

## Internet-related psychopathology: clinical phenotypes and perspectives in an evolving field

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### Summary

*Having become an integral part of everyday life, it is not surprising that the Internet has also given birth to a wide range of problematic and, in some cases, pathological behaviours. Under the vague term "Problematic Internet Use" (PIU), many different forms of harmful Internet use are included. A thorough assessment of the most widely reported forms of PIU can help clinicians to recognise core symptom dimensions. Psychopathological elements reminiscent of impulse control, obsessive-compulsive spectrum and substance use disorders have been reported in Internet addicts, with the presence of psychiatric comorbidity representing the rule rather than the exception. Ultimately, In-*

*ternet addicts can experience significant functional impairment, often reporting negative impact on the family, work and school performances, and legal difficulties. While diagnostic criteria are still investigational, and epidemiologic and treatment studies remain necessary, herein we will provide an overview of the main psychopathological characteristics, clinical phenotypes and scientific advances on PIU.*

### Key words

*Problematic Internet use • Internet addiction • Behavioral addiction • Impulse control disorder*

### Introduction

The Internet now represents an integral, almost obligatory, part of everyday life: most people communicate, listen to music, shop, read the news, work and learn online or on social networks, often with the help of other digital tools. When, in 1837, the British mathematician Charles Babbage revealed to the world his "Analytical Engine", the first prototype for a mechanical programmable calculator, he probably did not realise how far the human-machine interaction would evolve. Indeed, by the end of the 20<sup>th</sup> century, the downstream effects of his invention had contributed to a dramatic and likely irreversible change in human life. Although our species has always attempted to produce technology to help meet needs and control the environment, the degree of change since the introduction of personal computers and digital communications is unprecedented, in part due to the "bidirectional" relationship between us and these tools: humans created computers, and computers, in turn, are reshaping humans.

Many sociologists, psychologists, information technology experts and anthropologists have spoken of a "digital revolution" occurring in the last two decades of the last century<sup>1</sup>, and compared it to two prior technology-enabled revolutions: mechanisation and electricity in

the 19<sup>th</sup> century and mass production in the early 20<sup>th</sup> century<sup>2</sup>. Indeed, some have proposed that the abrupt changes taking place in how we utilise information technology at the beginning of the 21<sup>st</sup> century may point to a second digital revolution<sup>3</sup>. While the first may have been characterised by mass "digitisation" (i.e., the conversion of communication media into a digital format), the second is being described as mass "atomisation" (i.e., the deep penetrance of digital content into people's lives<sup>4</sup>, or "virtualism", with "described as the disappearance of any boundary between the physical and virtual worlds<sup>5</sup>. Such developments have rapidly exposed us to an unprecedented volume of information and to novel ways of interacting, seeing and presenting oneself. The result is new personality traits that are incorporated and nurtured online, as well as modifications to how we read, write, remember and process information<sup>5</sup>.

Since, among the medical disciplines, psychiatry is the most attuned to social and cultural changes, it is not surprising that mental health professionals, already in the early 1990s, warned about the addictive properties of the Internet, later defining the "typical profile" as a socially-isolated male teenager with poor self-confidence, whose main activity is related to his computer use and internet access<sup>6,7</sup>. The landscape has greatly changed since then,

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as each successive generation has become more familiar with, and reliant upon, the Internet, resulting in less typicality in the problematic Internet user's profile and in problematic online behaviour. Consequently, different psychiatric disorders related to the use of new digital tools have been proposed. The aim of the present paper is to review Internet-related psychopathology, discuss prototypes of proposed disorders and comment on future directions within this field.

## Internet-related psychopathology

The constant growth of online activities has meant that users stay online longer than before, perhaps resulting in more individuals meeting criteria for addiction<sup>8</sup>. Indeed, early markers of potentially problematic use focused on excessive or longer than intended use of the Internet<sup>9</sup>. By 2010, more than 2 billion people, or about a third of the world population, had access to the Internet, compared with 0.05% in 1990<sup>10</sup>. Besides increased access, other factors may have contributed to increased Internet use<sup>11</sup>. First, through broadband, smartphones and wireless connections, the Internet has become independent of space and time. Second, the technology has become more affordable as the industry was "scaled" and service providers competed to provide faster connectivity at lower costs. An older but still relevant third factor may be the anonymity of the medium: Internet users may easily disguise their real identity, which results in a greater sense of freedom and control<sup>5</sup>. With rising Internet penetration rates (currently 40% worldwide and 78% in developed countries)<sup>10</sup>, the time spent online has doubled over the past decade<sup>12</sup>.

