sociodemographic and behavioral patterns, but also self-perception of risks and the self-protection mechanisms they use, which are related to their maturity. This approach is more complex and up-to-date, especially when considering how these factors have evolved in the wake of the COVID-19 pandemic.

In relation to the prevention of risks inherent in the use of digital technology, the results obtained are relevant to the prevention of digital risks in young people. As in previous research (Theophilus et al., 2024b), it is observed that active mediation by the family prevents risky situations. Previous studies linking age to risk exposure (Boniel-Nissim et al., 2022) are also confirmed. As a nuance, the results emphasise that a high perception of online dangers is significantly related to a greater ability to protect oneself and to healthier practices in the digital environment. This perception is not necessarily linked to age but rather to digital literacy. In fact, the research also reveals that young people, despite their intensive use, are often unaware of the dangers and have low risk perception and self-regulation problems, which makes them vulnerable. This implies that prevention strategies should focus on increasing this perception.

7. Conclusions

The way in which young people from a very early age relate and interact with electronic devices on the Internet and social networks influences how their digital development will be in adulthood. This already universal Internet use among aged 10 to 15 (ONTSI. National Observatory of Technology and Society. Ministry of Economic Affairs and Digital Transformation, 2024) is influenced by different factors among which are mainly age, sex, as well as economic situation (Lahti et al., 2021). It is higher among 15 year olds and slightly more among female and in households with higher incomes (ONTSI. National Observatory of Technology and Society. Ministry of Economic Affairs and Digital Transformation, 2024).

The high frequency of use and exposure of young people on the Internet, which increases with age, increases the possibility of suffering situations of vulnerability that lead to addictive behaviors, mental problems (such as depression, anxiety or loneliness), obsession with certain aesthetic canons or excessive screen time, among others. These problems (exacerbated during and after the COVID-19 pandemic -ONTSI. Observatorio Nacional de Tecnología y Sociedad. National Observatory of Technology and Society. Spanish Ministry of Economic Affairs and Digital Transformation, 2023) directly influence their academic performance and their social and family relationships (ONTSI. Observatorio Nacional de Tecnología y Sociedad. National Observatory of Technology and Society. Spanish Ministry of Economic Affairs and Digital Transformation, 2023). The presence of parental control systems, as well as a family environment with greater communication (active versus restrictive mediation) can favor more responsible and less harmful digital behaviors (Bertrandias et al., 2023).

This research confirms that the frequency of exposure to social networks, age and the number and type of applications used are the most discriminating variables of the segments found and the source of their digital vulnerability. Considering these variables, there have been four identified segments confirming the same line of research as that proposed by Ramos Soler et al. (2018).

Group 1 (50.3 %) are called "connected-cautious". They are young people, mainly 14 years old, whose experience in using the Internet is limited due to the number of basic applications they use. They

make intensive use of a few popular applications but use them very frequently.

Group 2 (11.8 %) are called "active in shopping and digital entertainment". These are young people, mainly aged 15 and 16, who have more experience in using the Internet, as well as in training and acquiring digital skills. They are the ones who play and buy the most, and there is a possibility of addiction to risky activities: shopping, purchasing gadgets, gambling or games of chance that involve financial outlay.

Group 3 (12.1 %) are called "sporadic beginners". They are young people, mainly aged 14, whose experience in using the Internet is limited due to low frequency of participation. They have no experience and do not protect themselves from online risks.

Group 4 (25.8 %) are called "regular and exposed to social networks". They are young people, mainly aged 15 and 16, who have more experience in using the Internet, as well as in training and acquiring digital skills. Their vulnerability lies in their high exposure. They engage in addictive activities related to money but to a lesser extent than group 2. Compared to group 2, they make daily digital use of many other activities considered less socially dangerous but potentially also addictive, such as playing video games, watching YouTube videos, visiting shopping websites, etc. However, they use more proactive and specific self-protection mechanisms such as frequent password changes and account blocking.

