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Key Points:

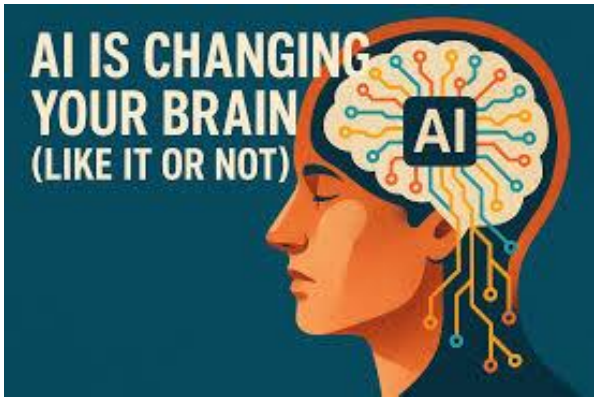
- Social media is neither good nor bad; it is merely another technology tool whose impact depends on the individual user.
- Social media has been shown to exacerbate anxiety, depression, and addiction, especially among younger cohorts.
- Mechanisms such as likes, comments, and notifications were shown to be the primary drivers of mental health conditions and should be used with awareness and caution.

Abstract:
Since the start of the digital era, people have experienced an unmatched rise in the speed of change brought about by technological innovations. Digital media are widely used and have certainly become part of our daily lives, affecting how we think in many ways. The rise of artificial intelligence, which has developed alongside cognitive science, has intensified these effects. It has brought new ways to shape human society through better interaction between people and machines, along with faster knowledge generation and accumulation.

The Digital Revolution also marks the beginning of the Information Era.
The digital era has also made various social and economic impacts too, it has brought many opportunities also introduced new challenges.
Digitalization brings multifaceted impact on society that covers every dimension of social behaviour of human being. Technology has reconstructed the way of interaction among individuals, method of learning, knowledge gain, accessing information, business policies etc.

Digitalization introduced new pathways for learning, communication, work platforms and business expansion. For communication we have various social media platforms through we can stay interconnected with our friends, family and knowns.

The digital age profoundly influences humans, offering connectivity but also causing psychological effects like anxiety, depression, lowered self-esteem, and sleep disruption, driven by social media comparison, cyberbullying, information overload, and addictive design, while also altering brain structure (grey matter), attention spans, memory (cognitive offloading), and social skills, necessitating mindful use and real-world connections to balance benefits and harms



Cognitive issues in the digital age relate to how digital technologies influence human thought. This includes problems like increased mental demands and decreased focus due to multitasking, changes in memory and decision-making from internet use, and the possibility of both negative and positive changes.

Now days, almost everyone is constantly using screens and digital platforms that has led to a phenomenon called 'Digital Dementia.' This term was first describe by German psychiatrist Manfred Spitzer to analyze the harmful effects on young people's thinking caused by too much time spent with digital technology and video games.

Additionally, frequent use of digital media is associated with a higher risk of developing symptoms related to ADHD (Attention-Deficit/Hyperactivity Disorder), particularly in teenagers.

Neuroplasticity refers to the brain's ability to change its structure and function over a person's life. This flexibility allows the brain to respond to different internal or external stimuli by reorganizing its structure, function, or connections. This process results in changes to both physiological and morphological aspects.

The digital era affects neuroplasticity in many ways. It brings both positive and negative impacts. For example, it can improve certain attention skills but may reduce focus and memory accuracy. Tools like virtual reality and therapy apps can help harness neuroplasticity for cognitive recovery. However, too much screen time or harmful content can change brain structure and function negatively. Digital resources introduce new ways to use neuroplasticity, but it's important to take a careful approach to avoid issues like cognitive overload and sleep problems.

Researchers have noted neurological effects connected to internet and gaming addiction, language learning, and reading emotional signals. However, much of the neuroscientific research so far relies on self-reported data to measure social media use. It is recommended that scientists use more precise data on screen activities, usage time, and user age.

We need to keep up with current and future information systems and digital spaces. This will help improve human resilience against new technologies while dealing with inherent human vulnerabilities. This paper aims to gather and summarize previous research to create a clear framework. This framework will categorize digital technologies, the cognitive skills they affect, and their relationships.