Problematic Internet use (PIU)<sup>13</sup>, which has also been referred to as "Internet addiction"<sup>14</sup>, "computer addiction"<sup>15</sup>, "pathological Internet use"<sup>16</sup>, "compulsive Internet use"<sup>17</sup>, and "impulsive-compulsive Internet Usage Disorder"<sup>18</sup>, has been defined in multiple ways (Table I). Most conceptualisations, however, tend to converge on excessive time spent online that is linked to significant downstream impairment and negative consequences<sup>14,19</sup>.

Epidemiological estimates of PIU show relatively low prevalence rates (below 1%)<sup>20</sup>, with a varying age distribution ("digital natives" at higher risk)<sup>21</sup>, sex (slight male preponderance)<sup>22</sup> and geographic area (greater number of cases in developed countries)<sup>23</sup>. High comorbidity rates with other psychiatric disorders (in particular mood, anxiety, impulse control and substance use disorders) are frequent<sup>24</sup>. However, epidemiological studies of PIU are significantly compromised by inconsistency in defining the disorder and lack of inclusion in any diagnostic manual: the APA decided not to include PIU in the lat-

**TABLE I.**  
Proposed nomenclature of PIU.

Synonyms
Problematic Internet use
Internet addiction
Impulsive-compulsive Internet usage disorder
Internet addiction disorder
Excessive Internet use
Computer addiction
Cyber addiction
Net addiction
Compulsive Internet use
Internet dependence
Internet overuse
Internet-related disorder
Internet behavior dependence
Pathological Internet use

est edition of the DSM<sup>25</sup>, despite some pleas in favour of doing so<sup>26</sup>. Instead, an Internet-related problem was mentioned in the appendix to the manual as an area for further research<sup>6</sup>.

The aetiology of PIU is still largely unknown, but probably involves different psychological, neurobiological and cultural factors. Evidence concerning abnormal levels of dopamine receptors in the striatum of subjects with PIU have been recently reported<sup>27</sup>, which is in line with some imaging<sup>28</sup> and neuropsychological<sup>29</sup> data. Taken together, the available data suggest that the pathophysiology is mediated by a prefrontal dysfunction. Such abnormalities may represent a neurobiological vulnerability upon which life events, exposures or individual characteristics act to trigger onset of the disorder, perhaps along a diathesis-stress model<sup>30</sup>. However, it remains to be elucidated whether these neurobiological findings constitute the cause of PIU or are rather the result of neural adaptation and functional plasticity following excessive use.

From a psychopathological standpoint, PIU has been differently conceptualised, including as an impulse-control disorder, such as pathological gambling disorder, a behavioural addiction modelled on substance use disorders, or an obsessive-compulsive condition similar to OCD<sup>31</sup>. Over the past several years, more specific problematic behaviours related to Internet and digital technology use have been described, making PIU a sort of "umbrella" diagnosis including one or more specific psychopathological phenomena.

## Specific Internet-related psychopathology

According to the original model by Davis et al.<sup>30</sup>, two types of Internet misuse can be identified: “generalised” (which conceptually overlaps with PIU) and “specific”. The latter category refers to misuse involving specific content or platforms. While some “specific” entities can be seen as “old” psychopathological phenomena that have been reconfigured by new technologies, others are so intrinsically linked to cyberspace that they can be considered as new problems born out of a new type of interaction between humans and technology<sup>32</sup>.

### Online Gambling

Gambling disorder is recognised as a mental disorder in the DSM-5, where it is included under non-substance-related use disorders, but the DSM-5 is silent on an independent online variant or online specifier for gambling disorder. However, in its discussion of “Internet gaming disorder” included under “Conditions for Further Study”, the DSM-5 states: “Excessive gambling online may qualify for a separate diagnosis of gambling disorder.” Some have considered online gambling to be the most addictive form of gambling, linking it to greater impairment<sup>33</sup>. For example, recent data suggest that electronic slots and video-lottery terminals account for nearly 60% of gambling revenue<sup>34</sup>. Still, the common psychopathological explanation of problematic online gambling resembles the classic addiction model with hypothesised abnormality in the brain circuitry involved in decision making (i.e., ventral striatum, ventro-medial prefrontal cortex, mid-brain and insula)<sup>35</sup>.

