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SPECIAL ARTICLE

Impact of screen and social media use on mental health

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Abstract The widespread use of digital media, especially in childhood and adolescence, raises significant concern about its impact on health, as it can affect physical, mental, and psychosocial health and development.

Technology could be beneficial for specific areas, but current use and design carry significant risks. Several studies have linked the use of electronic devices with an increase in symptoms of anxiety and depression and self-injury, particularly in people with pre-existing risk factors. Problematic internet use, including interaction with social networks and exposure to cyberbullying, can aggravate existing psychiatric disorders.

Therefore, health care professionals must adopt a preventive stance, promoting active supervision and setting of screen time limits. Regulating the use of digital devices should be a priority in the context of child care to protect children's and adolescents' physical, emotional, and mental well-being in the short, medium, and long term.

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PALABRAS CLAVE
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Tiempo de pantalla

Impacto de las pantallas y las redes sociales en la salud mental

Resumen El uso generalizado de los medios digitales, especialmente en la infancia y adolescencia, genera gran preocupación sobre su impacto en la salud al poder afectar a la salud física, mental y psicosocial, así como al desarrollo.

La tecnología podría ofrecer beneficios en aspectos concretos, pero el uso y el diseño actual, conlleva riesgos significativos. Diversos estudios vinculan el uso de dispositivos electrónicos con un incremento en síntomas de ansiedad, depresión y conductas autolesivas, particularmente en personas con factores de vulnerabilidad preexistentes. El uso problemático de internet, incluyendo la interacción con redes sociales y la exposición al ciberacoso, puede agravar trastornos psiquiátricos ya presentes.

Por lo tanto, resulta fundamental que los profesionales de la salud adopten una postura preventiva, promoviendo la supervisión activa y estableciendo límites en el tiempo frente a las pantallas. La regulación del uso de dispositivos digitales debe ser una prioridad en el cuidado infantil, para proteger el bienestar físico, emocional y mental de los niños y adolescentes a corto, medio y largo plazo.

Introduction

The use of digital technology (smartphones, gaming consoles, Internet, social media, online gaming, etc) has increased exponentially in the last decade, raising concerns about its impact on the health and development of children and adolescents. Parallel to it, there has been an increase in what is known as ''problematic usage of the internet'' (PUI), understood as use generating psychological, social, educational, and/or work problems.[1] Emphasis is placed not on screen time, but on the problems the individual experiences as a result of the use of digital technology. In addition to the excessive usage of the internet, the term PUI also comprehends problematic involvement in other types of online activity, such as gaming. This narrative review summarizes the conclusions of reviewed studies on the association between the PUI and mental health in children and adolescents.

Problematic usage of the internet

The European Network for Problematic Usage of the Internet (EU-PUI) has proposed a working definition of different forms of PUI (Table 1). One of the goals of this classification was to promote the use of homogenous terminology to allow comparisons between studies and increase the level of evidence.[1]

The prevalence of PUI varies on account of multiple factors (Table 2). A systematic review and meta-analysis that included 113 epidemiological studies, with approximately 700 000 participants from 31 countries, estimated a prevalence of 7.02%.[2] A study conducted in Spanish adolescents that included 41 507 participants found a prevalence of 33% for PUI and 3.1% for problematic gaming, a specific form of PUI, applying the diagnostic criteria of the Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition (DSM-5).

Table 1 Categories of problematic usage of the internet proposed by the EU-PUI.

1. Gaming disorder
2. Gambling disorder
3. Online buying-shopping disorder
4. Cyberchondria: An urge-driven tendency to excessively seek illness-related information on the Internet
5. Compulsive sexual behavior disorder: consumption of pornography resulting in significant functioning impairment
6. Cyberbullying: repetitive digital posting of threatening or disparaging messages to another individual
7. Problematic social media use
8. Digital hoarding: excessive accumulation of digital material such as files, photos, etc.

EU-PUI, European Network for Problematic Usage of the Internet.

Table 2 Main factors contributing to the variability in reported prevalence estimates.

- Clinical criteria (greater prevalence with DSM-5 vs ICD-11 criteria)
- Geographical area (higher prevalence in Asian countries)
- Detection instruments (higher prevalence with use of self-report questionnaires vs clinical interviews)
- Sampling method (higher prevalence with convenience vs randomized sampling)
- Year study was conducted (the prevalence increases year after year and PUI starts at increasingly young ages)
- COVID-19 pandemic

PUI, problematic usage of the internet.

