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Research Article

Mental Health and the use of Internet-mobile phones in adolescents

La salud mental y el uso de Internet-móvil en los adolescentes

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Abstract:
Introduction: Because of this situation, emotional well-being coordinators are being created in educational centers because of the growing concern for the mental health of adolescents. One of the elements that are being investigated as a possible cause is the high use of the Internet and cell phones; for this reason, restrictive measures are being taken in the classroom. **Methodology:** This research aims to analyze the socioemotional perception and use of the Internet and cell phones of a sample of 134 students from the first to third year of ESO through a relational model test. **Results:** It was found that the use of these digital devices and the Internet has correlations with the regulation and socioemotional management of students and significant differences by Gender. **Conclusions:** There is a possible cause of emotional health distress due to poor emotional management of these digital devices. This requires an increase in the number of investigations and the creation of training programs for students and teachers to help them in the proper management of Internet, mobile, and socioemotional skills.

Keywords: Internet—Mobile; emotional awareness and control; conversational skills and communication use; interpersonal and intrapersonal conflicts; adolescence; defense of one's rights; cooperation and help; life and subjective well-being.

Resumen:
Introducción: En los centros educativos se están creando las figuras de coordinadores de bienestar emocional como consecuencia de esta situación como consecuencia de la creciente preocupación por la salud mental de los adolescentes. Uno de los elementos que se están investigando como posible causa es el uso elevado de internet y móviles, por este motivo, se están tomando medidas restrictivas en el aula. **Metodología:** Esta investigación pretende analizar la percepción socioemocional y de uso de internet y móvil de una muestra de 134 alumnos de primero a tercero de la ESO, mediante una prueba de modelo relacional. **Resultados:** Se ha podido comprobar que el uso de estos dispositivos digitales e internet tiene correlaciones con la regulación y gestión socioemocional de los alumnos y diferencias significativas por género. **Conclusiones:** Existe una posible causa de malestar en la salud emocional debido a la mala gestión emocional de estos dispositivos digitales. Esto requiere de aumentar el número de investigaciones y la creación de programas de formación para el alumnado y el profesorado para ayudarles a una gestión adecuado de internet y móvil, y de las habilidades socioemocionales.

Palabras clave: Internet - Móvil; Conciencia y control emocional; Habilidades conversacionales y Uso comunicacional; Conflictos interpersonales e intrapersonales; Adolescencia; Defensa de los propios derechos; Cooperación y ayuda; Vida y bienestar subjetivo.

1. Introduction

The abusive use of the Internet and cell phones has generated great concern today. Some countries have taken restrictive measures, such as banning their use in classrooms (Armstrong, 2023; Carbonaro, 2023) or requesting greater control (Villar, 2023) and exceptional use in classrooms of mobile devices, as established by Decree 60/2020, of July 29, of the Governing Council, amending Decree 32/2019, of April 9, of the Governing Council, which establishes the Regulatory Framework for Coexistence in the Educational Centers of the Community of Madrid. Likewise, there is growing concern about the possible negative relationship between excessive Internet and cell phone use and aspects such as the socioemotional skills of young people, their inter- and intrapersonal relationships, emotional control, and improved quality of life (Klimenko et al., 2021; Rubio & Méndez, 2023; Vilchez &Vía and Rada, 2024).

Several studies have found that constant device use can lead to a reduced capacity for self-regulation and greater difficulty managing emotions (Hinojo-Lucena et al., 2019). In addition, excessive screen time has been linked to problems in social and emotional skills and difficulties in interacting with others and recognizing social cues (Odgers, 2018; Instituto Internacional de Estudios sobre la Familia, 2023).

Coupled with this, the mental Health of young people is an issue of growing concern globally. One in three young people in Europe experience emotional distress, and it is on the rise. However, most of these young people do not seek professional help to address these problems (Fundación La Caixa, 2024).

In the case of Spain, recent data show an even more worrying situation. In 2023, 59.3% of young people recognized having had some mental health problem, which represents a considerable increase compared to 2017, when only 28.4% reported these problems. Young women appear to be particularly vulnerable, experiencing mental health problems more frequently than men (20.7% vs. 13.3% of men), as noted by Kuric et al. (2023).

The most common symptoms include nervousness or restlessness (47.1%), not being able to sleep (43.2%), feeling lonely (38.3%), anxiety (38.3%), excessive sadness (47%), and isolation (46.6%). Some 60.5% of girls report that their mental health is poor, compared to 40% of boys (Toledano et al., 2023).

In addition, it has been found that a significant proportion of young people (57.7%) show a high degree of concern for their external image, with women tending to give more importance to this aspect, since 25.2% of them are quite concerned and 40.8% are somewhat concerned, compared to 16.4% of men who are quite concerned and 34.3% who are somewhat concerned (Kuric et al., 2023).

Likewise, they attribute the influence on their mental Health of the use of information, relationship and communication technologies (IRCT) to the possibility of addiction to the cell phone in 41.2% and by the influence on a negative self-perception of their body image in 41.2% (Toledano et al., 2023). Also, they consider " *el uso excesivo de las TIRC les produce ansiedad y estrés continuo (31,3%), disminución de su nivel de concentración (29,5%) y problemas de sueño (28%)*" (Toledano et al., 2023, p.12).

1.1. Emotions and adolescent development

The emotional skills model of Salovey and Mayer (1990) determines five fundamental emotional skills: recognition of emotion, emotional understanding of what is happening to me, labelling of emotion, expression of what the person is feeling with the emotion and, finally, emotion regulation (Fernández-Berrocal &Cabello, 2021). These skills are fundamental in many aspects of people's lives, even in the digital era, where the use of the Internet and cell phones has become indispensable.