The identification of these segments has made it possible to answer the research questions posed at the beginning of this study. Four segments have been identified based on their digital vulnerability (RQ1). These segments are largely determined by age (RQ2), mainly in the "connected-cautious" and 'sporadic beginners' groups with a lower age (14 years) and the 'regular and exposed on social networks' group with a higher age (16 years). Differences in digital behavior have been observed, particularly in terms of frequency of use, type of applications used, and content uploaded (especially vulnerable in the "regular and exposed to social networks" group). Exposure to risks (RQ3) mainly affects the "active in shopping and digital entertainment" and "regular and exposed to social networks" segments, the two most experienced groups. Finally, it was found that young people do differentiate between self-protection mechanisms (RQ4) in general, and especially the "connected-cautious" and "regular and exposed to social networks" groups. However, it is worrying that those who are "active in shopping and digital entertainment" do not use them in general or use them less, and that the 'sporadic beginners' group does not protect themselves given their infrequent use.

It is concluded, therefore, that knowledge of this reality is essential to understand and accompany the new generations in their development and digital well-being. In addition, identifying the most vulnerable segments differentiated by their vulnerability in a multidimensional way, taking into account their characteristics and behavior, i.e. those who are most exposed to the dangers of the network and who apply the least self-protection mechanisms, will make it possible to establish different digital literacy strategies applied to the different profiles of young people that will enable them to protect themselves better and more effectively.

The key is to rely on active mediation through the family environment, especially at an early age (when the child has his or her first mobile device) and to work on training in digital skills so that young people make a safe, critical and more responsible use of digital technologies, thus reducing their vulnerability in the online environment.

8. Limitations

The study has limitations. Among the methodological limitations, the sample size is limited by the difficulty of collecting data from young people under the age of 16, for whom parental authorization is required. Although the sample is representative of Spain, it is possible that a larger sample would have allowed for a better profile of some of the segments found. Some clusters (group 2 and 3) have relatively small sizes, which may limit statistical power and the generalizability of the results. Although chi-square tests were significant at the 95 % confidence level and ORs are reported with their 95 % CIs, findings for these groups should be interpreted as exploratory. Ambos segmentos revelan patrones atípicos que deberían ser monitorizados para observar su evolución en futuras investigaciones.

Another limitation of the study relates to the possible self-selection bias associated with the use of an online panel. Although this type of recruitment may involve an over-representation of young people who are more willing to participate or have a greater affinity with digital technologies, we consider this risk to be limited in our case. The sample was analyzed using ratios and includes representation from different socioeconomic levels, geographical areas and public and private educational centres. Furthermore, Internet access among young people in Spain is practically universal (98 %) (ONTSI. National Observatory of Technology and Society. Ministry of Economic Affairs and Digital Transformation, 2024), which significantly reduces barriers to participation. However, it is possible that certain profiles that are less sporadic in their participation or less involved in the digital environment may have been underrepresented, and this limitation should be taken into account when interpreting the results and generalizing them. It is also worth highlighting the need to include parents' digital skills and parenting styles as variables for analysis in future studies. The presence of parental control systems, as well as a family environment with greater communication (active mediation versus restrictive) may favor more responsible and less harmful digital behaviors (Bertrandias et al., 2023) that may affect the future evolution of the segments identified.

CRediT authorship contribution statement

María José Narros-González: Writing – review & editing, Writing – original draft, Validation, Supervision, Software, Methodology, Investigation, Conceptualization. **Sonia Carcelén-García:** Writing – review & editing, Writing – original draft, Visualization, Validation, Supervision, Project administration, Methodology, Investigation, Funding acquisition, Formal analysis, Conceptualization. **Ana Pedreño-Santos:** Writing – review & editing, Writing – original draft, Visualization, Validation, Supervision, Formal analysis, Conceptualization.

Declaration of the use of AI

Authors did not use AI for any part of the work related to the manuscript submitted.