However, applying the criteria of the International Classification of Diseases 11th Revision (ICD-11), the prevalence was 2.98% for PUI and 1.8% problematic gaming.[3] It is likely

Table 3 Psychiatric comorbidities associated with PUI.

- Anxiety disorders (especially social anxiety disorder and generalized anxiety disorders).
- Depressive disorders
- Neurodevelopmental disorders (ADHD and ASD)
- Conduct disorders
- Disorders related to body image, such as body dysmorphic disorder and eating disorders (increased risk with photo- or video-based social media)

ADHD, attention-deficit hyperactivity disorder; ASD, autism spectrum disorder.

Table 4 Impact of PUI on health.

- Physical health: sleep disturbances, increased resting heart rate, decreased physical activity, unhealthy diet, migraines, musculoskeletal pain, etc.
- Psychosocial health: interferes with relationships with family and peers, greater perceived loneliness.
- Mental health: obsessive, depressive and anxiety symptoms. Increase in impulsivity, aggressive behavior and somatization.
- Other: low self-esteem, difficulty with daily life activities, poorer perceived quality of life, increased risk of emotional dysregulation

PUI, problematic usage of the internet.

that some of the factors associated with the increase in PUI concern the design of online services. These services, from the design stage, incorporate addictive features such as content personalization, infinite scrolling etc to maximize the number of users per unit of time.

Risk factors vary according to the study. It seems that in Spanish adolescents, PUI is associated with female sex, higher parental educational attainment, a greater number of hours spent online, being online after midnight and mobile phone use during school hours. On the other hand, the risk factors for problematic gaming seem to be male sex, non-traditional household structure or unstable living conditions, a greater number of hours spent online and mobile phone use.[3]

Consequences of PUI

Most of the evidence currently available comes from cross-sectional studies, which makes it difficult to establish causality. Multiple psychiatric disorders have been found to occur in association with PUI (Table 3). In light of the clinical data accumulated to date, the findings of the Adolescent Brain Cognitive Development (ABCD) cohort study[4] and studies that have assessed different digital detox strategies,[5,6] there is sufficient evidence to believe that this is a problem that has a significant impact at any age. The first two decades of life constitute a particularly vulnerable period, since the brain is still developing and on one hand, this entails a decreased ability to self-regulate and, on the other, screen use affects brain development. Problematic internet use does not only affect mental health, but also physical health and emotional and social wellbeing (Table 4).

Association between screen use and symptoms of anxiety and depression

The association between screen use and symptoms of anxiety and depression in adolescents depends on the type of use, individual factors and protective factors, such as outdoor activities, sports or artistic activities (Table 5). Several studies have found an association between screen time and anxiety and depression symptoms in adolescents,[12] although with modest effect sizes that varied according to the type of screen use.[7] Studies have found heterogeneous results,[10] which suggests an interaction between screen time and other factors, such as the type of content or individual risk factors.[7] Most of the reviewed studies were cross-sectional, which makes it difficult to establish causality. However, a randomized clinical trial[11] found that reducing leisure-time screen media use to fewer than 3 h a week for two weeks improved the mental health of children and adolescents. There was a significant decrease in emotional symptoms and peer problems and an increase in prosocial behavior. The authors recommended performance of studies with a longer follow-up to determine whether the benefits are sustainable in the long term. Furthermore, considering depressive symptoms alone, systematic reviews[12] and full-scale studies[7] have shown that adolescents with PUI are more likely to experience depressive symptoms.[13]

Association between screen use and self-harm and suicidal ideation

There is evidence of an association between the use of social media, cyberbullying and self-injurious behaviors (Table 6). Exposure through screens to images of self-harm (not only viewing, but also sharing and comparing with a competitive spirit) is a potential risk factor for suicide and self-harm, although a quantitative assessment of their relationship with new technologies is not yet possible.[14] However, a systematic review[23] cited studies that found some protective effects, such as promotion of self-harm recovery, help-giving or the viewing of self-harm images helping some adolescents self-regulate, reducing the urge to self-harm. Still, none of these studies established a causal association for this positive impact nor explicitly explored the potential mechanism underlying these benefits. In short, the evidence indicates that there is an association between the use of social media and self-injurious behaviors in adolescents. However, this association is complex and influenced by factors such as the type of use, the context of the interaction and individual vulnerabilities. The impact of cyberbullying as a risk factor for suicidal and self-injurious behaviors is particularly significant, and its combination with PUI seems to increase these risks.

Association between screen use and disordered eating

In adolescence, the concern for body image is common, and exposure to social media content exacerbates physical appearance pressures, promoting the selection and editing of photographs for online posting, an activity on

Table 5 Relationship between screen use and anxious-depressive symptoms.

