



The Epidemiology of Mental Health Disorders in the Digital Age: A Growing Challenge

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Received: 01/11/2023

Accepted: 05/02/2024

Published: 20/03/2024

Abstract

The digital age, characterized by ubiquitous technology and social media, has profoundly transformed human interactions and lifestyles, impacting mental health in both positive and negative ways. This paper explores the epidemiology of mental health disorders in the digital age, examining the evolving trends in prevalence, risk factors, and consequences associated with digital technologies and social media use. We discuss the potential benefits of digital technologies for mental health, including access to information, support networks, and therapeutic interventions. However, we also delve into the potential risks associated with excessive screen time, cyberbullying, social comparison, and the impact of social media on sleep, attention, and self-esteem. The paper explores the challenges of studying the relationship between digital technologies and mental health, highlighting the complex interplay of factors and the need for robust research methodologies. Finally, we examine strategies for promoting mental well-being in the digital age, emphasizing the importance of digital literacy, responsible technology use, and a balanced approach to navigating the digital landscape.

Keywords: Mental health, digital age, technology, social media, epidemiology, prevalence, risk factors, consequences, benefits, risks, social comparison, cyberbullying, digital literacy, responsible use, mental well-being

1 Introduction

The unprecedented proliferation of digital technologies and social media platforms, a defining characteristic of the current era, has instigated a profound transformation in human interactions, social structures, and daily life. This rapid and pervasive shift, often termed the digital age, has brought forth myriad opportunities for connectivity, access to information, and enhanced efficiency; however, it has also concurrently introduced a complex landscape of challenges, particularly with respect to mental health. The ubiquitous nature of digital technologies and their integration into nearly every facet of modern life necessitates a rigorous investigation into their potential impacts on psychological well-being. This paper aims to explore the evolving epidemiology of mental health disorders within the context of the digital age, with a particular focus on elucidating the shifting patterns in prevalence, identifying emerging and established risk factors, and comprehensively analyzing the multifaceted consequences associated with both excessive and maladaptive digital technology and social media utilization. This examination will move beyond simple correlations to delve into the complex mechanistic pathways that may underpin the observed associations between the digital environment and various mental health outcomes, considering both the potential benefits and the documented risks. By integrating epidemiological data with emerging research in neuroscience and psychology, this paper seeks to provide a comprehensive overview of the current state of knowledge, identify knowledge gaps, and ultimately contribute to a more nuanced understanding of the complex interplay between the digital world and human mental health, thereby informing future research and interventions aimed at

promoting psychological well-being in this rapidly evolving technological landscape. This exploration acknowledges the diverse impacts of digital technology across different demographic groups and contexts, recognizing that the relationship between digital engagement and mental health is not uniform and requires a multi-dimensional approach.

2 The Evolving Landscape of Mental Health in the Digital Age

The advent of the digital age has coincided with a notable shift in the epidemiological patterns of mental health, characterized by an apparent increase in the prevalence of various disorders, particularly amongst younger populations. While attributing this trend to a single causative factor is overly simplistic, the omnipresent nature of technology and social media has emerged as a significant area of investigation, with both potential benefits and demonstrable risks for psychological well-being. This section explores the complex relationship between the digital environment and mental health, examining the observed trends and the mechanisms by which these technologies may influence psychological outcomes (1).

Observational research consistently indicates a positive correlation between increased engagement with digital technologies, particularly elevated levels of screen time, and a higher incidence of certain mental health disorders, particularly anxiety and depressive disorders, notably within adolescent and young adult populations. While these correlational findings do not establish causality, they highlight the need for rigorous investigation into potential mechanistic pathways. One postulated mechanism involves the displacement of other crucial activities, such as physical activity, face-to-face social

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interactions, and restorative sleep, which are known to be protective factors for mental health. Furthermore, the curated and often unrealistic portrayals of life presented on social media platforms may contribute to feelings of inadequacy, social comparison, and low self-esteem, thereby increasing vulnerability to depression and anxiety (2). The constant exposure to potentially distressing content, such as cyberbullying and online harassment, can further contribute to negative emotional states and psychological distress. Sleep disruption, induced by the blue light emitted from digital devices which suppresses melatonin secretion, represents another important pathway, as inadequate sleep has well-documented adverse effects on mood regulation, cognitive function, and overall mental well-being. This disruption in circadian rhythms can contribute to insomnia and exacerbate existing mental health vulnerabilities. Finally, excessive screen time, particularly among children and adolescents whose brains are still developing, may impair attention span, executive function, and working memory, potentially hindering academic performance and overall cognitive development, and increasing risk for developing attentional deficits (3).

