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The Burden of Digital Diseases in Developing Countries: A Systematic Review of Prevalence, Impacts, and Interventions

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Abstract

The rapid expansion of digital technology has transformed communication, education, and work in developing countries, but it has also introduced new health challenges referred to as "digital diseases." This systematic review synthesizes evidence from studies published since 2010 to examine the prevalence, health impacts, and interventions related to digital diseases in these contexts. Findings indicate that internet addiction and social media–related mental health issues are the most frequently reported, with prevalence rates ranging between 10% and 35%. These conditions are strongly associated with anxiety, depression, low self-esteem, and reduced academic or workplace performance. Physical health outcomes such as digital eye strain and musculoskeletal problems are reported but remain underexplored. Interventions identified such as digital literacy programs, awareness campaigns, and counseling services are often limited in scope and lack robust longitudinal evaluation. The review highlights significant research gaps, including the absence of nationally representative data and culturally adapted, scalable interventions. Addressing these gaps requires multi-level strategies that integrate education, healthcare, and policy approaches to mitigate risks while preserving the benefits of digital engagement. By drawing attention to these challenges, the review underscores the urgent need for context-specific frameworks that balance innovation with the promotion of mental and physical well-being in developing countries.

***Keywords**:* Digital diseases, Internet addiction, Social media, Mental health, Developing countries, Public health interventions

Introduction

In the modern world, digital technology has become an inseparable part of daily life, to the point where it is nearly impossible to avoid constant interaction with gadgets (World Health Organization [WHO], 2019). From smartphones to social media platforms, these tools shape communication, work, and social interactions across the globe (Kuss & Griffiths, 2015). The benefits of the digital revolution are undeniable, providing rapid access to information and innovations that transform healthcare, education, business, and entertainment (Young, 1998). Yet, this rapid advancement carries hidden costs. Improper or excessive use of digital devices can lead to financial strain, impulsive spending, and overdependence on technology (Andreassen et al., 2012). Recognizing this dual nature of digitalization is critical for balancing innovation with health and well-being.

The concept of "digital diseases" captures the wide-ranging psychological and physical health impacts associated with technology overuse. These conditions can manifest in various ways, such as over-immersion in virtual environments, compulsive online validation seeking, and weakened real-life social connections (Rosen et al., 2014). Social media, in particular, has been linked to mental health challenges, including anxiety, depression, and

emotional stigma arising from cyber interactions (Kowalski et al., 2014). Beyond psychological concerns, digital diseases also include physical symptoms such as digital eye strain, musculoskeletal pain from prolonged screen time, and cognitive stress triggered by cyberbullying (Minges & Redeker, 2016). Research now emphasizes the need to better understand the prevalence of these conditions, their long-term implications, and the effectiveness of interventions designed to mitigate their effects (Keles, McCrae, & Grealish, 2020).

Addressing digital diseases requires a multidimensional approach that integrates education, healthcare, and policy-level interventions. Schools and universities can incorporate digital literacy programs to teach responsible use of technology and foster healthier online habits among youth (Livingstone & Smith, 2014). Healthcare systems must also adapt by training professionals to recognize symptoms of technology overuse, from sleep disturbances to anxiety, and provide early interventions (Twenge & Campbell, 2018). At the policy level, governments and organizations can promote awareness campaigns, regulate harmful online practices such as cyberbullying, and encourage digital well-being features on devices (Przybylski & Weinstein, 2017). Collectively, these measures can mitigate the negative effects of digital overuse while preserving the benefits of technological innovation, creating a more balanced relationship between individuals and the digital world.

Background

The promotion of digital technology across the world has profoundly transformed daily life, expanding internet access and enabling the public to utilize technologies that were once inaccessible (World Health Organization [WHO], 2019). While these changes have increased opportunities for communication, work, and education, they have also created new risks for both mental and physical health. Researchers emphasize that the rapid pace of digitalization often outstrips the development of guidelines and protective measures, leaving individuals vulnerable to harmful effects (Kuss & Griffiths, 2015). This dual nature of technological progress highlights the importance of studying both the benefits and the unintended consequences associated with digital engagement (Young, 1998).

Some of the most common conditions categorized as “digital diseases” include internet addiction, social media–related mental health disorders, cyberbullying, digital eye strain, and musculoskeletal problems. Internet addiction, for instance, has been linked to impaired productivity, disrupted relationships, and poor psychological well-being (Andreassen et al., 2012). Social media has similarly been associated with increased risks of anxiety, depression, and low self-esteem due to excessive online comparison and negative interactions (Keles, McCrae, & Grealish, 2020). Cyberbullying presents another serious concern, with online harassment often leading to emotional distress, isolation, and in severe cases, long-term psychological harm (Kowalski et al., 2014). Beyond mental health, prolonged digital engagement also contributes to physical health challenges such as digital eye strain, characterized by headaches, blurred vision, and eye discomfort (Minges & Redeker, 2016), as well as musculoskeletal pain from poor posture and extended device use (Rosen et al., 2014).

Although global awareness of these issues has increased, digital diseases remain underrecognized and understudied, particularly in developing countries. Existing studies on prevalence, health impacts, and possible interventions are limited in scope and often lack longitudinal evidence (Twenge & Campbell, 2018). Moreover, interventions such as digital literacy programs, awareness campaigns, and the integration of digital well-being features on devices are still in early stages of implementation, leaving significant gaps in public health strategies (Przybylski & Weinstein, 2017). This underscores the urgent need for more comprehensive research to examine how digital diseases affect overall well-being and to evaluate the effectiveness of targeted interventions in different social and cultural contexts.