	Key findings	Comments
Type of use	Social media and internet use associated with anxiety and depression symptoms[7]; TV watching not associated in adolescents aged 15 years[7] Dose-dependent association of screen use with depression symptoms in adolescence	Excessive TV watching in childhood predicts anxiety in adulthood[8]
Risk groups	Female sex[9] and low-income household[7]	Greater combined impact with reduced time outdoors[7]
Protective factors	Outdoor activities, sports, creative activities/art[10]	Associated with greater optimism, lower anxiety and greater satisfaction[10]
Longitudinal evidence	ABCD study offers evidence on the causal relationship between screen use and symptoms[11]	Most studies are cross-sectional, precluding assessment of causality
Clinical impact	Excessive use associated with depressive symptoms; screen use must be considered in clinical evaluations and for digital therapeutics.[12]	Robust evidence limited by contextual factors[8]

Table 6 Relationship between social media use, cyberbullying and self-injury.

	Main findings	Comments
Negative impact	Cyberbullying[15] increases the risk of self-injury and suicidal ideation[16]	There is also evidence of increased risk in perpetrators, albeit lower[17]
Consumed content	Viewing images of self-injury[14] in social networks intensifies these behaviors (social validation, sense of belonging)[18,19]	Predominance of deleterious effects, especially in risk groups[20]
Evidence of benefits	Some studies[18] mention emotional support and social connection[21]	Scarce and inconclusive, no solid evidence of causality[22]
Review and meta-analysis	Excessive use and cyberbullying are corelated to an increased prevalence of self-injury and suicidal behaviors	Increased risk in vulnerable adolescents[22]
Technological initiatives	Tools such as #chatsafe promote safe communication regarding suicide online, but do not specifically address self-harm[19]	Inconsistent data from exploratory studies, need of ongoing updates[21]

which adolescents may spend considerable time. In addition, consumption of highly visual media increases exposure to appearance-related content.[24] The use of social media platforms with highly visual content is associated with eating disorders (EDs), disordered eating behaviors (not meeting the criteria for diagnosis of an ED) and negative body image. However, experts highlight that, in addition to screen time, the behaviors exhibited while online also play a role, with social comparison and consumption of specific types of content (nutrition, weight and body image) appearing to be particularly detrimental.[25] The variables associated with an increased risk of ED symptoms are screen time, the frequency of online media use and video or instant messaging.

There are differences in the type of screen use based on sex, with girls reporting instant messaging, streaming videos, and scrolling content on diets and celebrities more frequently compared to a greater consumption of bodybuilding and videogame content in boys.[25] In girls, online gaming once or more a day was found to be associated with an increased risk of disordered eating behaviors. In boys, there is also evidence that social media use, instant messaging and video streaming are associated with disordered eating behaviors. The ABCD study found that the risk of ED symptoms (fear of gaining weight, self-esteem associated with body weight, compensatory behaviors and binge-eating episodes) increased with each additional hour of screen time

or social media use. In boys, screen time was associated with binge-eating disorder at one year of follow-up.[26]

The COVID-19 pandemic and the ensuing home confinement measures, which resulted in an increased use of digital technologies, was associated with a significant increase in the incidence of EDs in adolescents (1.5 times greater). There was an increase in the hospitalization rate, although the median length of stay decreased. In general, there was a worsening of ED symptoms, especially anorexia-related cognitions and excessive exercising.[27]

A phenomenon that is a source of particular concern is the rise of pro-eating disorder sites in which the discourse focuses on normalizing ED symptoms and rationalizing them as a lifestyle choice. In some cases, individuals engage with this type of content in search of social support, but the support they find online may have a very harmful effect, as it may lead them to withdraw from the people who are close to them.[24]

Association between screen use and body dysmorphic disorder

Victimization on account of one's own physical appearance (weight, acne...) and social anxiety symptoms are associated with the development of body dysmorphic disorder.[28] Social networks and social media platforms constitute a social learning space where comparisons and even bullying do occur. This context carries a risk of developing unrealistic expectations regarding physical appearance, with a negative impact on self-concept, body image and body satisfaction, thereby increasing the risk of body dysmorphic disorder in children and youth. Viewing idealized images, editing selfies and making appearance comparisons have been identified as risk factors for body dissatisfaction.[29]