In adolescence, emotions acquire a relevant role, both because of their evolutionary psychological stage, experiencing important emotional changes that can affect their mental Health (Gross, 2014; Sánchez-Álvarez et al., 2016; Ayllón-Salas and Fernández-Martín, 2024). According to Fernández-Berrocal et al. (2012), adolescence is characterized by emotional fluctuations of certain intensity as a consequence of physical, cognitive and social changes in their personal growth. Therefore, they must learn to regulate and manage emotions correctly (Patel et al., 2018; Turan, 2021).

Likewise, emotional regulation in the evolutionary stage of adolescence is closely linked to adjustments in depressive and anxious symptomatology, academic performance and social relationships (Gross, 2014; Fernández-Berrocal et al., 2012; Caprara et al., 2016). That is why they may have difficulties in emotional regulation, leading to a vulnerability that results in mental problems (Schäfer et al., 2017; Ayllón-Salas & Fernández-Martín, 2024).

1.2. Internet and mobile usage and its emotional impact

Nowadays, the use of the Internet and cell phones has changed our way of working and interacting; there are ways of relating to and managing our emotions. Firstly, they facilitate the connection and communication with other people, allowing us to communicate over long distances and with people we do not know in our environment; this leads us to modify the way we express and communicate our emotions (Valkenburg and Peter, 2009). Secondly, the high use of these digital resources can generate a negative impact on our emotional well-being, especially in the dependence and addiction that can generate social isolation despite having more facility to communicate, and, finally, all this generates anxiety (Przybylski and Weinstein, 2017). According to Kuss and Griffiths (2017) and Throuvala et al. (2019), the high

use of the Internet and cell phones makes it difficult for adolescents to express and manage their emotions. Therefore, adolescents interact socially less time in a face-to-face manner, which makes it difficult for them to emotionally adapt to the digital (Zaki &Williams, 2013; Solera-Gómez et al., 2022).

The latest data on the use of mobile devices and the Internet in Spain (Toledano et al., 2023) show that there is an increase in anxiety and depression due to excessive or inappropriate use. This situation is not only found in Spain but also other European countries (Fundación La Caixa, 2024). Factors that can trigger anxiety and depression can be social isolation, social comparison, and difficulty regulating emotions in digital environments (Primack et al., 2017; Instituto Internacional de Estudios sobre la Familia, 2023; Toledano et al., 2023).

Odgers (2018) notes that high use of digital devices raises levels of stress, worry, and difficulty concentrating for adolescents, having an impact on their academic performance and emotional well-being. The use of electronic devices, the constant exposure to digital stimuli, the defocusing of attention and the decrease in social interactions may be responsible for these mentioned effects (Baumgartner et al., 2014; Rosen et al., 2013; Solera-Gómez et al., 2022).

Therefore, the literature shows that the use of social networks (Internet and mobile) can generate mental health problems in adolescents (Valkenburg et al., 2017; Nesi et al., 2022). According to Choukas-Bradley et al. (2019) and Stronge et al. (2019), young women place more importance on their digital image and their acceptance in this environment and involve them in a greater concern for physical appearance and symptoms of anxiety and depression.

Therefore, in this digital era, it is important to educate people on the proper management of emotional skills, as emotional regulation can help them cope with the challenges and risks of using digital devices, such as cyberbullying or screen addiction (Extremera &Rey, 2016).

1.3. Objective and hypothesis

Following the literature review, we posed the following research question: How does the use of mobile devices and the Internet affect the emotional state of adolescents? The research's objective is to solve this question by checking whether there is a relationship between the inappropriate use of the Internet and cell phones and various socioemotional skills.

Likewise, we determined two hypotheses for the development of our study that allow us to find answers to how the use of this digital technology impacts the socioemotional skills of adolescents and if there is a significant difference by Gender:

Hypothesis 1: Excessive use of the Internet and mobile devices in adolescents may have a negative impact on the regulation and management of their emotional skills.

Hypothesis 2: Gender may influence how adolescents use the Internet and mobile devices and how they are emotionally affected by them.

2. Methodology

In this research, we tested a relational model of the perception of socioemotional skills and the use of the Internet and cell phones. We have used the HHSS/EM questionnaire, which assesses socioemotional skills; the questionnaire of Internet-related experiences (CERI), which analyzes the use of the Internet and the inter- and intrapersonal conflicts of such use; and the questionnaire of mobile phone-related experiences (CERM), which investigates the abuse of cell phones in two variables: conflicts and communicational and emotional use.

The methodology used in the research was a field study in which 134 students (55.2% female and 44.8% male) from the first to third year of ESO (41% from the first year, 27.6% from the second year and 31.3% from third year) participated in an educational centre in the capital city of Madrid. Authorization was requested from the families to obtain the sample data, and then the CERI-CERM questionnaires and the HHSS/EM questionnaire were administered to the respondents.

2.1. Instruments

The HHSS/EM questionnaire by Díez et al. (2007) was used to assess socioemotional skills. This instrument assesses several representative components, such as emotional awareness and control, conversational skills, cooperation and helpfulness during work, self-advocacy, as well as life skills and subjective well-being (Díez et al., 2007). The questionnaire consists of 36 items, with a Likert scale of 4 possible answers. Some of these responses are positively rated, while others are negatively rated. In the items with a positive rating, the "Never" option is scored as 1 and the "Always" option as 4. On the contrary, in the items with a negative rating, the score is inverted so that "Always" is scored as 1 and "Never" as 4. The authors validated the instrument in a sample of 462 protocols, obtaining an internal consistency (Cronbach's alpha) of 0.88, which indicates high reliability.

The CERI (Beranuy et al., 2009) evaluates people's experiences and use of the Internet. This instrument consists of 10 items distributed in 2 dimensions: intrapersonal conflicts and interpersonal conflicts. The response is collected through a 4-point Likert scale, where 1 indicates "Almost never" and 4 "Almost always". The psychometric properties of the CERI have shown adequate content validity and reliability (Cronbach's Alpha) between 0.74 and 0.75 for the different dimensions and 0.77 overall.