Keywords: Digital Dementia, Cognitive Neuroscience, Digital Media Addiction, Neuroplasticity, ADHD.

(1) INTRODUCTION:

In recent times, the rise of digital tools like smartphones, social media platforms, and artificial intelligence has changed how we engage with information. Concerns have grown about the effects of digital media on brain function and structure, as well as its impact on physical and mental health, education, social interactions, and politics.

Over a century ago, E. M. Forster published a short story (The Machine Stops, 1909, The Oxford and Cambridge Review) that describes a future where a mysterious machine controls everything from food supply to information technology.

Similar to events related to the internet and digital media today, this dystopian story shows a world where all communication happens remotely and in-person meetings no longer exist. The machine influences societal thinking, leading to dependence among its users. In the story, society collapses when the machine stops working.

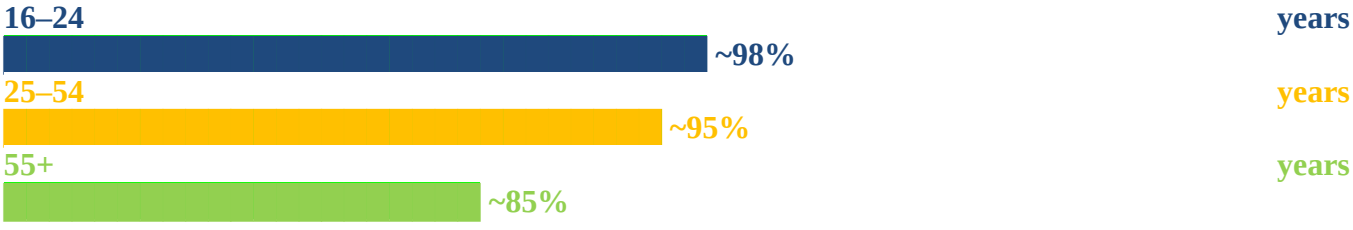
In the UK **95% of 16–24-year-olds** own a smartphone, and overall smartphone use dominates online activity, with almost all adults online using one as their primary device (2025 Ofcom Online Nation data). (1).

People in the UK admit to checking their smartphones **on average every 12 minutes** during waking hours, with high early-morning and pre-sleep checking behavior reported. It is clear that digital media, especially the internet, are becoming more important in our lives. As of 2025, an estimated ~6 billion people — about 75% of the world's population — use the internet worldwide.

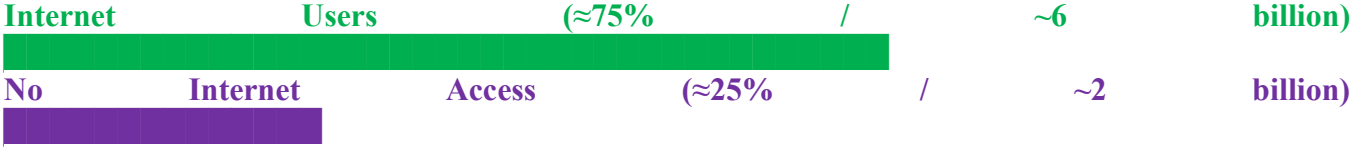
By 2025, global health guidance continues to stress limits on children's screen use: the WHO still advises minimal or no screen time for under-2s and limited recreational use for young children, citing risks to sleep, physical activity, and health. (2). At the same time, many countries, including the UK, have moved toward stricter **school-level smartphone restrictions** to reduce distraction and improve focus. Recent research shows **mixed effects** of digital technology: structured and educational screen use can support learning and cognitive skills, while excessive or unsupervised use is linked to reduced attention spans, poorer sleep, and higher risks of obesity.

We have noticed neurological effects linked to internet or gaming addiction, language learning, and understanding emotional cues. However, much of the existing neuroscientific research relies mainly on self-reported measures of social media use. It is suggested that neuroscientists should include more detailed data about the type of screen activities, how long they last, and the age when they take place.