Data availability statement

Data not available, the data that has been used is confidential. The data that support the findings of this study are available on request from the corresponding author. The data are not publicly available due to privacy or ethical restrictions.

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Declaration of competing interest

The authors declare the following financial interests/personal relationships which may be considered as potential competing interests: Complutense University reports article publishing charges, statistical analysis, and writing assistance were provided by Community of Madrid and Ministery of Consumption. If there are other authors, they declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

References

Agresti, A. (2007). *An introduction to categorical data analysis* (2nd ed.). Wiley-Interscience.

Altuna, J., Martínez-de-Morentin, J. I., & Lareki, A. (2020). The impact of becoming a parent about the perception of internet risk behaviors. *Children and Youth Services Review, 110*, Article 104803. https://doi.org/10.1016/j.childyouth.2020.104803

Andrade, B., Guadix, I., Rial, A., & Suárez, F. (2021). *Impact of technology in adolescence. Relationships, risks and opportunities*. Spain: UNICEF. Retrieved from https://www.unicef.es/sites/unicef.es/files/comunicacion/Informe_estatal_impacto-tecnologia-adolescencia.pdf.

Bäker, N., & Schütz-Wilke, J. (2023). Behavioral changes during the first year of the COVID-19 pandemic: A longitudinal comparison of bullying, cyberbullying, externalizing behavior problems and prosocial behavior in adolescents. *COVID, 3*(2), 289–300. https://doi.org/10.3390/covid3020022

Bertrandias, L., Bernard, Y., & Elgaaied-Gambier, L. (2023). How using parental control software can enhance parents' well-being: The role of product features on parental efficacy and stress. *Journal of Interactive Marketing, 58*(2–3), 280–300. https://doi.org/10.1177/10949968221144270

Boniel-Nissim, M., van den Eijnden, R. J., Furstova, J., Marino, C., Lahti, H., Inchley, J., … Badura, P. (2022). International perspectives on social media use among adolescents: Implications for mental and social well-being and substance use. *Computers in Human Behavior, 129*(107144). https://doi.org/10.1016/j.chb.2021.107144

Cabello-Hutt, T., Cabello, P., & Claro, M. (2018). Online opportunities and risks for children and adolescents: The role of digital skills, age, gender and parental mediation in Brazil. *New Media & Society, 20*(7), 2411–2431. https://doi.org/10.1177/1461444817724168

Carcelén-García, S., Narros-González, M. J., & Galmes-Cerezo, M. (2023). Digital vulnerability in young people: Gender, age and online participation patterns. *International Journal of Adolescence and Youth, 28*(1), Article 2287115. https://doi.org/10.1080/02673843.2023.2287115

Chen, I. H., Chen, C. Y., Chen, C. Y., Pakpour, A. H., Griffiths, M. D., Lin, C. Y., Lin, C. Y., Li, X. D., & Tsang, H. W. H. (2021). Problematic internet-related behaviors mediate the associations between levels of internet engagement and distress among schoolchildren during COVID-19 lockdown: A longitudinal structural equation modeling study. *Journal of Behavioral Addictions, 10*(1), 135–148. https://doi.org/10.1556/2006.2021.00006

Cowling, M., Sim, K. N., Orlando, J., & Hamra, J. (2024). Untangling digital safety, literacy, and wellbeing in school activities for 10 to 13 year old students. *Education and Information Technologies, 30*, 941–958. https://doi.org/10.1007/s10639-024-13183-z

Da Silva, F. A. (2020). Navigating the digital landscape: Ensuring youth safety and well-being online. https://doi.org/10.69849/revistaft/cs10202001150532.