On the other hand, the CERM (Beranuy et al., 2009) aims to assess individuals' experiences and use of cell phones. This instrument consists of 10 items distributed in 2 dimensions: conflict and communicational and emotional use. Like the CERI, the response is collected through a 4-point Likert scale, where 1 indicates "Almost never" and 4 "Almost always". The CERM has also shown adequate content validity and reliability (Cronbach's Alpha) between 0.81 and 0.75 for the different dimensions and 0.80 overall.

2.2. Procedure

After obtaining authorization from the centre's management, the families gave their authorization for the collection of information; 73.62% of the total sample of the three grades (182 students) gave their authorization. The students then answered the questionnaires in a single session that was carried out collectively and in a face-to-face format, always preserving anonymity. The researchers carried out the evaluation.

2.3. Statistical analysis

The SPSS statistical processing software (version 25) was used to calculate descriptive statistics and associations. First, the responses received were coded, and descriptive analyses were performed. Subsequently, inferential analyses were performed.

The Kolmogorov-Smirnov test analyzed the variables' normality, whose results indicated that the assumption of normality was not met. Therefore, statistical tools were used for nonparametric variables, such as Spearman's Rho for associations and Mann-Whitney U for two-group independent variables.

In addition, it is verified that our sample obtains a Cronbach's Alpha of the HHSS/EM questionnaire of 0.837 and the CERI questionnaire 0.789 and CERM 0.968, close values obtained in the initial validation of these.

3. Results

The results are presented beginning with a description of the position and dispersion values (Table 1) that summarize the behaviour of the variables of the questionnaires used in the sample.

We can see (Table 1) that the mean presents intermediate values, slightly higher in the socioemotional variables and slightly lower in the CERI and CERM variables. The variables with the greatest dispersion in the scores are Conversational (3.966), Total HHSS/EM (13.880), Total CERI (4.791), Total CERM (4.307) and Emotional awareness and control (4.224) and those with the least dispersion in the scores are Interpersonal conflicts (2.199), Conflicts (2.329) and Communicative and emotional use (2.520).

Table 1.
Mean, standard deviation, asymmetry and kurtosis of variables

	Mean	standard deviation	Mín	Máx	Asymmetry	Kurtosis
Emotional awareness and control	23.52	4.224	8	30	-1.023	1.347
Conversational	30.82	3.966	21	39	-.321	-.221
Cooperation and assistance during work	26.45	3.413	17	35	.132	-.156
Defence of one's rights	18.03	2.681	9	24	-.403	.552
Socioemotional	18.63	2.947	13	25	.040	-.605
Life skills and subjective well-being	16.45	2.553	10	24	.222	.550
HHSS/EM total	133.90	13.880	104	172	.058	-.144
Intrapersonal conflicts	13.37	3.209	6	22	.102	-.229
Interpersonal conflicts	6.91	2.199	4	13	.658	-.248
CERI total	20.28	4.791	10	32	.261	-.170
Conflicts	7.11	2.329	5	17	1.643	2.782
Communicational and emotional use	9.73	2.520	5	18	.609	.585
CERM total	16.84	4.307	10	31	1.017	.668

Source: Own elaboration (2024)

Most of the variables, except for three, present positive asymmetries. This asymmetry denotes that the data of the distribution extend more to the right (are more distant from the mean) than the data on the left, highlighting the asymmetry presented by Conflicts of the CERM questionnaire (1.643). It was also observed that there were a few students with values well above the mean score. In the opposite direction, we highlight, with negative symmetry, the variable emotional awareness and control (-1.023) with a concentration of higher values on the left side of the distribution compared to the right side of the HHSS/EM questionnaire, which means that there are few students with values below the mean score. Finally, the socioemotional variable of the HHSS/EM questionnaire with skewness close to 0 (value of 0.04) should be highlighted.

3.1. HHSS/EM, CERI and CERM Correlations

Next, we present the results of the correlations of the variables of the three questionnaires, first for the female Gender (Table 2) and then for the male Gender (Table 3).

Table 2.
Correlations of the different variables of HHSS/EM, CERI and CERM for female Gender (Spearman's Rho)

	1	2	3	4	5	6	7	8	9	10	11	12	13
1													
2	.342**												
3	.461**	.386**											
4	.195	.289*	.073										
5	.330**	.518**	.494**	.250*									
6	.201	.281*	.216	.184	.397**								
7	.687**	.741**	.673**	.467**	.739**	.509**							
8	-.436**	-.364**	-.368**	-.076	-.180	-.297*	-.443**						
9	-.432**	-.317**	-.199	-.036	-.055	-.059	-.305**	.573**					
10	-.486**	-.384**	-.352**	-.054	-.146	-.244*	-.435**	.940**	.804**				
11	-.363**	-.218	-.206	.037	-.126	-.203	-.288*	.469**	.696**	.596**			
12	-.415**	-.368**	-.301**	-.269*	-.244*	-.316**	-.466**	.728**	.548**	.718**	.489**		
13	-.411**	-.353**	-.286*	-.163	-.232*	-.318**	-.432**	.700**	.673**	.750**	.766**	.913**	

Source: Own elaboration (2024)
Note: 1 - awareness and emotional control, 2 - conversational skills, 3 - cooperation and help during work, 4 - defense of own rights, 5 - socioemotional skills, 6 - life skills and subjective well-being, 7 - total value of HHSS/EM, 8 - intrapersonal conflicts, 9 - interpersonal conflicts, 10 - total value of CERI, 11 - conflicts, 12 - communicational and emotional use, 13 - total value of CERM.

If we consider the variables related to CERI and CERM (8 to 13), we observe that they present several positive correlations among themselves. First, it is observed that the personal conflicts experienced by women tend to be reflected in problems in their interpersonal relationships. Likewise, a higher general level of intrapersonal conflicts is associated with more difficulties at both the individual and emotional levels. In addition, variables measuring problems in the management and expression of emotions correlate positively with the presence of conflict in the participants. This suggests that personal and emotional difficulties and challenges in women are interrelated.