### Internet gaming disorder

Internet Gaming Disorder (IGD) is a condition in which affected individuals spend excessive time playing video games with ensuing negative consequences on academic, professional or interpersonal functioning. Recent research<sup>36</sup> suggests that IGD may represent a distinct entity from PIU, being characterised by male preponderance, lower levels of depression comorbidity and lower engagement in other internet activities (e.g., social networking). Interestingly, this condition, as opposed to a more general one alluding to all potentially problematic Internet activity, was added to the research appendix of DSM-5, as a potential new diagnosis.

Biological research has demonstrated that IGD subjects may show neuropsychological impairment (e.g., more inhibition errors, possibly due to altered decision-making processes)<sup>37</sup>. Such findings would be consistent with data from recent brain imaging studies which report structural and functional abnormalities of prefrontal, cingulate and insular cortices<sup>38-39</sup>. As with PIU, research into IGD has

been considerably hampered by the lack of consensus on its definition and diagnostic thresholds. Thus, reports on prevalence and psychosocial impact vary widely<sup>40</sup>.

A unique subtype of IGD may be represented by massively multiplayer online role-playing games (MMORPGs), in which the player interacts with other users via virtual representations (“avatars”) in a more immersive environment that often results in more time investment. MMORPGs seem to be associated with specific self-identity and self-efficacy issues<sup>41-42</sup>, which may lead to a greater involvement in the online community<sup>43</sup> and to worse personal impact<sup>44</sup>.

### Cyberchondria

Help-and reassurance-seeking behaviour is hardly a new potentially psychopathological symptom, but the use of the Internet for this purpose has become increasingly more common. Cyberchondria has been defined as excessive or repeated online searching for health-related information that is aimed to calm down health-related anxiety. Paradoxically, such behaviour may increase anxiety in some individuals, usually due to the discovery of new triggers for health-related worries<sup>45</sup>. This “amplification mechanism” may relate to the fact that the Internet was not designed to provide reliable, accurate and unambiguous health information, a fact that may increase uncertainty and worrying<sup>46</sup>. Despite some evidence concerning the association with anxiety and intolerance of uncertainty<sup>47</sup>, and despite attempts to formulate it as a multidimensional psychopathological concept<sup>48-49</sup>, cyberchondria is still seen as part of the spectrum of classic hypochondriasis<sup>32</sup>.

### Cybersuicide

The link between PIU, clinical depression and suicide is unclear, with only limited data emerging from methodologically weak studies mostly conducted in adolescents<sup>48</sup>. Nonetheless, some studies report a potential correlation with suicidal ideation or attempts<sup>50-53</sup>. What seems to be relatively more established is a link between specific web content and suicidal behaviour. “Cybersuicide” refers to self-inflicted death promoted by websites that provide the know-how and encourage people to perform suicidal behaviours, sometimes via simultaneous “suicide pacts”<sup>54</sup>. Another form is “webcam suicide”, or the online broadcasting of one’s suicide using video sharing services, sometimes to an audience that taunts and challenges the victim to commit the act<sup>5</sup>.

Psychologically, cybersuicidal behaviours have been explained in terms of strong ambivalence about life, social isolation and the need to share suicidal thoughts<sup>55</sup>, although in some cases they may also represent a cry for help. However, the differences between “traditional”

suicide and the online counterpart, as well as the role of culture in this phenomenon, remain to be elucidated<sup>32</sup>.

### **Cybersex**

The term “cybersex” describes a wide range of behaviours related to the search for and procurement of sexual pleasure via the Internet. Cybersexual behaviours vary widely and potentially include online dating, viewing of pornographic material, or “cruising” for sex and arranging sexual encounters. However, only those associated with significant personal discomfort or aggressive, coercive or illicit activities can be regarded as pathological<sup>32</sup>. In these situations, the appeal of short-term pleasure leads to failure in controlling the sexual urge, causing long-term negative consequences (e.g., financial or relationship consequences, risk of contracting sexually transmitted infections, legal problems from harassment or sexual exploitation)<sup>56</sup>.