UK Smartphone Ownership by Age (Ofcom – latest survey)

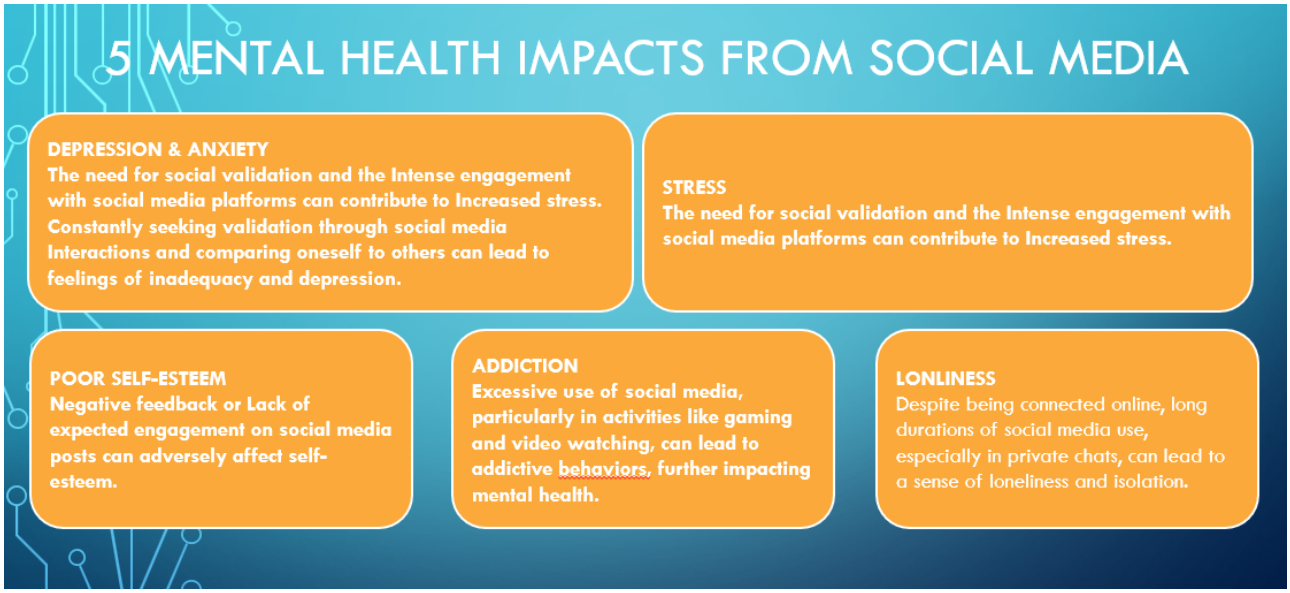


Worldwide Internet Access (latest surveyed global estimate referenced by Ofcom)



Source context: Ofcom Online Nation 2025 references global connectivity estimates from international telecom bodies.

(2) NEGATIVE IMPACTS OF DIGITAL AGE ON HUMAN:



a) Mental Health Issues:

Increased rates of depression, anxiety, loneliness, and stress linked to constant connectivity, fear of missing out (FOMO), and curated online realities.

b) Low Self-Esteem & Body Image:

Social media comparison with idealized lives fosters feelings of inadequacy and poor self-image, especially in young women.

c) Cognitive overload:

- Constant digital distractions from multitasking can overwhelm our ability to think, leading to decreased focus and shorter attention spans.
- The more people use their smartphones to switch quickly between different tasks, the easier it is for them to get distracted. They also perform worse in task-switching tests than those who rarely multitask. (3).
- Most digital media users switch their attention rapidly from one task to another. This habit may reduce their attention spans and contribute to a rise in attention-deficit hyperactivity disorder (ADHD) diagnoses, which are higher now than they were ten years ago. (4).
- Digital media has a complicated relationship with ADHD, presenting both risks and benefits. Excessive or problematic use can worsen symptoms such as inattention and impulsivity, disrupt sleep, and lead to social withdrawal. However, structured digital tools, like educational apps, can improve learning and focus, while online communities can provide support. It's crucial to manage digital media use to maximize its benefits and minimize risks, using strategies like setting limits and parental monitoring. (5).
- Reduced concentration, impaired emotional regulation, and shorter attention spans due to information overload and divided attention.