The analysis of the correlations between the variables of socioemotional skills (1 to 7) and the variables related to CERI and CERM (8 to 13) in Table 2 reveals that greater development of capacities such as emotional awareness and regulation, conversational skills, and cooperation in women is associated with lower levels of conflicts both at the personal level and in their interpersonal relationships. Likewise, a more solid mastery of socioemotional and well-being competencies is linked to a lower presence of emotional difficulties and problems reported by the participants.

These findings suggest that the comprehensive strengthening of socioemotional skills in women could have a positive impact on the reduction of various types of conflicts and problems at the individual, relational and emotional levels.

Table 3.
Correlations of the different variables of HHSS/EM, CERI and CERM for male Gender (Spearman's Rho)

	1	2	3	4	5	6	7	8	9	10	11	12	13
1													
2	.725**												
3	.426**	.502**											
4	.256*	.339**	.295*										
5	.386**	.548**	.379**	.432**									
6	.537**	.489**	.425**	.432**	.530**								
7	.804**	.875**	.676**	.531**	.701**	.716**							
8	-.273*	-.345**	-.376**	-.176	-.292*	-.305*	-.401**						
9	-.465**	-.379**	-.487**	-.241	-.294*	-.238	-.490**	.438**					
10	-.432**	-.445**	-.486**	-.215	-.346**	-.311*	-.521**	.874**	.805**				
11	-.668**	-.618**	-.521**	-.293*	-.377**	-.410**	-.679**	.297*	.656**	.544**			
12	-.474**	-.381**	-.391**	-.356**	-.251	-.387**	-.507**	.490**	.556**	.604**	.598**		
13	-.600**	-.567**	-.491**	-.358**	-.345**	-.424**	-.648**	.440**	.643**	.624**	.856**	.908**	

Source: Own elaboration (2024)
Note: 1 - awareness and emotional control, 2 - conversational skills, 3 - cooperation and help during work, 4 - defence of own rights, 5 - socioemotional skills, 6 - life skills and subjective well-being, 7 - total value of HHSS/EM, 8 - intrapersonal conflicts, 9 - interpersonal conflicts, 10 - total value of CERI, 11 - conflicts, 12 - communicational and emotional use, 13 - total value of CERM.

The analysis of the correlations between the variables of socioemotional skills (1 to 7), according to Table 3, reveals that 83.3% of the variables have a significant correlation at 99% and 6.4% with a significant correlation at 95%, and some of them with high correlation values. In addition, the socioemotional and emotional skills variables (1 to 7), which include emotional awareness and control, conversational skills, cooperation and help during work, self-advocacy, socioemotional skills in general, and life skills and subjective well-being, are closely interrelated, showing positive correlations with each other. This close relationship suggests that the development of these different skills is closely linked so that the strengthening of one of them tends to be accompanied by an improvement in the others.

The CERI and CERM variables (8 to 13) also reflect important interrelationships. Thus, intrapersonal conflicts and interpersonal conflicts are linked, suggesting that conflict resolution at the personal level and in relationships with others are interconnected aspects. On the other hand, the total value of the CERI questionnaire, conflicts in general and the total value of the CERM questionnaire are positively associated, indicating that the greater the presence of conflicts, both internally and in interactions, the higher the values obtained in these measures related to emotional management and conflict regulation. Finally, the variable communicational and emotional use is related both to conflict management and to the development of the socioemotional skills previously evaluated, highlighting the importance of adequate communication and emotional expression to deal adaptively with conflict situations and to strengthen socio-emotional skills in general.

The analysis of the correlations between the socio-emotional skills variables (1 to 7) and the variables related to CERI and CERM (8 to 13) in Table 3 reveals that the ability to manage internal and relational conflicts, as well as to regulate emotions and communicate effectively, make up a set of interconnected skills. By integrating both sets of variables, it can be inferred

that there is a connection between the development of socio-emotional and emotional skills (variables 1 to 7) and conflict management, emotional management and communicational aspects (variables 8 to 13).

Next, after the analysis of correlations is performed, we will discuss whether the two groups, women and men, are independent in the questionnaire variables, which will allow us to determine whether there is differentiation in the variables.

3.1. Analysis of independent variables of two groups

Tables 4 and 5 present the results of the Mann-Whitney U test for the independent variables of the HHSS/EM variables. The Mann-Whitney U test is a nonparametric test used to compare differences between two independent groups when the dependent variable is ordinal or continuous but does not follow a normal distribution (McKnight y Najab, 2010). In this case, this test was used to analyze the differences in the HHSS/EM, CERI and CERM variables between the groups.

Table 4.
Mann-Whitney U-test of independent variables of the HHSS/EM variables (gender variable))

	Emotional awareness and control	Conversational	Cooperation and assistance during work	Defence of one's rights	Socioemotional	Life skills and subjective well-being	HHSS/EM total
Mann-Whitney U	2135.000	1944.500	1488.500	2100.000	2189.000	1928.500	1915.000
W for Wilcoxon	4910.000	3774.500	3318.500	3930.000	4964.000	3758.500	3745.000
Z	-.382	-1.238	-3.289	-.541	-.140	-1.317	-1.365
Asymptotic sign(bilateral)	.702	.216	.001	.588	.889	.188	.172

Source: Own elaboration (2024)

The results of the Mann-Whitney U test, presented in Table 4, analyze the differences in the HHSS/EM variables between the groups. The statistical values and significance levels obtained from this nonparametric test indicate that there are significant differences between the groups in relation to the cooperation and help during work variables, but not for the rest of the HHSS/EM variables.

Table 5 shows the values of the Mann-Whitney U test for independent variables of the CERI and CERM variables between the groups determined by Gender.