Despite the potential for negative impacts, it is crucial to acknowledge the beneficial applications of digital technologies in promoting mental health and well-being. The vast accessibility of information via the internet provides individuals with the opportunity to learn about various mental health conditions, treatment options, and available support resources, which can empower self-advocacy and reduce the stigma associated with mental illness. Online support networks and virtual communities, facilitated by social media and specialized forums, can connect individuals with others who share similar experiences, fostering a sense of belonging, reducing isolation, and creating spaces for mutual support and understanding. This can be particularly beneficial for individuals who face barriers to accessing traditional forms of support or may experience social isolation due to geographic limitations or stigma (4). Furthermore, digital technologies are increasingly being utilized to deliver evidence-based therapeutic interventions, including online cognitive behavioral therapy (CBT), mobile apps for mental health self-management, and virtual reality (VR) applications for exposure therapy and relaxation techniques. The scalability and accessibility of these digital interventions can overcome barriers to treatment, such as cost, geographic location, and waiting lists, potentially reaching a wider population of individuals in need of support. Finally, digital platforms can facilitate the collection of large-scale, real-time data on mental health trends, enabling researchers and clinicians to identify vulnerable populations and tailor interventions more effectively (5).

3 The Potential Risks of Digital Technologies and Social Media

While digital technologies offer a range of potential benefits for mental health, their pervasive influence also introduces a constellation of significant risks that warrant careful consideration. This section delves into the specific ways in which digital platforms, particularly social media, can negatively impact psychological well-being, focusing on social comparison, cyberbullying, and the problematic aspects of addictive use and excessive screen time.

Social media platforms, characterized by their emphasis on visually appealing content and meticulously crafted online personas, often present idealized and often unrealistic representations of individuals and their lifestyles. This curated presentation of reality can fuel social comparison, whereby

individuals constantly evaluate themselves against the seemingly perfect lives and appearances of others. This process can lead to feelings of inadequacy, low self-esteem, and heightened self-consciousness, particularly among young people who are more vulnerable to social pressures. The constant exposure to these idealized images can be particularly damaging in the realm of body image. Social media platforms frequently showcase unrealistic beauty standards, promoting thinness, muscularity, and often unattainable physical ideals. This bombardment of unrealistic imagery can contribute to body dissatisfaction, disordered eating patterns, and an increased risk of developing eating disorders. Moreover, the pressure to maintain a flawless online persona can lead to anxiety, perfectionism, and a preoccupation with self-presentation, thereby hindering genuine self-acceptance and fostering a fragile sense of self-worth that is contingent upon external validation. These pressures are further amplified by the use of filters and editing tools, creating a distorted perception of reality and contributing to unrealistic expectations of physical appearance (6).

The anonymity and wide reach of social media platforms can exacerbate the problem of cyberbullying and online harassment, creating an environment where individuals may feel unsafe, vulnerable, and subject to constant scrutiny and negativity. Cyberbullying, characterized by repeated and intentional acts of aggression or humiliation perpetrated through digital means, can have profound and lasting negative consequences for the mental health of victims. This form of harassment can lead to feelings of anxiety, depression, social isolation, and even suicidal ideation. The digital nature of cyberbullying can make it particularly insidious, as it can occur at any time, in any place, and often leaves victims feeling trapped and unable to escape. The anonymity afforded by some platforms can also empower perpetrators, making it more difficult to identify them and hold them accountable for their actions. Moreover, the public nature of online harassment can amplify the humiliation and distress experienced by victims, leaving lasting scars and affecting their self-esteem and sense of safety. The constant exposure to negativity and online conflict can further erode psychological well-being, increasing the risk of developing mental health problems and contributing to a pervasive sense of insecurity and vulnerability (7).