Díaz-López, A., Maquilón-Sánchez, J. J., & Mirete-Ruiz, A. B. (2020). Maladaptive use of ICT in adolescence: Profiles, supervision and technological stress. *Comunicar, 28*(64), 27–36. https://doi.org/10.3916/C64-2020-03

García-Jiménez, A., López-de-Ayala, M. C., & Catalina, B. (2013). The influence of social networks on the adolescents' online practices. *Comunicar, 41*(21), 195–204. https://doi.org/10.3916/C41-2013-19

Garmendia Larrañaga, M. S., Jiménez Iglesias, E., Karrera Juarros, I., Larrañaga Aizpuru, N., Casado del Río, M.Á., Martínez Fernández, G., & Garitaonandia Garnacho, C. (2019). Actividades, mediación, oportunidades y riesgos online de los menores en la era de la convergencia mediática. Retrieved from https://addi.ehu.eus/handle/10810/49632.

Hair, J., Black, W. C., Babin, B. J., & Anderson, R. E. (2009). *Multivariate data analysis*. Prentice Hall.

INE. Instituto Nacional de Estadística – INE Base. (2022). Población residente por fecha, sexo y edad. Retrieved from https://www.ine.es/jaxiT3/Tabla.htm?t=9681&L=0 .

Kalmus, V., Batista, S., Opermann, S., Tercova, N., & Jaron Bedrosova, M. (2024). Child vulnerability in the digital world. In D. Kutsar, M. Beilmann, & O. Nahkur (Eds.), *Child vulnerability and vulnerable subjectivity: Interdisciplinary and comparative perspectives* (pp. 131–152). Nature Switzerland: Springer.

Kamasak, T., Topbas, M., Ozen, N., Esenulku, G., Yildiz, N., Sahin, S., Arslan, E. A., Cil, E., Kart, P. O., & Cansu, A. (2022). An investigation of changing attitudes and behaviors and problematic internet use in children aged 8 to 17 years during the COVID-19 pandemic. *Clinical Pediatrics, 61*(2), 194–205. https://doi.org/10.1177/00099228211065842

Koch, T., Laaber, F., & Florack, A. (2024). Socioeconomic status and young people's digital maturity: The role of parental mediation. *Computers in Human Behavior, 154*, Article 108157. https://doi.org/10.1016/j.chb.2024.108157

Lahti, H., Lyyra, N., Hietatajärvi, L., Villberg, J., & Paakkari, L. (2021). Profiles of internet use and health in adolescence: A person-oriented approach. *International Journal of Environmental Research and Public Health, 18*(13), 6972. https://doi.org/10.3390/ijerph18136972

Lu, C., & Gu, M. (2024). A systematic review and meta-analysis of factors and outcomes of digital citizenship among adolescents. *Asia Pacific Journal of Education, 45*(4), 1130–1145. https://doi.org/10.1080/02188791.2023.2296352

Malhotra, N. K. (2008). *Marketing research: An applied orientation* (5th ed.). Pearson Education.

Marinoni, C., Zanetti, M. A., & Caravita, S. C. (2023). Sex differences in cyberbullying behavior and victimization and perceived parental control before and during the COVID-19 pandemic. *Social Sciences & Humanities Open, 8*(1), Article 100731. https://doi.org/10.1016/j.ssaho.2023.100731

Martínez, G., Garmendia, M., & Garitaonandia, C. (2020). Childhood and adolescence before Information and Communication Technologies (ICTs): Opportunities, risks and harm. *Zer: Revista de Estudios de Comunicacion, 25*(48), 349–362. https://doi.org/10.1387/zer.21116

Morelli, M., Gómez Plata, M., Isolani, S., Zapata Zabala, M. E., Cabas Hoyos, K., Uribe Tirado, L. M., Sucel Ruiz Gracia, M., Paba Barbosa, C., Pistella, J., Zuffianò, A., Gerbino, M., Laghi, F., Pastorelli, C., & Baiocco, R. (2023). Sexting behaviors before and during COVID-19 in Italian and Colombian young adults. *Sexuality Research and Social Policy, 20*, 1515–1527. https://doi.org/10.1007/s13178-023-00798-z