Table 5.
Mann-Whitney U test of independent variables of the CERI and CERM variables (gender variable)

	Intrapersonal conflicts	Interpersonal conflicts	CERI total	Conflicts	Communicational and emotional use	CERM total
Mann-Whitney U	1744.000	1706.500	1616.500	1823.000	1906.000	1815.500
W for Wilcoxon	4519.000	4481.500	4391.500	4598.000	4681.000	4590.500
Z	-2.142	-2.323	-2.708	-1.821	-1.418	-1.820
Asymptotic sign(bilateral)	.032	.020	.007	.069	.156	.069

Source: Own elaboration (2024)

The results of the Mann-Whitney U test, presented in Table 5, study the differences in the CERI and CERM variables between the groups. The statistical values and significance levels obtained from this nonparametric test indicate that there are significant differences between the groups in relation to the intrapersonal and interpersonal conflict variables and the CERI questionnaire total, but not for the CERM questionnaire variables.

These results show significant differences between men and women in the variables of the CERI questionnaire and the ability to cooperate and help during work. However, no significant differences were found between men and women in the rest of the variables analyzed.

4. Discussion

The concern about the consequences of high Internet and mobile device use in adolescence is latent; more and more countries and educational entities are limiting the use of Internet and electronic devices in the classroom. There is concern about the impact of the constant use of digital devices on the development of emotional skills, self-management, and well-being in adolescents; abuse is leading to a worsening in the mental Health of people, especially in adolescents and young people. Acquiring social-emotional and digital management skills is critical for a healthy transition to adulthood (Guadix et al., 2023).

Studies regarding emotional control and awareness skills indicate that the intensive use of digital technologies has been associated with greater difficulties in regulating and expressing emotions (Twenge, 2020; Odgers, 2018; Ayllón-Salas and Fernández-Martín, 2024). This may be due to a decrease in face-to-face social interactions, which are fundamental for learning these skills (Kuss and Griffiths, 2017; Throuvala et al., 2019).

Likewise, evidence suggests that excessive use of the Internet and mobile devices can generate problems in adolescents' self-advocacy and subjective well-being. For example, constant social comparison and preoccupation with the image projected on social networks, especially among females, can undermine self-esteem and the ability to set healthy boundaries (Choukas-Bradley et al., 2019; Stronge et al., 2019; Kuric et al., 2023).

In terms of life and socioemotional skills, data indicate that the problematic use of digital technologies has been linked to difficulties in the development of social and autonomy competencies (Nesi et al., 2022; Lup et al., 2015). Social isolation and decreased face-to-face interactions can hinder the acquisition of life and socioemotional skills critical for long-term

independence and well-being.

Sources mention that the use of the Internet and mobile devices can facilitate the expression and processing of emotions, enabling greater connection and communication with others (Valkenburg and Peter, 2009; Solera-Gómez et al., 2022). However, excessive use of these technologies can have a negative impact on emotional well-being, such as dependence, social isolation, and anxiety (Przybylski and Weinstein, 2017; Ayllón-Salas and Fernández-Martín, 2024). These factors could potentially affect conversational skills and cooperation in different types of work for men and women (Solera-Gómez et al., 2022).

Therefore, both the results obtained in our research and the contribution of the discussion of these results confirm the first hypothesis, the excessive use of Internet and mobile devices in adolescents can have a negative impact on the regulation and management of their emotional skills.

Regarding the second hypothesis, emotion regulation plays a crucial role in the development and well-being of adolescents (Fernández-Berrocal et al., 2012). Factors that can influence emotional regulation are Gender, age and sociocultural context, among others (Zimmermann and Iwanski, 2014; Mestre et al., 2017). Understanding and locating these factors is essential to designing effective prevention and intervention strategies both in the classroom and in society (Aldao et al., 2016).

The existing gender differences in the use of the Internet and mobile devices may have implications for the cooperation skills between men and women; it has been empirically proven, in our research, that there is significant differentiation in cooperation according to Gender, which can lead to a decrease in self-regulation and difficulties in managing emotions (Hinojo-Lucena et al., 2019). Women seem to be more vulnerable to mental health problems related to excessive use of the Internet and cell phones (Kuric et al., 2023). This could affect their cooperation skills in the work environment, as can be confirmed in the study with that significant gender difference. However, to come to a definite conclusion, more research specifically focused on the issue of cooperation skills between men and women is needed.

Likewise, the excessive or problematic use of digital technologies, such as the Internet and mobile devices, can have significant implications in the field of interpersonal and intrapersonal conflicts in adolescents (Bernal-Ruiz et al., 2021).

Regarding interpersonal conflicts, several studies have found an association between problematic use of social networks and problems in young people's social relationships (Lup et al., 2015; Nesi et al., 2022). In addition, social isolation and decreased face-to-face interactions resulting from excessive use of digital technologies hinder socioemotional growth and regulation, leading individuals to the inability or decline of healthy social relationships (Kuss and Griffiths, 2017; Throuvala et al., 2019).

In terms of intrapersonal conflicts, high Internet and mobile use is associated with increased levels of anxiety and depression in adolescents (Twenge, 2020; Odgers, 2018; Elhai et al., 2020). This suggests that digital technologies may be a trigger or aggravating factor for emotional difficulties and mental health problems in this population. For example, constant social comparison and preoccupation with the image projected in digital environments, especially among adolescent females, can generate conflicts and difficulties in interaction with peers (Choukas-Bradley et al., 2019; Stronge et al., 2019; Kuric et al., 2023), which reinforces the result obtained in our research. Therefore, the second hypothesis, that Gender may influence how adolescents use and are emotionally affected using the Internet and mobile devices is partly

confirmed.