The design of many digital technologies and social media platforms often incorporates elements that can be highly addictive, utilizing reward systems, variable reinforcement schedules, and persuasive design techniques to encourage compulsive use. The addictive nature of these platforms can lead to excessive screen time, where individuals spend inordinate amounts of time engaged with digital devices, often at the expense of other essential aspects of life, such as sleep, physical activity, face-to-face social interaction, and academic or occupational commitments. This excessive engagement can result in a range of negative consequences, including sleep disturbances, decreased physical fitness, impaired academic or work performance, and a decline in overall cognitive function. The displacement of other vital activities can disrupt healthy habits, contribute to social isolation, and exacerbate pre-existing mental health vulnerabilities (8). Furthermore, the constant availability of digital devices and the fear of missing out (FOMO) can lead to a state of hyper-vigilance and anxiety, where individuals feel compelled to constantly check their devices and stay connected online. This can create a cycle of dependency, where individuals become increasingly reliant on digital technologies for validation, social interaction, and a sense of belonging, further eroding their psychological well-being and their capacity to engage meaningfully with the real world.

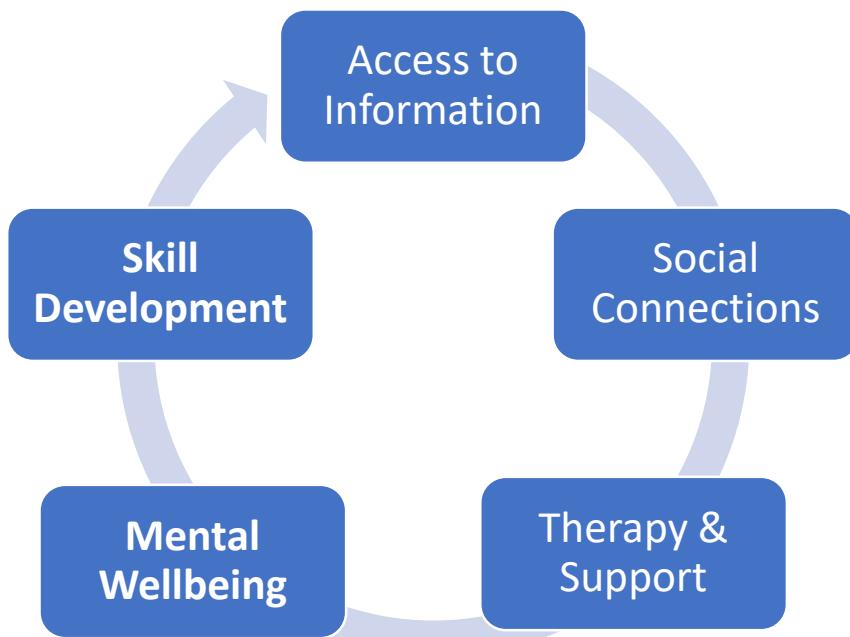


Figure 1: Pros and Cons of the Digital Age for Mental Health

4 Challenges in Studying the Relationship Between Digital Technologies and Mental Health

Investigating the intricate and multifaceted relationship between digital technologies and mental health presents a formidable array of methodological and conceptual challenges. While the proliferation of digital devices and their integration into daily life offers unprecedented opportunities for research, the complexity of this phenomenon necessitates careful consideration of the inherent limitations and potential biases that may confound scientific inquiry. This section explores some of the key obstacles that researchers face when attempting to understand the true nature of this relationship, emphasizing the need for robust research methodologies and a nuanced understanding of the factors at play (8).

One of the most significant challenges in this area of research lies in establishing a causal relationship between technology use and specific mental health outcomes. While observational studies may reveal correlations between increased screen time, social media engagement, and indicators of mental distress, these correlations do not inherently imply causation. Numerous confounding variables, both known and unknown, can influence both technology use and mental health, making it difficult to isolate the independent effects of digital technologies. For example, individuals with pre-existing mental health vulnerabilities may be more likely to engage in excessive or maladaptive technology use as a coping mechanism, leading to a reverse causality issue where mental health difficulties drive technology usage, rather than the other way around. Moreover, socioeconomic factors, family dynamics, genetic predispositions, and exposure to other stressors can all contribute to mental health problems, making it challenging to disentangle the specific contribution of digital technologies from these other influences. Randomized controlled trials, which are considered the gold standard for establishing causality, are often difficult and ethically complex to implement in this context, as it is not feasible or ethical to randomly assign individuals to different levels of technology

use over extended periods. Therefore, researchers must employ sophisticated statistical techniques, longitudinal designs, and careful consideration of potential confounders to infer causality with greater confidence (9).

