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Review

Digital dependency and its consequences for human well-being

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ABSTRACT

This article examines how digital technology affects the thinking and emotional well-being of young people. Spending too much time on screens can make it harder to concentrate, remember important information, get enough sleep, and manage emotions. Research shows that frequent use of smartphones and social media leads to serious problems known as digital dementia and brain rot. These habits can change brain function, cause unhealthy behaviors, and mental disorders. The negative effects can be reduced by setting limits on device use and encouraging controlled usage. Simple steps such as putting phones away during meals, reading printed books, and spending more time outdoors have been shown to have positive impacts on health. Taking regular breaks from digital content also helps the mind stay clear. The complex problem of the digital era can only be solved with collective action. All interested parties should cooperate on the policies and guidelines for using digital tools to protect mental health in the long run.

1. Introduction

The digital world brings both good and bad changes. It is important to think about how technology affects daily life because it shapes how we handle simple things like staying focused and connecting with others. Some questions matter now more than ever, such as: Can we still focus or enjoy deep thinking when notifications keep interrupting us? Are we using our devices, or are they starting to control how we think and feel? In recent years, experts have warned about the effects of digital technology on well-being. Using smartphones and social media often leads to mental health risks. These problems are most common among teenagers and young adults. Table 1 shows some key terms used to describe these issues. Digital addiction refers to compulsive and uncontrolled use of digital technologies, often accompanied by anxiety and distress when access is restricted [1]. Digital dementia is the term used to describe the deterioration of memory, focus, and cognitive performance linked to prolonged digital exposure [2]. The term brain rot, recently named Oxford's Word of the Year, reflects the mental fatigue and decline in critical thinking caused by the overconsumption of fast-paced, low-value digital content [3]. Cue reactivity, a concept from neuroscience, describes the brain's heightened response to smartphone-related stimuli, particularly in regions associated with craving and reward [4]. This article reviews studies about the consequences of digital dependency and its influence on mental health. The second section presents current findings and the results of clinical studies on how constant digital stimulation impacts memory, focus, emotional regulation, and neurological structure. The third section discusses strategies and expert recommendations to moderate these effects. The last section considers the broader implications of digital overuse. It emphasizes the need for interdisciplinary collaboration. The development of long-term studies is recommended for future research.

2. Scientific insights into cognitive decline

This section presents a review of current scientific research, expert opinions, and observational reports on digital technology use and health relations. The focus is on how constant exposure to smartphones and online platforms may interfere with attention, memory, sleep, and emotional regulation, particularly during sensitive developmental periods. Additionally, it focuses on the observed common patterns and the mechanisms driving these changes in individuals and broader youth populations. Statistical data supports growing concerns about the effects

of digital overuse. Research from Kristiania University College reveals that suicidal ideation among university students has nearly doubled in the last decade, rising from 15 percent to 29 percent [5].

Table 1. Definitions and Symptoms of Digital Dependency Phenomena

Term	Definition	Key Symptoms
Digital Addiction	Compulsive, uncontrolled use of digital devices	Anxiety, restlessness, inability to focus
Digital Dementia	Cognitive decline from prolonged digital exposure	Memory loss, focus issues, reduced learning capacity
Brain Rot	Mental fatigue from trivial, low-value content	Critical thinking decline, emotional fatigue
Phantom Vibration Syndrome	The false perception that a phone is vibrating without notifications.	Frequent phone checking, anxiety, mental fatigue

Surveys conducted in 2024 among mental health professionals identified social media as the most significant contributor to the youth mental health crisis. Additional studies have linked increased smartphone use with declining IQ scores, diminished attention spans, disrupted sleep, and a rise in anxiety and depression [5, 6]. Neuroimaging research has shown that individuals with excessive smartphone use exhibit reduced gray matter volume and impaired functional connectivity in brain regions that regulate emotional and cognitive control [1,4]. These effects are not limited to the clinical setting. Many individuals experience difficulty concentrating while reading, working, or even holding a conversation. The habit of frequently checking phones, often without any notification, has become so widespread that it is now known as Phantom Vibration Syndrome. Mental exhaustion, difficulty sleeping, reduced interpersonal engagement, and persistent feelings of restlessness have become common symptoms of an overstimulated digital lifestyle [2].