5. Conclusions

Excessive use of the Internet and mobile devices, particularly social networks, has been related to problems in the social and emotional skills of adolescents, as evidenced by the high number of correlations and high values between the different variables in both females and males. This includes difficulties in interacting with other people and recognizing social cues, as well as a greater concern for the image projected in digital environments. This is especially true in young women because image and physical appearance, associated with excessive use of social networks, could influence their confidence and security when actively participating in discussions and collaborating at work (Livingston et al., 2020). The research consulted and mentioned in the paper offers relevant insights into the impact of excessive Internet and cell phone use on mental Health and socioemotional skills, which could potentially affect conversational skills and cooperation in work settings. However, more research specifically focused on the topic of conversational skills, cooperation, and helpfulness during different types of work for men and women is needed to obtain a more complete and accurate answer to the question.

Therefore, it is necessary to comprehensively address the impact of the use of technology on the mental Health of adolescents. To do so, not only is it necessary to establish laws that control or prohibit their use in the classroom, except in exceptional cases, such as Decree 60/2020 of the Community of Madrid, it is also necessary to design prevention and intervention strategies that strengthen the emotional skills and resilience of young people (Turán, 2021; Valiente et al., 2020) and promote a healthy and balanced use of the Internet and mobile devices. This implies, on the one hand, working on the development of emotional regulation and, on the other, encouraging a more conscious and responsible approach to the use of digital technologies. Likewise, teacher training in socioemotional competencies will be required in order to be able to work on it in the classroom (Marcos et al., 2023; Marcos-Sánchez, 2024).

So, it is important to understand and comprehensively address the relationship between the use of the Internet and mobile devices and the emotional well-being of adolescents. Only through a multidimensional approach that considers both technological and psychological aspects will it be possible to promote the development and mental Health of young people in the digital age.

Our study has some limitations, such as the sample size and the location in a single educational centre, which make it difficult to extrapolate the data globally for all adolescents. Another limitation is that the cross-sectional study design and the use of self-reporting may lead to social desirability bias in the participants despite efforts to anonymize the sample. More longitudinal research is needed to analyze the evolution of these phenomena over time and to understand the underlying mechanisms better. Finally, it should be noted that the differences considered in the statistical analysis were based on comparisons of mean ranges between groups, which does not necessarily imply causality; other factors can influence the data, such as sociocultural and psychological factors, among others.

In any case, we believe that the research conducted is of great interest because it has allowed us to delve into the complex relationship between the use of the Internet and cell phones with socioemotional skills and mental Health. The results obtained are particularly interesting, as they provide evidence of how the constant use of these technologies can decrease the regulation and management of the emotional, social, and life skills of young people. Likewise, evidence has been found, both in the research and in the literature review, that this use

generates significant differences between men and women in cooperation and interpersonal conflicts. This is of particular concern given that emotional skills play a key role in the development and well-being of adolescents who experience intense physical, cognitive and social changes.

In relation to hypotheses 1 and 2 posed in the research, the results obtained allow us to give empirical support to the idea that excessive use of the Internet and mobile devices is associated with lower development of socio-emotional skills, as well as with higher levels of psychological distress in adolescents, with a significant difference between males and females in cooperation and inter- and intrapersonal conflicts.

These findings highlight the need to implement prevention and intervention strategies that promote responsible and balanced use of digital technologies and strengthen the integral development of young people. In this sense, and as a possible future line of research, the design and implementation of educational and intervention programs that seek to promote the well-being and adaptation of young people in the digital age could be considered. Other future lines of research could consist of delving into the role of specific activities and applications and exploring both the negative effects and the possible benefits of the use of these technologies, always with an approach that considers the cultural and contextual diversity of young people.

6. References

Armstrong, K. (2023, 5 de julio). Países Bajos anuncia que prohibirá el uso del celular en las salas de clase. *BBC News*. https://www.bbc.com/mundo/articles/cxxexe01gxzo

Aldao, A., Gee, D. G., De Los Reyes, A. & Seager, I. (2016). Emotion regulation as a transdiagnostic factor in the development of internalizing and externalizing psychopathology: Current and future directions. *Development and Psychopathology, 28*(4pt1), 927-946. https://doi.org/10.1017/S0954579416000638

Ayllón-Salas, P. & Fernández-Martín, F. D. (2024). The role of social and emotional skills on adolescents' life satisfaction and academic performance. *Psychology, Society & Education*, *16*(1), 49-56. https://doi.org/10.21071/pse.v16i1.16625

Baumgartner, S. E., Weeda, W. D., van der Heijden, L. L. & Huizinga, M. (2014). The Relationship Between Media Multitasking and Executive Function in Early Adolescents. *The Journal of Early Adolescence, 34*(8), 1120-1144. https://doi.org/10.1177/0272431614523133

Beranuy, M., Chamarro, A., Graner, C. & Carbonell, X. (2009). Validación de dos escalas breves para evaluar la adicción a Internet y el abuso de móvil. *Psicothema*, *21*(3), 480-485. https://www.psicothema.com/pdf/3658.pdf

Bernal-Ruiz, C. & Rosa-Alcázar, A. I. (2022). The relationship between problematic internet use, WhatsApp and personality. *Europe's Journal of Psychology*, *18*(1), 6. https://doi.org/10.5964%2Fejop.2051

Carbonaro, G. (2023, 27 de julio). La UNESCO pide a las escuelas de todo el mundo que prohíban los smartphones en las aulas. *EURONEWS*. https://bit.ly/4aMYmZQ

Choukas-Bradley, S., Nesi, J., Widman, L. y Higgins, M. K. (2019). Camera-ready: Young women's appearance-related social media consciousness and relationships with

appearance-related engagement and stress. *Psychology of Popular Media Culture, 8*(4), 365–375. https://doi.org/10.1037/ppm0000196

Decreto 60/2020, de 29 de julio, del Consejo de Gobierno, por el que se modifica el Decreto 32/2019, de 9 de abril, del Consejo de Gobierno, por el que se establece el Marco Regulador de la Convivencia en los Centros Docentes de la Comunidad de Madrid, pp. 1-34. https://bit.ly/4aJJgnZ

Díez, C., García, J.N. & Pacheco, D.I. (2007). *Dificultades del desarrollo*. Pirámide.