Recently, two subtypes of cybersexual behaviours have been described: “receptive”, which involves information-seeking and the viewing of sexually explicit Internet content, and “interactive”, which refers to the use of websites or social networks for the purpose of engaging in virtual, sexually charged, relationships<sup>57</sup>. The latter behaviour has been also dubbed “cyberaffair” and refers to a romantic and/or sexual relationship that is initiated online and maintained through electronic conversations<sup>57</sup>. Although such behaviours can be harmless, in some cases they may lead to serious consequences due to altered sleep patterns (chat rooms tend to be more active at night), problems with real-life relationships (due to neglect of family and everyday responsibilities, lying to partners and family members), or loss of interest in real-life sex. Older, more educated and less religious individuals have been considered more at risk for cyber-affairs<sup>58</sup>.

While Internet sexual addiction has been conceptualised as a variant of PIU<sup>59</sup>, a distinct “hypersexual disorder”, characterised by increased frequency and intensity of sexual fantasies, urges and enacted behaviours and impulsivity, was proposed but not included in the DSM-5. A proposal for the inclusion of “compulsive sexual behaviour” in ICD-11 has been put forward<sup>60</sup>.

### **Cyberbullying/cyberstalking**

Cyberbullying is defined as repeated hostile or aggressive behaviour aimed to inflict harm or discomfort by means of digital tools<sup>61</sup>. Unlike real-life bullying, cyberbullying is not based on the physical superiority of the bully over the victim, since digital technology makes physical strength less important. Digital technology can also make bullying more ubiquitous since it can be carried out anytime and anywhere, with possible amplification of its effects through “viral” dissemination of the victim’s

humiliation<sup>61</sup>. From a psychopathological viewpoint, cyberbullying has been considered a manifestation of other forms of psychopathology, including antisocial personality disorder and conduct disorder, and has been linked to high rates of psychiatric comorbidity in victims, bullies and bully-victims (victims who become bullies or vice versa)<sup>61</sup>.

A related phenomenon, usually described in adults, involves repeated attempts via digital tools (Internet, e-mails, chats, social networks, etc.) to locate and stalk another person. “Cyberstalking” as the behavior has been called may be part of traditional stalking or an independent behaviour<sup>62,63</sup>.

### **Compulsive online shopping**

Since the Internet introduced new features of shopping that may potentially make it more “addictive”, a new conceptual model for “online shopping addiction” has been proposed, with a psychological and socio-demographic profile that includes: low self-esteem, low self-regulation, negative emotional state, female gender, anonymity and cognitive overload<sup>18</sup>. The psychopathological conceptualisation of compulsive online shopping is mostly based on a classic addiction model, although it maintains some relationship with depression, obsessive-compulsive disorder and hoarding. Materialism and sensitivity to reward play a role in the emergence of this behaviour.

### **Other Internet-related psychopathology**

In some cases, the Internet may play a direct role in promoting pathological behaviours, such as websites that expressly promote unhealthy eating, thus encouraging the emergence of anorexia and bulimia nervosa, with associated negative impact on body image and mood<sup>64</sup>. Similarly, specific online content can contribute to anxiety or affective crises, most tragically when they encourage suicide. A “Twitter psychosis”<sup>65</sup> and the online emergence and magnification of various problematic personality traits<sup>5</sup> have also been described.

Changes in children’s lifestyles, including increased time spent playing videogames, have drawn attention to the risks of excessive Internet use in individuals with neurodevelopmental disorders, in particular children with ADHD, who are particularly vulnerable to excessive screen games where visual experiences are privileged over auditory ones and where one operates in brief segments with immediate rewards and without the need for sustained attention<sup>66</sup>.

## **Discussion**

One of the first reports on Internet and mental health<sup>67</sup> defined the Internet as a “rapid communication resource”



that was “beginning to have an impact on medicine... and will soon have a major effect on psychiatry”. The anticipated effect, however, involved mainly the availability and retrieval of patients’ clinical information as well as the communication among scientists and with remote psychiatric settings. Nearly 20 years later, unforeseen psychological cyber-problems have emerged and established “offline” disorders have been transformed by the online experience (Table II).