A recent Pew Research Center survey shows the ongoing struggle adolescents face with smartphone usage [7]. While 38% of U.S. teens acknowledge spending too much time on their smartphones and 27% say the same about social media, only a minority have successfully reduced their usage. This awareness is more pronounced among girls, with 44% reporting excessive phone use compared to 33% of boys. Video platforms like TikTok and YouTube dominate usage habits, with daily engagement rates at 71% and 58%, respectively. These findings align with legislative efforts to limit smartphone use during school hours. It reflects the growing societal concern over digital dependency, as shown in Figure 1 [8].

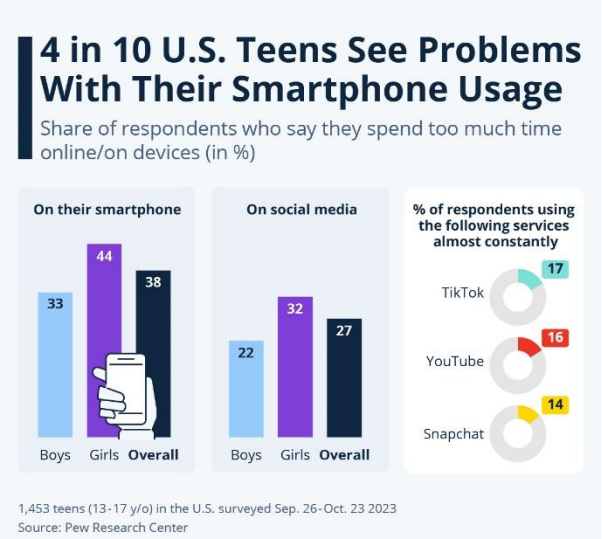
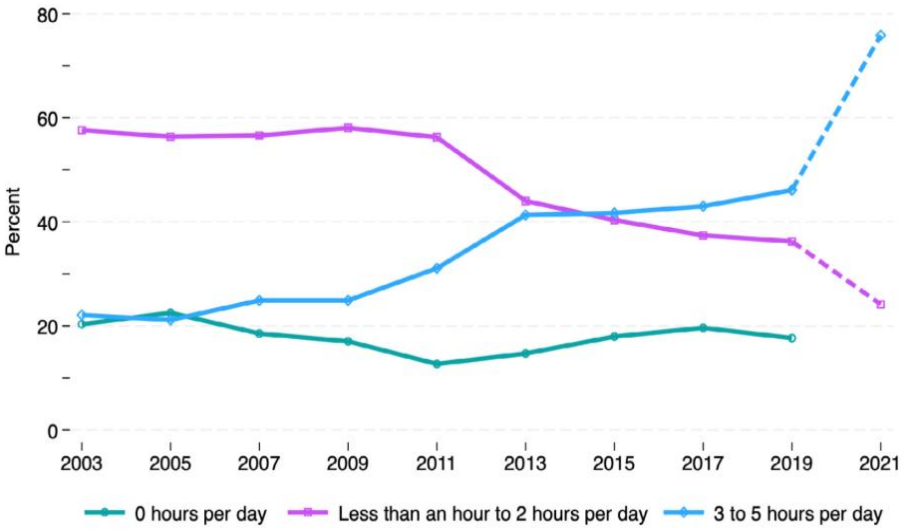


Figure 1. Adolescent Smartphone Usage Awareness and Habits [8]

Building on these usage patterns, other social and psychological implications have been explored in recent studies. Manhattan Institute report explores the complex relationship between mental health trends and the rapid adoption of smartphones and social media, particularly among young Americans [9]. Despite material prosperity, today's youth face unprecedented levels of psychological distress, especially young women. While some attribute these mental health trends to the rise of smartphones and social media, others argue that this relationship is overstated and influenced by broader sociocultural factors [10]. According to this report, the effect of social media on mental health is not

uniform but varies based on individual personality traits and sociopolitical environments. Traits like neuroticism, low conscientiousness, and justice sensitivity can increase vulnerability to negative emotional outcomes from social media exposure [11, 12]. Meta-analyses confirm statistically significant relationships between negative mental health outcomes and social media or smartphone use [13, 14]. Longitudinal studies further support these findings, showing that extended social media engagement correlates with increased depressive symptoms among adolescents [15-17]. Experimental studies also demonstrate causal relationships between reduced social media use and improved mental health outcomes [18, 19]. Figure 2 and Figure 3 illustrate visual summaries of these patterns.