Mýlek, V., Dedkova, L., & Smahel, D. (2023). Information sources about face-to-face meetings with people from the internet: Gendered influence on adolescents' risk perception and behavior. *New Media & Society, 25*(7), 1561–1579. https://doi.org/10.1177/14614448211014823

ONTSI. National Observatory of Technology and Society. Ministry of Economic Affairs and Digital Transformation. (2024). El uso de las tecnologías por los menores en España. Retrieved from https://www.ontsi.es/sites/ontsi/files/2024-07/El%20uso%20de%20menores%20en%20Espa%C3%B1a%202023.pdf.

ONTSI. Observatorio Nacional de Tecnología y Sociedad. National Observatory of Technology and Society. Spanish Ministry of Economic Affairs and Digital Transformation. (2023). Impact of increased use of the internet and social media on the mental health of young people and adolescents. Retrieved from https://www.ontsi.es/sites/ontsi/files/2023-10/policybriefredesocialesaludmentaljovenesyadolescentes.pdf.

Pastor, Y., García-Jiménez, A., & López-de-Ayala, M. C. (2022). Regulatory strategies for smartphone use and problematic internet use in adolescence. *Anales de Psicología, 38*(2), 269–277. https://doi.org/10.6018/analesps.461771

Ramos Soler, I., López-Sánchez, C., & Torrecillas-Lacave, T. (2018). Online risk perception in young people and its effect on digital behavior. *Comunicar, 56*(3), 71–79. https://doi.org/10.3916/C56-2018-07

Rodríguez de Dios, I., Van Oosten, J. M., & Igartua, J. J. (2018). A study of the relationship between parental mediation and adolescents' digital skills, online risks and online opportunities. *Computers in Human Behavior, 82*, 186–198. https://doi.org/10.1016/j.chb.2018.01.012

Romero Rodríguez, J. M., Berral-Ortiz, B., Martínez-Domingo, J. A., & Victoria-Maldonado, J. J. (2024). Online protection measures to prevent sexting among minors. In M. Buenestado-Fernández, A. Jiménez-Millán, & F. J. Palacios-Hidalgo (Eds.), *Comprehensive sexuality education for gender-based violence prevention* (pp. 246–264). IGI Global. https://doi.org/10.4018/979-8-3693-2053-2.ch014.

Santesmases, M. J. (1992). *Metodología de la investigación en ciencias sociales*. McGraw-Hill.

Shandilya, S. K., Datta, A., Kartik, Y., & Nagar, A. K. (2024). Nurturing resilience in minors. In S. K Shandilya, A. Datta, Y. Kartik, & A. Nagar (Eds.), *Digital resilience: Navigating disruption and safeguarding data privacy* (pp. 241–278). Springer International Publishing. https://doi.org/10.1007/978-3-031-53290-0_4.

Tercova, N., & Šmahel, D. (2025). Digital skills' role in intended and unintended exposure to harmful online content among European adolescents. *Media and Communication, 13*. https://doi.org/10.17645/mac.8963

Theopilus, Y., Al Mahmud, A., Davis, H., & Octavia, J. R. (2024a). Preventive interventions for internet addiction in young children: Systematic review. *JMIR Mental Health, 11*(1), Article e56896. https://mental.jmir.org/2024/1/e56896.

Theopilus, Y., Al Mahmud, A., Davis, H., & Octavia, J. R. (2024b). Digital interventions for combating internet addiction in young children: Qualitative study of parent and therapist perspectives. *JMIR Pediatrics and Parenting, 7*(1), Article e55364. https://doi.org/10.2196/55364. https://pediatrics.jmir.org/2024/1/e55364

Vissenberg, J., D'haenens, L., & Livingstone, S. (2022). Digital literacy and online resilience as facilitators of young people's well-being? *European Psychologist, 27*(2), 76–85. https://doi.org/10.1027/1016-9040/a000478