(c1) Implicit pitfalls of digital media for ADHD (6)

1. **Worsening of symptoms:**

Fast-paced and interactive content can worsen inattention.

2. **Administrative function issues:**

Problematic media use is linked to difficulties with inhibition, planning, and working memory.

3. **Poor sleep:**

Excessive screen time, especially before bed, can disrupt sleep patterns, which can make ADHD symptoms worse.

4. **Social withdrawal:**

While social media can help connect people, overuse can lead to reduced face-to-face social interaction and social withdrawal.

Less face-to-face interaction can hinder development of crucial social-emotional skills, notes this YouTube video and research cited by this ScienceDirect article.

5. **Increased impulsivity and aggression:**

Research has shown a link between problematic media use and higher levels of impulsivity, which can lead to aggression.

6. **Cyberbullying:**

Anonymity fuels online harassment, causing significant distress, anxiety, and isolation for victims.

(c2) Implicit benefits of digital media for ADHD

1. **Educational tools:**

Structured educational apps and games can be used to improve attention and learning outcomes.

- Eg: Khan Academy Kids, Duolingo, Lumosity, Dragon Box, ABCmouse, etc.

2. **Social support:**

Online communities and support groups can provide a sense of fellowship and a platform for people with ADHD to build skills and find resources.

- Eg: CHADD, ADDitude, ADDA (Attention Deficit Disorder Association) ,etc.

3. **Therapy and management:**

- Online platforms offer access to various forms of support, including talk therapy and skill-building groups for adults with ADHD.
- Eg: BetterHelp, Talkspace, ADHD Online Therapy, etc.

(c3) Strategies for managing digital media use (7)

1. **Set limits:**

Establish clear time limits for recreational screen time.

2. **Prioritize sleep:**

Avoid screen use for at least an hour before bedtime to protect sleep quality.

3. **Use parental monitoring:**

Actively oversee a child's digital media use to ensure they're engaging with it in a healthy way.

4. **Focus on quality over quantity:**

Choose content that is structured and educational instead of purely recreational or fast-paced content.

5. **Encourage balance:**

Promote a balance between online activities and other real-world activities like physical exercise and in-person social interactions.

6. **Unplug Regularly:**

Engage in tech-free hobbies like reading, exercising, or being in nature.

7. **Mindful Use:**

Be intentional about online activities, setting specific goals for screen time.

8. **Prioritize Real Life:** Foster in-person connections and activities.
9. **Seek Professional Help:** Consult a mental health expert if digital use negatively impacts well-being.

(d) Memory:

Relying on the internet for information may lead to weakened memory function in brain areas important for recalling details from specific experiences, such as pictures.

Visual Working Memory (VWM) : visual working memory is a part of working memory that temporarily holds and manipulates visual information . It plays a key role in our working memory. As an essential cognitive function, VWM has been studied extensively in the context of the digital age and may be influenced by it. (8).

(e)Attention:

Excessive video gaming can reduce sustained attention, while simply having a smartphone nearby can affect self-control.

(f) Decision-Making:

Social media and excessive gaming are connected to decreased decision-making ability.

(g) Sleep Disruption:

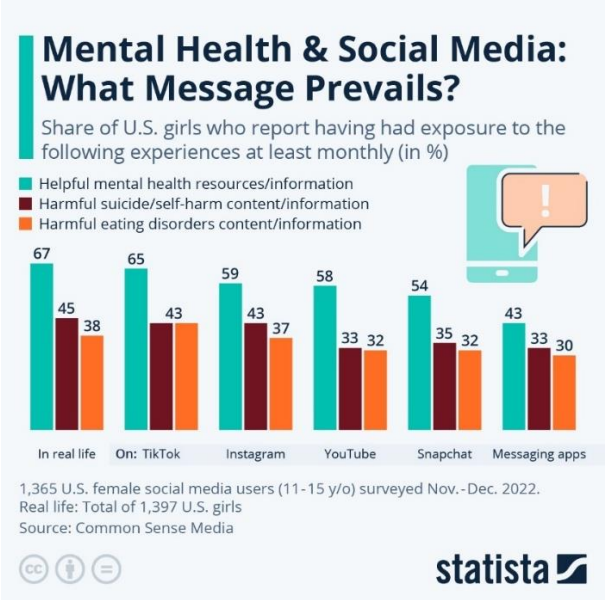
The blue light from screens can disturb sleep patterns and negatively affect cognitive function.