Measuring the effects of digital technologies on mental health presents a unique set of methodological challenges. The operationalization of constructs such as “screen time,” “social media use,” and “online engagement” is complex, as these terms can encompass a wide range of activities with varying impacts on mental well-being. Simply quantifying the time spent using digital devices does not provide a complete picture of the experience. The types of activities being performed, the nature of the content being consumed, and the individual’s motivations for using technology can all influence the impact on mental health. Furthermore, self-report measures of technology use can be subject to recall bias and social desirability bias, potentially leading to inaccuracies in data. The use of more objective measures, such as device usage logs and passive data collection techniques, can help to mitigate some of these limitations, but such techniques also raise concerns about privacy and data security. Researchers must also carefully consider the reliability and validity of mental health assessments within the context of digital technology use. Standardized questionnaires may not always capture the nuances of mental distress associated with specific forms of digital engagement, and it may be necessary to develop new assessment tools that are more tailored to the digital environment. Longitudinal studies that track individuals over time are crucial for understanding the long-term effects of technology use on mental health, but such studies are expensive and time-consuming, and are often subject to attrition bias (10).

The impact of digital technologies on mental health is not uniform across individuals and is significantly influenced by a multitude of personal and contextual factors. Individual differences in personality traits, coping mechanisms, pre-existing vulnerabilities, social support networks, and cultural background can all modulate the ways in which individuals interact with and are affected by digital technologies. For example, individuals who are highly susceptible to social

comparison may be more vulnerable to the negative impacts of social media, while those with strong social support networks may be more resilient to these effects. Furthermore, individuals with pre-existing mental health disorders may experience different challenges and benefits from digital technology use compared to individuals without such conditions (11). Understanding these individual differences is crucial for developing personalized interventions that are tailored to the specific needs and vulnerabilities of different populations. Researchers must employ more nuanced research designs that incorporate measures of these individual factors and that use more sophisticated statistical techniques that can account for heterogeneity in the relationship between digital technology use and mental health.

5 Conclusion

Food insecurity, as a persistent and pervasive global challenge, represents a significant barrier to achieving equitable and sustainable human development. The profound consequences of inadequate access to safe and nutritious food extend far beyond the immediate experience of hunger, undermining individual and population health, hindering economic progress, and threatening social stability. Addressing this complex issue requires a concerted, multi-sectoral, and globally coordinated approach that moves beyond short-term interventions to tackle the systemic root causes of food insecurity and build resilient and equitable food systems for future generations. This conclusion synthesizes the key insights from this exploration of the epidemiology of food insecurity, highlighting the urgent need for action and outlining a comprehensive pathway toward a future where food security is a reality for all. The preceding sections have demonstrated the multi-faceted nature of food insecurity, exposing its complex interplay of economic, social, environmental, and political factors. Poverty, conflict, climate change, and inadequate food systems each contribute to this challenge, often creating a synergistic effect that exacerbates vulnerabilities. The detrimental impacts of food insecurity extend to physical, mental, and developmental health, with particularly severe consequences for children, who are most vulnerable to the long-term effects of malnutrition. Furthermore, the challenges associated with measuring food insecurity underscore the need for continued innovation and rigorous methodological approaches to accurately monitor and evaluate the effectiveness of interventions. Addressing this complex challenge requires a holistic, multi-sectoral approach that transcends traditional disciplinary boundaries. Governments, international organizations, civil society, communities, and individuals must work together to create the necessary policy, institutional, and social environments to ensure food security for all. This approach must be founded on a commitment to human rights, equity, and sustainability.

Ethical issue

Authors are aware of and comply with, best practices in publication ethics specifically about authorship (avoidance of guest authorship), dual submission, manipulation of figures, competing interests, and compliance with policies on research ethics. Authors adhere to publication requirements that the

submitted work is original and has not been published elsewhere in any language.

Author Contributions

Conceptualization, Saltanat T. Urazayeva; methodology, Toleukhan B. Begalin; formal analysis, Akmalar Baspakova; investigation, Saltanat T. Urazayeva, Akmalar Baspakova; resources, Toleukhan B. Begalin; writing—original draft preparation, Toleukhan B. Begalin, Akmalar Baspakova; writing—review and editing, Saltanat T. Urazayeva.

Funding

This research received no specific grant from any funding agency, commercial or not-for-profit sectors.

Data Availability Statement

All data generated or analyzed during this study are included in this published article.

Conflicts of Interest

The authors declare no competing interests.

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