This is hardly surprising since psychopathology is in-

fluenced by social and cultural factors, and since new technologies have already profoundly impacted society and culture. Coupled with the trend to operationally define disorders and to split psychopathology into discrete categories, the opportunity to identify “new disorders” probably tempted many researchers. In addition, media fascination with the Internet and their tendency to blame digital technologies for many negative aspects of modern life may have made it harder for scholars to resist novel nosological categories derived from new behaviours. Al-

**TABLE II.**  
DSM-5 categories with potential “cyber” counterparts.

DSM-5	Internet-related disorders	Proposed examples
Neurodevelopmental Disorders	Favours ADHD	Weiss MD, Baer S, Allan BA, et al. <i>The screens culture: impact on ADHD</i> . <i>Atten Defic Hyperact Disord</i> 2011;327-34
Schizophrenia Spectrum and Other Psychotic Disorders	Websites promoting delusional beliefs	Aboujaoude E. <i>Psychotic Websites</i> . <i>Psychology Today</i> 2009 (available online at: <a href="http://www.psychologytoday.com/blog/compulsive-acts/200907/psychotic-websites">www.psychologytoday.com/blog/compulsive-acts/200907/psychotic-websites</a> )
Bipolar and Related Disorders	Online manic-like disinhibition	Suler J. <i>“The Online Disinhibition Effect”</i> . <i>Cyber Psych Behav</i> 2004;7:321-6
Depressive Disorders	Cybersuicide	Harris KM, McLean JP, Sheffield J. <i>Examining suicide-risk individuals who go online for suicide-related purposes</i> . <i>Arch Suicide Res</i> 2009;13:264-76
Anxiety Disorders	Favors anxiety	Chou C. <i>Incidences and correlates of Internet anxiety among high school teachers in Taiwan</i> . <i>Comput Hum Behav</i> 2003;19:731-49
Obsessive-Compulsive and Related Disorders	Obsessions about Internet content, compulsive email checking or gaming	Shapira NA, Goldsmith TD, Keck PE Jr, et al. <i>Psychiatric features of individuals with problematic internet use</i> . <i>J Affect Disord</i> 2000;57:267-72
Trauma- and Stressor-Related Disorders	Cyberbullying	Tokunaga RS. <i>Following you home from school: a critical review and synthesis of research on cyberbullying victimization</i> . <i>Comput Hum Behav</i> 2010;26:277-87
Dissociative Disorders	Dissociative identity disorder associated with internet role playing	TeWildt BT, Kowalewski E, Meibeyer F, et al. <i>Identity and dissociation in cyberspace. A case of dissociative identity disorder associated with internet role playing</i> . <i>Nervenarzt</i> 2006;77:81-4
Somatic Symptom Disorders	Cyberchondria	Starcevic V, Berle D. <i>Cyberchondria: towards a better understanding of excessive health-related Internet use</i> . <i>Exp Rev Neurotherap</i> 2013;13:205-13
Feeding and Eating Disorders	Websites promoting anorexia and bulimia nervosa	Talbot TS. <i>The effects of viewing pro-eating disorder websites: a systematic review</i> . <i>West Indian Med J</i> 2010;59:686-97
Sleep-Wake Disorders	Insomnia due to late night Internet web surfing or gaming	Cheung LM, Wong WS. <i>The effects of insomnia and internet addiction on depression in Hong Kong Chinese adolescents: an exploratory cross-sectional analysis</i> . <i>J Sleep Res</i> 2011;20:311-7

(continued)

Table II - Follows

DSM-5	Internet-related disorders	Proposed examples
Sexual Dysfunctions	Cybersex	Southern S. <i>Treatment of compulsive cybersex behavior</i> . <i>Psychiatr Clin North Am</i> 2008;31:697-712
Disruptive, Impulse Control and Conduct Disorders	Impulsive/Compulsive Internet Use	Dell'Osso B, Hadley S, Allen A, et al. <i>Escitalopram in the treatment of impulsive-compulsive internet usage disorder: an open-label trial followed by a double-blind discontinuation phase</i> . <i>J Clin Psychiatry</i> 2008;69:452-6
Substance Use and Addictive Disorders	Internet Addiction	Block JJ. <i>Issues for DSM-V: Internet addiction</i> . <i>Am J Psychiatry</i> 2008;165:306-7
Personality Disorders	Emergence and worsening of personality traits (e.g., narcissism, regression, impulsivity)	Aboujaoude E. <i>Virtually You: The Dangerous Powers of the E-Personality</i> . New York: Norton 2012
Paraphilic Disorders	Cybersex	Southern S. <i>Treatment of compulsive cybersex behavior</i> . <i>Psychiatr Clin North Am</i> 2008;31:697-712