It also plays a crucial role in decreasing melatonin (hormone that signals the body that its time to sleep.)

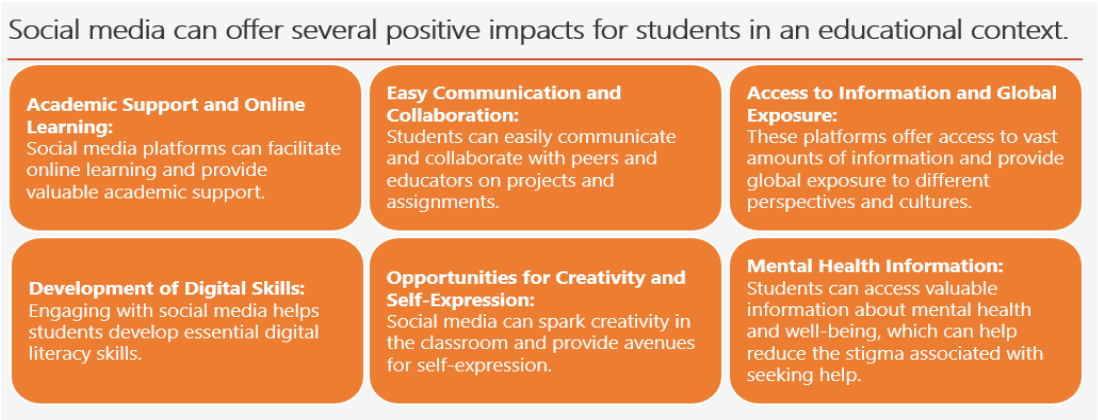
In easier terms : - less melatonin = decreased rate of falling asleep .

(h)Digital Dementia

- This term refers to the idea that excessive use of digital technology may lead to a decline in cognitive abilities similar to dementia, including memory loss and difficulty focusing.
- Overstimulation from digital tools, especially during developmental periods, raises the risk of neurodegeneration. This can result in poor attention, memory issues, lower academic performance, reduced IQ scores, weakened reasoning, and diminished creativity.
- 'Digital madness' describes the idea that overusing technology can contribute to neurological and mental health issues in individuals. (9) (10) (11).



(3) POSITIVE AND ADAPTIVE IMPACTS:



1. **STIMULUS:** Experiences, learning, injury, environmental demands, etc.

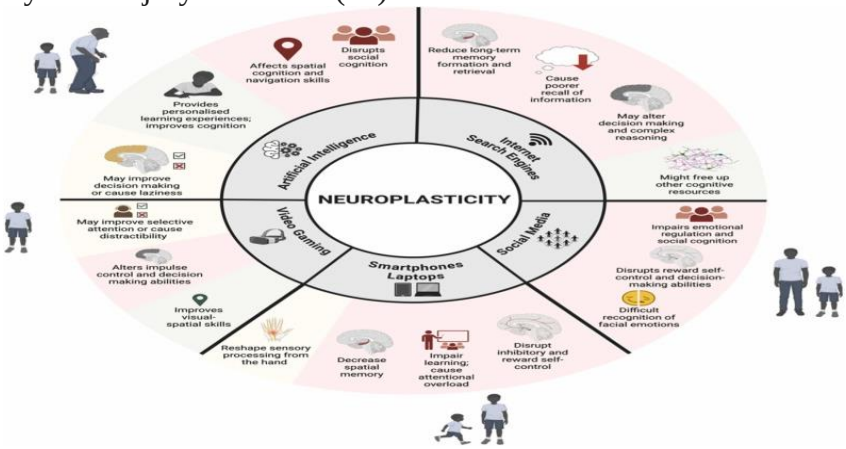
2. **RESPONSE:** Neural connections being strengthened, weakened, formed or eliminated.