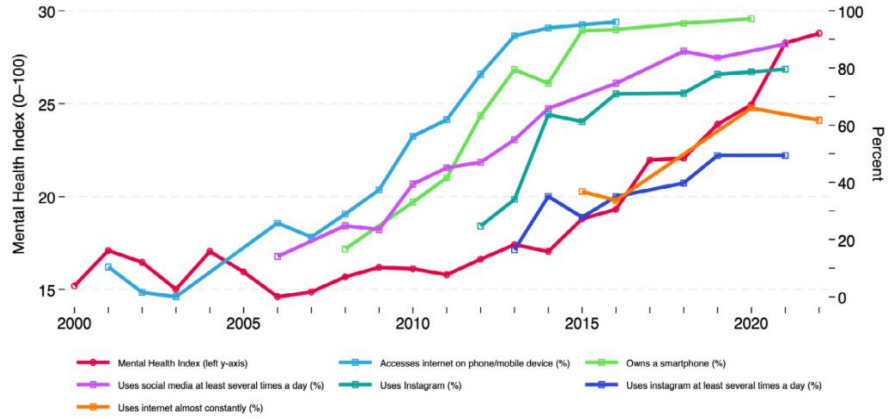


Note: Data are weighted. Question prompt reads: "On an average day, how many hours do you play video or computer games or use a computer for something that is not schoolwork? (Count time spent playing games, watching videos, texting, or using social media on your smartphone, computer, Xbox, PlayStation, iPad, or other tablet)." Until 2021, response options consisted of: 1) "I do not play video or computer games or use a computer for something that is not schoolwork"; 2) "Less than 1 hour per day"; 3) "1 hour per day"; 4) "2 hours per day"; 5) "3 hours per day"; 6) "4 hours per day"; and 7) "5 or more hours per day." In 2021, the first of these options was omitted. Therefore, solid lines until 2021 represent the percentage of high school students who chose option 1 (0 hours per day), options 2, 3, or 4 (less than an hour to 2 hours per day), and options 5, 6, or 7 (3–5 or more hours per day). Markers for 2021, in contrast, represent the percentage who chose options 2, 3, or 4 (less than an hour to 2 hours per day) and options 5, 6, or 7 (3–5 or more hours per day). To delineate this modification, lines connecting 2019 and 2021 markers are dashed.

Figure 2. Trends in Recreational Screen Time Among US High Schoolers, 2003-2021 [9]

2.1 Broader context and trends

The ongoing crisis in youth mental health has become a major public concern across North America and Europe. Over the past decade, a sharp increase in depression, anxiety, self-harm, and suicide among adolescents and young adults has been reported. The trend began in the early 2010s and intensified during the COVID-19 pandemic. In 2021, several leading U.S. health organizations declared a national emergency in child and adolescent mental health. Shortly after, the Surgeon General issued a public health advisory highlighting the severe mental health challenges youth face, which were already on the rise well before the pandemic. Data from the past ten years supports this warning: suicide rates for 10-24-year-olds in the U.S. rose by 56%, with Black youth experiencing a 78% increase. Among girls aged 10–14, the suicide rate surged by 167%. There are multiple explanations for this crisis. Media messages and popular culture that hurt young people's self-worth are one suspected cause. Social media, exposure to violence, climate anxiety, political uncertainty, and social isolation are other important factors in addition to the lack of independence and coping skills [20]. Jonathan Haidt's recent book attributes much of the crisis to phone-based childhoods and overprotective parenting.



Note: The red line, which corresponds to the left y-axis, represents smoothed estimates of score for young (18–21) U.S. adults on an aggregate index of mental health. Higher values indicate a greater proportion of respondents reporting negative mental-health outcomes, and lower values indicate the opposite. The index was generated using Stimson's (2018) Dyad Ratios Algorithm, which harmonized 85 time series of responses to mental-health measures. All other lines, which correspond to the right y-axis, represent the percentage of young (18–21) U.S. adults who reported using or adopting a given technology/social-media platform. These data were gathered from the Pew Research Center.