Association between screen use and attention

Screen use exacerbates attention deficits. However, research findings regarding the contribution of screen time to the risk of attention-deficit hyperactivity disorder (ADHD) are inconsistent. The largest meta-analysis conducted to date on the association between attention impairment and screen use found a positive correlation between the hours of screen time and the risk of ADHD.[30] Other studies have focused on intervening variables. A cohort study concluded that higher maternal screen time when the child was aged 3 years was associated with an increased risk of future ADHD, but did not find an association between the child's screen time and the probability of ADHD.[31] A study conducted in Canada found that excessive screen time in early childhood was associated with a six-fold increase in the probability of attention deficits and a seven-fold increase in the frequency of symptoms compatible with ADHD.[32] The lower the age of initial exposure to screens, the higher the risk of ADHD symptoms compared to peers exposed at later ages. Lastly, a salient study analyzed the effect of screen time on attention subdomains in children aged 6–10 years.[33] The study did not find evidence of a linear correlation between them. The authors proposed considering the potential interaction of socioeconomic variables, highlighting the need of longitudinal studies.

Particularities of electronic device use in clinical populations

Screen use in children with ADHD

Children and adolescents with ADHD are at increased risk of PUI, which was found to be significantly more severe compared to nonclinical controls.[34] The use of digital media exacerbates the core symptoms of ADHD (inattention, impulsivity and hyperactivity), but is also associated with oppositional defiant behaviors, emotional problems (anxiety, depression) and poorer executive functioning compared to children with ADHD without PUI.

A characteristic electroencephalographic pattern has been found in infants exposed to screens at age 12 months (1—4 h/day, progressively) that seemed to mediate in the association between screen use and executive function impairment in school age (9 years).[35] Executive functions are essential for self-regulation, learning, academic performance and mental health. They develop rapidly in the first years of life in concert with the prefrontal cortex, and they are highly susceptible to environmental influences.

Screen use and autism spectrum disorder

Previous studies show that prolonged screen time in children with autism spectrum disorder (ASD) exacerbates its symptoms, with an increase in repetitive behaviors and a reduction in the already limited social interactions. A study conducted in children aged 16–36 months concluded that excessive screen time has a negative impact on the social development of children with ASD, and the authors noted that toddler caregivers should manage screen time and provide natural opportunities for toddlers to develop their social skills and communication abilities.[36] They also hypothesized that prolonged screen time may contribute to the formation of non-social neural circuits during critical periods of brain development, inhibiting the development of neuronal social networks.

A systematic review on early exposure to screens found an association between screen time and the risk of ASD, especially if exposure started before age 2 years.[37] However, previous studies have also analyzed the association between the genetic risk of ASD and the use of screens, and their findings suggest that prolonged screen time may not be a cause of ASD, but rather an early sign of the disorder, as children with ASD are more attracted to objects than to people.[38]

Actual or potential benefits of digital media use

A systematic review of the association of digital media use and mental health in the context of the COVID-19 pandemic[39] concluded that one-to-one communication, self-disclosure in the context of mutual online friendship and positive and funny online experiences mitigated feelings of loneliness and stress and therefore improved mental well-

being. Nevertheless, the authors underscored the need for balance with physical activity and rest and of controlling screen time and the type of social media use.

There are numerous mental health applications for adolescents, but the evidence supporting their efficacy is still insufficient. The increase in mental health disorders and the limited resources of health care systems to respond to the demand for care have prompted the development of digital mental health interventions (DMHIs).[40] A systematic review on the subject[40] concluded that computerized cognitive-behavioral therapy was effective for management of anxiety and depression, while the results for the effectiveness of other DMHIs were inconclusive. Interventions involving in-person interactions with a professional, peer or parent were associated with greater effectiveness and adherence and less frequent dropout compared to fully automatized or self-administered interventions.

Conclusions

The recent literature suggests an association between the excessive use of digital technologies, especially social media, and the presence of anxiety and depression symptoms and self-injurious behaviors in children and adolescents. Problematic internet use has also been associated with EDs and body dysmorphia as well as attention impairments. In clinical samples of individuals with ADHD and ASD, there is evidence of worsening of symptoms in association with PUI. This calls for the implementation of preventive measures, such as psychoeducation programs on the balanced and responsible use of technology targeting all of society, not just children and adolescents, with promotion of physical and social activity outside the online environment and strategies to control screen time in both the school and home settings.[41]

On the other hand, certain digital tools, such as online therapy services and wellbeing apps could serve as supplemental resources as long as they are properly regulated and used under professional supervision. In short, although the current evidence highlights the adverse effects of unchecked screen use, the therapeutic potential of some digital tools in clinically indicated contexts should not be overlooked. Longitudinal studies and controlled trials are needed to establish the direction and magnitude of these associations more robustly.

Declaration of competing interest

The authors have no conflicts of interest to declare.

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