though whether new technologies have created truly new clinical issues or reshaped old psychopathology remains an open question, it does seem like for many conditions the Internet is more than just a simple “specifier” describing the expression of a disorder. Laying this issue to rest, however, requires more research and a shift from the lack of specificity and incompatible models (i.e., behavioural addiction, impulse control dysfunction, obsessive-compulsive features) that have dominated the field, leading to diagnostic uncertainty and great heterogeneity in reported data. Adding the lack of standardised, properly validated assessment tools, high psychiatric comorbidity and limited treatment options (mostly derived from mother-conditions), it becomes rather easy to support the claim of artificial creation of new psychopathology. Some years ago, Walker<sup>68</sup> warned against this phenomenon by describing a process by which everyday passions could be pathologised. Avid golfers who spend much time golfing, and invest heavily in equipment, may experience discomfort if forced to abstain, and prefer to play golf rather than fulfil occupational or family roles, may similarly be the object of clinical concern, leading to declaring golfing as a new addiction. The same might be said about “addiction” to the Internet, especially if seen as an adaptive response to today’s highly wired culture, or if it is a manifestation of introversion, boredom or low mood. Indeed, there is an urgent need to identify proper thresholds for what may constitute PIU, thus creating the basis for reliable epidemiological data.

Given the recent DSM-5 release and the anticipated ICD revision, it is time to reflect on what might constitute an Internet-related mental disorder. Major psychiatric diagnostic manuals still converge on the idea that a mental disorder is characterised by a clinically significant and

recognisable pattern of symptoms and behaviours that cause disability, distress and dysfunction. Within such a nosological framework that is defined by graded diagnostic boundaries, clinical thresholds can become blurred or are determined on the basis of medical or moral metaphors<sup>69</sup>. Nonetheless, the choice to include PIU among potential psychiatric pathologies seems rational, even if such an inclusion requires the differentiation of multiple putative clinical entities.

Only future empirical research can determine whether this approach is right. Presently, it must be acknowledged that some specific phenomenological core components of Internet-related psychopathology have been proposed. For example, Kuss et al.<sup>70</sup> discuss six phenomenological core components (salience, mood, tolerance, withdrawal, conflicts, relapse) as the basis for Internet-related psychopathology (see Table III).

In addition, a growing body of neurobiological and imaging studies points to abnormal prefrontal functioning, supporting a biological determinant that may underlie the clinical expression of Internet-related disorders. Finally, reviews of available treatments suggest that potentially effective psychological and pharmacological treatments may be available.

## Conclusions

Internet-related psychopathology represents a new challenge to wellbeing that cannot be disregarded. Digital addictions, in particular socially-driven activities, represent the most disabling problems of the DSM-5 “conditions for further studies”. More research into the triggers, manifestations and consequences of these activities is needed. Furthermore, cyber-psychopathology is likely

**TABLE III.**  
Core components of Internet-related psychopathology.

Component	Biopsychosocial aspects	Psychopathology
Salience	Cognitive, emotional and behavioural preoccupation with online activities	Obsessive thoughts, craving
Mood	Escape from real-life problems	Mood modifications
Tolerance	Need to stay longer and longer online	Initial addictive behaviour
Withdrawal	Unpleasant feelings when attempting to decrease/discontinue Internet usage	Psychological (e.g., anxiety, depressed mood, irritability) and physical (e.g., somatizations) symptoms
Conflicts	Intra- (subjective feelings of losing control) and inter-personal (family and social relationships) conflicts	Neglect of social/personal responsibilities
Relapse	Unsuccessful attempts to reduce or discontinue Internet use	Chronic course

to represent an even greater challenge to future generations. Actually, more than 30% of children under the age of 2 use a tablet or a smartphone, and 75% of kids aged 8 and younger live in a home with one or more mobile device. What the impact will be of such massive early exposure to digital technology is almost entirely unknown, but there is justifiable concern about the effects on thought processes, attention span and motor and sensory development. Finally, the interventions to confront cyber psychopathologies will have to be expanded beyond still-to-be-tested psychotherapeutic and psychopharmacological treatments to include public health awareness and education campaigns, as well as school-based prevention programs.

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