Figure 3. Trends in Young Adult (18-21) Mental Health and Smartphone/Social Media Use [9]

He links this shift to developmental disruptions, including poor sleep, addictive digital behavior, and reduced emotional resilience. The concerns over constant digital exposure are widely echoed by mental health experts, although there were contradictory opinions. Evolving diagnostic practices and broader social trends have been considered to explain the rising rates. Nonetheless, the convergence of technological, psychological, and social risks has made youth mental health one of the most urgent challenges of the decade. The sharp rise in youth mental health problems has a strong relation with the spread of smartphones, social media, and a decline in play-based childhoods. Haidt identifies the early 2010s as a critical turning point, where the widespread adoption of smartphones and significant increases in anxiety, depression, self-harm, and suicide among teens under 18 meet. He claims that these trends were largely absent in adults over 30 and observed across many developed countries. Therefore, it is an indicator of a strong connection to global technological and cultural shifts beginning around 2010. He explains that modern childhood has changed. Although children need challenges, risks, and free play to build resilience, parents now focus more on safety and preventing children from taking risks. More time spent indoors and online reduces important experiences for emotional and mental growth. Less Social Time, Poor Sleep, Short Attention Spans, and Digital Addiction are four key problems that are linked to phone-centered lifestyles. The time with friends has decreased, and sleep duration has fallen since 2010. Close friendships have declined as well. These issues affect girls more often due to body image concerns and social comparisons. Leaked documents in 2021 revealed that Facebook and Instagram were aware of the negative effects on teen mental health but took no serious action. This case shows how companies often place profit above well-being. Digital life also harms emotional and spiritual health. Children miss out on shared traditions and calm moments for thinking. Many now feel lonely and struggle to find meaning in life. Haidt not only stated the problems, but he also offered recommendations and practical steps. Collective action is needed to improve this situation. Governments should introduce protective laws and raise the minimum age for social media use. Schools should ban smartphones, add more recess, and support free play. Tech companies should provide better parental controls and reduce addictive features. Parents are encouraged to delay smartphone access, join initiatives like the Wait Until 8th pledge, and support outdoor activities. Greater cooperation can provide better improvement in mental health [21].

2.2 Cultural framing and public discourse

The term brain rot became Oxford University Press's Word of the Year in 2024. The term is defined as a decline in thinking ability caused by consuming online material that lacks depth or challenge. Use of this term increased by 230% in 2024. This term has already been used to criticize society's preference for simple ideas in the past. Today, it can be a good time to address the effects of endless scrolling and consuming low-quality online content, such as mental fog, shorter attention spans, and feeling mentally drained. Some mental health providers in the U.S. now treat brain rot as a real concern. Suggested preventive strategies include reducing screen time and taking regular breaks from digital devices. The term has become especially popular among Gen Z and Gen Alpha. This shows how they recognize the issue but still struggle to avoid it [3].

Magness also looks at how digital device use affects thinking. He introduces the term digital dementia to describe scattered thoughts, poor focus, and forgetfulness caused by constant screen time. He explains that smartphones keep people stuck in a shallow state of attention. Jumping between apps and staying connected all the time prevents deep thinking. This weakens memory and makes it harder to focus.

Research shows that even having a smartphone nearby can lower attention and performance. The brain sees the device as a possible source of reward, which distracts from the task at hand. While this helped humans in the past to notice danger, it now causes constant stress and mental overload. Studies also show that frequent digital interruptions increase stress without action. Therefore, people feel helpless and exhausted. The more people rely on their phones, the harder it becomes to stay present and focused. People can keep their phones out of sight, remove them from the bedroom, take regular breaks from screens, read physical books, and spend time alone without distraction to clear the mind and stay focused. These minor life changes are not about rejecting technology altogether but balancing it [2].