Elhai, J. D., Levine, J. C., Dvorak, R. D. & Hall, B. J. (2017). Non-social features of smartphone use are most related to depression, anxiety and problematic smartphone use. *Computers in Human Behavior, 69*, 75-82. http://dx.doi.org/10.1016/j.chb.2016.12.023

Extremera, N. & Rey, L. (2016). Ability emotional intelligence and life satisfaction: Positive and negative affect as mediators. *Personality and Individual Differences,* 102, 98-101. https://doi.org/10.1016/j.paid.2016.06.051

Fernández-Berrocal, P., Cabello, R., Castillo, R. & Extremera, N. (2012). Gender differences in emotional intelligence: The mediating effect of age. *Behavioral Psychology*, *20*(1), 77-89. https://bit.ly/3VzjKhb

Fernández-Berrocal, P. & Cabello, R. (2021). La inteligencia como fundamento de la educación emocional. *Revista Internacional de Educación Emocional y Bienestar, 1* (1), 31-46. https://doi.org/10.48102/rieeb.2021.1.1.5

Fundación La Caixa (2024, mayo) ¿Dónde y cómo buscan ayuda los jóvenes cuando tienen malestar emocional?. *El Observatorio Social, Fundación La Caixa*. https://bit.ly/3V6nVzx

Gross, J. J. (2014). Emotion regulation: Conceptual and empirical foundations. In J. J. Gross (Ed.), *Handbook of emotion regulation* (2nd ed., pp. 3–20). Guilford Press.

Guadix, I., Cuesta, L. & Flores, J. (2023). *Impacto del aumento del uso de internet y las redes sociales en la salud mental de jóvenes y adolescentes.* Digital Future Society. https://bit.ly/3V3ssTf

Hinojo-Lucena, F. J., Aznar-Díaz, I., Cáceres-Reche, M. P., Trujillo-Torres, J. M. & Romero-Rodríguez, J. M. (2019). Problematic Internet Use as a Predictor of Eating Disorders and Obesity in Students. *Nutrients, 11*(9), 2151. https://doi.org/10.3390/nu11092151

Instituto Internacional de Estudios sobre la Familia (2023). Familias 'Empantalladas'. *Fundación The Family Watch.* https://thefamilywatch.org/wp-content/uploads/Report-marzo.pdf

Klimenko, O., Cataño Restrepo, Y. A., Otalvaro, I. & Úsuga Echeverri, S. J. (2021). Riesgo de adicción a redes sociales e internet y su relación con habilidades para la vida y socioemocionales en una muestra de estudiantes de bachillerato del municipio de envigado: Risk of addiction to social networks and the internet and its relationship with life and socio-emotional skills in a sample of high school students from the municipality of envigado. *Psicogente*, *24*(46). https://doi.org/10.17081/psico.24.46.4382

Kuric, S., Sanmartín, A., Ballesteros, J. C. & Gómez Miguel, A. (2023). *Barómetro Juventud, Salud y Bienestar 2023*. Centro Reina Sofía de FAD Juventud. https://www.centroreinasofia.org/publicacion/barometro-salud-2023/

Kuss, D. J. & Griffiths, M. D. (2017). Social networking sites and addiction: Ten lessons learned. *International Journal of Environmental Research and Public Health, 14*(3), 311. https://doi.org/10.3390/ijerph14030311

Livingston, J., Holland, E. & Fardouly, J. (2020). Exposing digital posing: The effect of social media self-disclaimer captions on women's body dissatisfaction, mood, and impressions of the user. *Body Image*, *32*, 150-154. https://doi.org/10.1016/j.bodyim.2019.12.006

Lup, K., Trub, L. & Rosenthal, L. (2015). Instagram #instasad?: Exploring associations among Instagram use, depressive symptoms, negative social comparison, and strangers followed. *Cyberpsychology, Behavior, and Social Networking, 18*(5), 247-252. https://doi.org/10.1089/cyber.2014.0560

McKnight, P. E., & Najab, J. (2010). Mann-Whitney U Test. *The Corsini encyclopedia of psychology*, 1-1. https://doi.org/10.1002/9780470479216.corpsy0524

Marcos, R., Manzanal, A. I., & Gallego-Domínguez, C. (2023). Las competencias socioemocionales y la gestión del aula del profesorado de Educación Secundaria, Bachillerato y Formación Profesional. *Profesorado, Revista De Currículum Y Formación Del Profesorado*, *27*(2). https://doi.org/10.30827/profesorado.v27i2.21467

Marcos-Sánchez, R. (2024). Las competencias socioemocionales del profesorado en España. *Cuadernos de pedagogía*, 553, 4.

Mayer, J. D. & Salovey, P. (1997). What is emotional intelligence? In P. Salovey y D. Sluyter (Eds.), *Emotional development and emotional intelligence: Educational implications* (pp. 3-31). Basic Books.

Mestre, J. M., Núñez-Lozano, J. M., Gómez-Molinero, R., Zayas, A. & Guil, R. (2017). Emotion regulation ability and resilience in a sample of adolescents from a suburban area. *Frontiers in Psychology, 8*, 1980. https://doi.org/10.3389/fpsyg.2017.01980

Nesi, J., Rothenberg, W. A., Bettis, A. H., Massing-Schaffer, M., Fox, K. A., Telzer, E. H., … Prinstein, M. J. (2022). Emotional Responses to Social Media Experiences Among Adolescents: Longitudinal Associations with Depressive Symptoms. *Journal of Clinical Child and Adolescent Psychology*, *51*(6), 907–922. https://doi.org/10.1080/15374416.2021.1955370

Odgers, C. L. (2018). Smartphones are bad for some teens, but not all. *Nature, 554*(7693), 432–434. https://doi.org/10.1038/d41586-018-02109-8