The brain's neuroplasticity allows it to adjust to digital environments. For example, past internet experiences change how the brain responds when making decisions and using logic

In the early years of life, particularly during the perinatal stage, the brain experiences rapid growth and development, with a high level of plasticity (it allows learning and memory and helps the brain recover after damage).

- Research indicates that this time is marked by increased sensitivity to environmental input, which helps form new neural connections. (strongly influenced by environmental cues). (12).
- In contrast, plasticity later in life is more controlled and depends on the environment. Changes in neural activity, environmental factors, and behavioral issues can trigger the release of certain neurotransmitters. These allow changes in neural connections only under specific conditions that support plasticity. (development cannot occur without environmental influence). (13).
- Human resilience, supported by neural malleability, can potentially counteract known negative effects of digital technologies.

- Neuroplasticity (10), the brain's ability to reorganize by creating new neural connections, is essential to modern neuroscience. It was once thought to only occur during early development.
- However, research now shows that malleability continues throughout life and supports learning, memory, and recovery from injury or illness. (14).



3. External memory:

The internet can work like an external "transactive memory." This means, we rely on other or external sources to store and retrieve information. It allows us to save our internal thinking skills.

4. Neural pathways:

The White matter in our brain enables fast and accurate communication to take place . Internet use can strengthen some neural circuits and improve white matter integrity in areas related to decision-making and reasoning.

5. Curiosity and learning:

Digital platforms can spark curiosity and give access to a broader range of information, which expands our intellectual horizons.

Eg: Khan Academy providing interactive lessons on various subjects

6. Specific skill enhancement:

Some digital activities, such as certain video games, may improve focus.

Eg: Minecraft, Lumosity, and Brain Age

7. Cognitive training:

Digital tools can help with cognitive training and rehabilitation for people with mild cognitive impairment.

Eg: Lumosity, CogniFit, and BrainHQ

8. Enhanced Social Connectivity:

Digital platforms allow people to maintain relationships across distances, find support groups (e.g., for chronic illness or mental health challenges), and feel a sense of community, which can alleviate stress, anxiety, and feelings of isolation.

(4) RESULT:

Digital technologies have significantly impacted human thinking. Our access to rapidly growing sources of information and knowledge is creating new challenges. Artificial intelligence, supported by key digital technologies and modern machine learning methods, has entered our daily lives, offering new opportunities for improvement and creativity.

Policy advisors could help by providing guidance on how parents and teachers should manage digital technology use among young children. This guidance would help maximize the benefits of educational technologies for learning.

We need to better prepare ourselves and our society for the current and future information landscape. This includes improving human adaptability to new technologies and addressing key human weaknesses. Thanks to human flexibility and brain adaptability, this should be achievable while also minimizing the negative effects of digital technologies.

While this review provides a dynamic view of digital media's impact on the human brain, it faced challenges in finding relevant and reliable sources. It also struggled to maintain a clear and logical structure. The study's neutrality may have been affected by inherent biases (in-built biases and prejudices), which could influence the interpretation of the findings. In the future, further research should focus on exploring these aspects more deeply, providing a more practical perspective on the relationship between digital media and its effects on cognitive processes.

(5) CONCLUSION:

In conclusion, digital madness poses significant challenges to cognitive health in the digital age. Still, in this growing era, complete abstinence from digital technology isn't possible. We need to create a balance between time spent off-screen and on-screen. Taking digital breaks can be the first step to reducing the threat posed by excessive technology use.

This review has developed a broad framework to explore the potential cognitive impacts of digital media, based on the brain's ability to change in response to natural or external stimuli.

The findings related to these effects have shown both positive and negative aspects. Technology can negatively affect key cognitive functions like attention, memory, and executive functions and on the other hand it also comprises many positive effects as it enhances learning by providing access to vast information and interactive educational tools. It also improves communication, helping people stay connected and access support networks easily.

This impact depends on the stage, extent, and type of digital media use. Deeper investigation and intervention studies of these issues are necessary to provide a better understanding of the long-term effects of digital media on cognitive processes throughout life, before dependence takes hold.

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