2.3 Psychological and cognitive evidence

A study looked at the health effects of too much smartphone use in teens and young adults. This study reviewed 84 research papers and found strong links between heavy phone use and many health problems. These include depression, anxiety, ADHD, OCD, low self-esteem, social anxiety, and even behaviors linked to alcohol abuse. People who use their phones a lot also struggle with controlling their emotions and often act without thinking. Many people who struggle with phone overuse have unhealthy ways of handling emotions. They focus on negative thoughts, blame themselves, and expect the worst in situations. These emotional struggles lead to conflicts with family and friends and poor performance at school. Difficult childhood experiences and insecure relationships also cause unhealthy smartphone habits. Teens who have faced emotional trauma may turn to smartphones, but this makes their depression and anxiety worse. Certain personality traits also raise the risk of overuse. Young people who act on impulse, avoid responsibilities, or look for constant excitement are more likely to develop these habits. Many use their phones to avoid boredom or uncomfortable feelings. Even short breaks from devices can cause anxiety and show strong dependency. Fear of missing out (FOMO) also keeps them online since they worry that something important can be missed if they disconnect. Social media platforms encourage this behavior by offering quick rewards but promoting shallow interactions and constant comparisons. Smartphone overuse also affects how the brain works. Brain scans show changes in areas responsible for focus, decision-making, and emotions. Frequent phone users also have less gray matter in their brains. These changes are similar to patterns seen in people with gambling addiction. The research also links smartphone overuse to serious mental health problems. Depression and anxiety are listed as the most common issues. In addition to mental problems, physical health also suffers. People who are addicted to smartphones have trouble falling asleep late and not sleeping well. This happens not only because of screen time at night but also because of constant mental stimulation from notifications. Other health effects include eye strain, headaches, neck pain, reduced physical activity, and unhealthy eating habits. Over time, these habits can lead to weight gain and chronic pain [1]. Brain scans show that heavy smartphone use affects brain development. Studies found lower connectivity in areas that help with language and learning. Some scans also show less gray matter and weaker connections in parts of the brain linked to emotions and thinking. In some cases, simply seeing a smartphone causes brain activity similar to addiction cravings [11]. Some researchers argue that smartphone overuse should not be called an addiction. However, this review shows that the mental and physical effects are serious and deserve more attention. The patterns of behavior and changes in the brain are very similar to addictions. Therefore, public health and education systems should focus less on definitions and more on the harm [1].

2.4 Public Experiments and policy implications

A recent study explored what happens in the brain when regular smartphone users take a short break from their phones. A group of 25 young adults was asked to avoid using their phones for 3 days. During this time, their brain activities were measured. They were shown pictures of smartphones and other everyday objects to see how their brains reacted. The results indicated that even a short break caused noticeable changes. Parts of the brain linked to wanting rewards became more active when people saw smartphone images. This means their brains were craving phone use, like addiction. Even short breaks made people want to check their phones more. This helps explain why it is hard to spend less time on phones. Breaking this habit may take time, require support from others, and changes in daily routines [4]. These results also show why better rules and guidelines are needed to help people manage phone use. A recent and notable study by the University of York tested what happens when students stop using smartphones. The study followed Year 8 students at The Stanway School in Colchester. They agreed not to use smartphones for 21 days. Researchers tracked changes in sleep, emotions, and thinking skills. The results have shown that students fell asleep about 20 minutes faster, slept around 60 minutes longer, and went to bed an average of 50 minutes earlier. Students reported feeling better emotionally. Depressive symptoms dropped by 17%, and anxiety fell by 18%. Heart rate data also improved, but mental performance changed less. Although focus did not change much, working memory scores increased by 3%. Longer studies may be needed to fully understand this impact. These results come at a time when many countries are discussing new rules about phone use for children. Researchers believe restricting smartphones, especially for kids under 14, can help [23, 24].