Patel, V., Flisher, A. J., Hetrick, S. & McGorry, P. (2007). Mental Health of young people: a global public-health challenge. *The Lancet, 369*(9569), 1302-1313. https://doi.org/10.1016/S0140-6736(07)60368-7

Primack, B. A., Shensa, A., Sidani, J. E., Whaite, E. O., Lin, L. Y., Rosen, D., ... & Miller, E. (2017). Social media use and perceived social isolation among young adults in the US. *American Journal of Preventive Medicine, 53*(1), 1-8. https://doi.org/10.1016/j.amepre.2017.01.010

Przybylski, A. K. & Weinstein, N. (2017). A large-scale test of the Goldilocks hypothesis: Quantifying the relations between digital-screen use and the mental well-being of

adolescents. *Psychological Science, 28*(2), 204-215. https://doi.org/10.1177/0956797616678438

Rosen, L. D., Whaling, K., Rab, S., Carrier, L. M. & Cheever, N. A. (2013). Is Facebook creating "iDisorders"? The link between clinical symptoms of psychiatric disorders and technology use, attitudes and anxiety. *Computers in Human Behavior, 29*(3), 1243-1254. https://doi.org/10.1016/j.chb.2012.11.012

Rubio, V. & Méndez, I. (2023). Uso problemático del teléfono móvil e internet en la adecuación social en adolescentes Problematic use of the mobile phone and the Internet in the social adequacy in adolescents. *Psicología.com*, *27*. https://psiquiatria.com/trabajos/usr_8899763536767.pdf

Salovey, P., & Mayer, J. D. (1989-1990). Emotional intelligence. *Imagination, Cognition and Personality, 9*(3), 185–211. https://doi.org/10.2190/DUGG-P24E-52WK-6CDG

Sánchez-Álvarez, N., Extremera, N. & Fernández-Berrocal, P. (2016). The relation between emotional intelligence and subjective well-being: A meta-analytic investigation. *The Journal of Positive Psychology, 11*(3), 276-285. https://doi.org/10.1080/17439760.2015.1058968

Schäfer, J. Ö., Naumann, E., Holmes, E. A., Tuschen-Caffier, B. & Samson, A. C. (2017). Emotion regulation strategies in depressive and anxiety symptoms in youth: A meta-analytic review. *Journal of Youth and Adolescence, 46*(2), 261-276. https://doi.org/10.1007/s10964-016-0585-0

Solera-Gómez, S., Soler-Torró, J. M., Sancho-Cantus, D., Rodríguez, R. G., de la Rubia-Ortí, J. E. & Pelegrí, X. C. (2022). Patrón de uso del teléfono móvil e Internet en adolescentes de entre 11 y 15 años. *Enfermería Clínica*, *32*(4), 270-278. https://doi.org/10.1016/j.enfcli.2021.12.007

Stronge, S., Greaves, L. M., Milojev, P., West-Newman, T., Barlow, F. K. & Sibley, C. G. (2019). Facebook is linked to body dissatisfaction: Comparing users and non-users. *Sex Roles, 73*(5-6), 278-292. https://doi.org/10.1007/s11199-015-0517-6

Throuvala, M. A., Griffiths, M. D., Rennoldson, M. & Kuss, D. J. (2019). Motivational processes and dysfunctional mechanisms of social media use among adolescents: A qualitative focus group study. *Computers in Human Behavior, 93*, 164-175. https://doi.org/10.1016/j.chb.2018.12.012

Toledano, S., Gutiérrez, G. & Mountain, I. (2024). Informe# rayadas: la salud mental de la población joven en España. *Fundación Manantial.* https://bit.ly/3RaY6wP

Turan, M. E. (2021). The Relationship between Social Emotional Learning Competencies and Life Satisfaction in Adolescents: Mediating Role of Academic Resilience. *International Online Journal of Educational Sciences*, *13*(4), 1126-1142. https://doi.org/10.15345/iojes.2021.04.012

Twenge, J. M. (2020). Increases in Depression, Self-Harm, and Suicide Among U.S. Adolescents After 2012 and Links to Technology Use: Possible Mechanisms. *Psychiatric research and clinical practice*, *2*(1), 19–25. https://doi.org/10.1176/appi.prcp.20190015

Valiente Barroso, C., Marcos Sánchez, R., Arguedas Morales, M., & Martínez Vicente, M.

(2020). Fortaleza psicológica adolescente: relación con la inteligencia emocional y los valores. *Aula abierta*, *49*(4), 385-394. https://doi.org/10.17811/rifie.49.4.2020.385-394

Valkenburg, P. M., & Peter, J. (2009). Social consequences of the Internet for adolescents: A decade of research. *Current Directions in Psychological Science, 18*(1), 1-5. https://doi.org/10.1111/j.1467-8721.2009.01595.x

Valkenburg, P. M., Koutamanis, M. & Vossen, H. G. (2017). The concurrent and longitudinal relationships between adolescents' use of social media and their social self-esteem. *Computers in Human Behavior, 76*, 35-41. https://doi.org/10.1016/j.chb.2017.07.008

Vilchez Galarza, N. D. & Vía Y Rada Vittes, J. F. (2024). Impacto de la nomofobia en la calidad del aprendizaje en adolescentes. *Ciencia Latina Revista Científica Multidisciplinar*, *8*(1), 10604-10622. https://doi.org/10.37811/cl_rcm.v8i1.10369

Villar, F. (2023, 22 de octubre). Hay que prohibir los móviles hasta los 16 años. *EL PAÍS*. https://bit.ly/3yN2nAw

Zaki, J. & Williams, W. C. (2013). Interpersonal emotion regulation. *Emotion, 13*(5), 803–810. https://doi.org/10.1037/a0033839

Zimmermann, P. & Iwanski, A. (2014). Emotion regulation from early adolescence to emerging adulthood and middle adulthood: Age differences, gender differences, and emotion-specific developmental variations. *International Journal of Behavioral Development, 38*(2), 182-194. https://doi.org/10.1177/0165025413515405

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