Concerns about phone use are also raised in another report [6]. It explains that too much screen time can affect brain development, emotional well-being, and academic focus. Schools that ban phones find that students are more focused, build stronger friendships, and take part more actively in learning. Constant notifications and entertainment can overload the brain. The idea that people can multitask is also challenged. Switching between digital tasks lowers performance and can even reduce IQ. Furthermore, teens lose important social skills when they spend more time on screens than in face-to-face conversations. They may struggle to socialize and form deeper relationships. Social media also contributes to low self-esteem, anxiety, and depression, especially when teens compare themselves to idealized images or experience cyberbullying. Other negative impacts can be cheating, health problems, and compulsive habits created by application designs. Some schools, like Fork Union Military Academy, limit phone use to help students stay focused and build stronger values [6]. The report ends by calling on parents and teachers to set clear, supportive rules to help young people. Another study reports a drop in IQ scores since 2010, the same time smartphones and social media became more popular. Applications like TikTok give quick pleasure but weaken cognitive skills. Mental health problems have also increased sharply. Rates of anxiety, depression, and suicidal thoughts among students have nearly

doubled in recent years. This report suggests that constant phone use may cause young people to lose touch with the real world. Some researchers suggest that even if overall intelligence has not fallen, important skills like deep focus and reading habits have weakened due to today's digital habits [5].

3. Restoring mental and cognitive health in the digital age

There can be many solutions to improve mental and emotional health. This will start with creating healthier digital habits. Simple changes in daily routines and environments support mental and physical health. Changes in phone use can be followed by better sleep. Keeping phones out of bedrooms or reducing screen time before sleep helps fall asleep faster, feel more rested, and improve moods. Having a phone nearby reduces attention even when it is switched off, so work and study areas free from phones or out of sight can support concentration. Limiting screen use also results in more social connections. Schools that restrict phone use often report stronger friendships and lower social anxiety. In-person conversations can rebuild social skills. Delaying phone use after waking up and reducing screen time during meals can change our daily lives. Spending time outdoors and engaging in physical activity improves well-being and reduces stress. Reading printed books instead of digital content provides deeper concentration and better memory by strengthening thinking and curiosity. Quiet moments without digital devices can heal us quickly. It becomes easier to recognize thoughts and feelings without constant notifications. Reducing notifications helps lower mental overload. People who limit alerts often feel calmer and more present. Small adjustments result in greater improvements. Emotional improvements may appear quickly, but restoring thinking skills may take longer. Strengthening memory, focus, and mental flexibility requires time and practice. Mental detoxification also supports recovery from digital overload. This process involves clearing out unnecessary digital content, similar to cleaning a cluttered space. The first step is recognizing when the mind feels overloaded. Reducing exposure to trivial content and focusing on one task at a time creates more mental space. The goal is to build a balanced relationship with technology, rather than avoiding it completely [25].

4. Conclusion

Nowadays, it is undeniable that people rely on digital devices in almost every part of life. It is neither possible nor necessary to enforce full disconnection. Digital tools should support us without controlling our daily lives. Many people see technology as entirely good or bad. It is more helpful to focus on how people use these tools and what purposes they serve. Proper use of technology can provide many opportunities. The research and projects need to explore many aspects. Education plays a key role in building healthier digital habits. Schools and training programs can teach critical thinking, help people assess online content, and promote better screen-time management. Online platforms can also provide tools to support responsible use. Governments, companies, and communities need to update old-fashioned guidelines, laws, and policies. Clear rules can limit harmful content, protect users, and ensure data privacy. Enforcing the responsible design of digital platforms can also reduce negative effects. Individual choices shape digital culture. People who avoid harmful content and support positive material help create healthier online spaces. Every decision about what to watch or share influences the digital environment. Society should also review how it invests resources. Companies spend large amounts on new technologies, but investments in education, health, and social programs have declined. Stronger support for human development is vital. Technology companies should consider how their products affect people's lives. Prioritizing profit over well-being has always created serious problems. Companies should design products that help people live better and healthier. Researchers have not fully explored the long-term effects of technology use. Long-term studies can show how current habits affect mental health over time. Collaboration between scientists, educators, and policymakers is essential. Personal decisions are important, but lasting progress also requires supportive laws, improved education, and better social behaviors. Responsible choices at every level can help people use technology without harming themselves and others. Technology and human well-being can develop together for a safer future.

Ethical issue

The author is aware of and complies with best practices in publication ethics, specifically concerning authorship (avoidance of guest authorship), dual submission, manipulation of figures, competing interests, and compliance with policies on research ethics. The author adheres to publication requirements that the submitted work is original and has not been published elsewhere in any language.

Data availability statement

The manuscript contains all the data. However, more data will be available upon request from the corresponding author.

Conflict of interest

The author declares no potential conflict of interest.

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