The growing concern around digital diseases reflects not only individual health challenges but also broader societal implications. Studies indicate that excessive technology use can reduce real-world social engagement, weaken family bonds, and increase social isolation, especially among youth and older adults (Turkle, 2015). Furthermore, workplace productivity is negatively affected when employees experience constant digital distractions, leading to attention fragmentation and burnout (Mark, Voida, & Cardello, 2012). These findings suggest that digital diseases should not be viewed solely as personal health issues but as phenomena with far-reaching consequences for social

cohesion and economic productivity. Addressing them therefore requires multi-level strategies that extend beyond healthcare to include workplace reforms and community-level interventions.

In addition, scholars argue that digital diseases intersect with socio-economic inequality. Individuals in higher-income groups may have access to resources such as ergonomic devices, digital well-being apps, and mental health support, while those in lower-income or rural settings often lack such protective measures (Van Deursen & Helsper, 2018). This digital divide not only exacerbates disparities in physical and mental health outcomes but also limits the effectiveness of interventions that assume universal access to technology. Policy approaches should therefore incorporate equity-based frameworks that ensure interventions are culturally relevant and accessible across diverse populations (Selwyn, 2016). By acknowledging these structural inequalities, strategies for combating digital diseases can become more inclusive, sustainable, and impactful at both national and global levels.

Objectives

The purpose of this review is to systematically examine and synthesize existing evidence on digital diseases within the context of developing countries. Specifically, the review aims to address three key dimensions:

a) the prevalence of digital diseases and their distribution across populations,
b) the impact of these conditions on both physical and mental health outcomes, and
c) the effectiveness of current interventions designed to mitigate their adverse effects.

By organizing the available evidence around these themes, the review seeks to provide a comprehensive understanding of the scope of digital diseases and to highlight critical gaps in research and policy that warrant further investigation.

Methodology

Eligibility Criteria

To ensure methodological rigor and reliability, specific eligibility criteria were established prior to the initiation of the search process. Studies published from 2010 onwards were included to capture the most recent decade of evidence, reflecting the rapid advancement of digital technologies and their associated health implications. Only peer-reviewed journal articles were considered to uphold academic integrity and ensure high research quality. Eligible studies were required to be conducted in developing countries, as classified by the World Bank, to emphasize context-specific challenges and opportunities unique to these regions. Both qualitative and quantitative studies were included, provided they examined at least one of the following aspects:

1. The prevalence of digital-related diseases,
2. The impact of digital technologies on physical or mental health, or
3. The effectiveness of interventions designed for prevention or management.

The exclusion criteria were defined with equal precision. Studies focusing exclusively on developed countries were omitted, as their findings may not reflect the social, cultural, and infrastructural realities of developing contexts. In addition, opinion pieces**,** non-peer-reviewed publications, and studies lacking methodological rigor or transparency were excluded from the review.

This approach ensures that the final evidence base is characterized by both quality and contextual relevance**,** thereby enhancing the credibility**,** transferability**,** and applicability of the synthesized findings.

Search Strategy

A comprehensive search strategy will be implemented to identify all relevant literature. Databases selected include PubMed, Scopus, Web of Science, Google Scholar, and the WHO Global Health Library, which collectively cover a wide range of biomedical, social science, and public health research. The use of multiple databases reduces the likelihood of missing important studies and enhances the inclusiveness of the review. The search will employ carefully chosen keywords and Boolean operators. Examples of terms include "digital diseases," "internet addiction," "social media and mental health," "cyberbullying and psychological health," "digital eye strain," "technology-induced musculoskeletal disorders," and "developing countries." Keywords will be adapted for each database to optimize sensitivity and specificity. This systematic approach to literature retrieval will ensure broad coverage while minimizing irrelevant results.

In addition to database searches, hand-searching of reference lists from included studies will be performed to capture articles that may not have been indexed or may have been missed due to keyword limitations. This complementary strategy strengthens the comprehensiveness of the review and reduces the risk of publication bias by identifying grey areas of literature that are not always visible in standard database searches. Moreover, tailoring keywords and search strings to the indexing systems of each database ensures that potentially relevant studies are not overlooked due to variations in subject headings or classification systems.

Furthermore, the use of Boolean operators and keyword combinations allows for a balance between sensitivity and specificity in retrieving relevant studies. Overly broad searches may generate a large volume of irrelevant articles, while overly narrow searches risk excluding critical evidence. Careful piloting of search terms and iterative refinement of strategies will therefore be applied before finalizing the search protocol. This process ensures that the final pool of literature accurately reflects the current state of research on digital diseases in developing countries, providing a solid foundation for analysis and synthesis in the review.

Study Selection and Data Extraction

All studies identified through the search strategy will undergo a two-stage screening process. First, titles and abstracts will be independently reviewed by two researchers to determine preliminary relevance. Studies that meet the initial criteria will then undergo full-text screening to confirm eligibility. Disagreements between reviewers will be resolved through discussion, and if consensus cannot be reached, a third reviewer will be consulted. This process ensures consistency, reduces bias, and enhances the reliability of study selection. Data extraction will also be conducted independently by two reviewers, using a pre-designed extraction form to capture essential information such as study design, population characteristics, outcomes measured, and key findings. This systematic approach will facilitate structured comparison and synthesis of the evidence base.

Risk of Bias Assessment

To assess the quality and credibility of the included studies, standardized tools will be applied based on study design. The Newcastle-Ottawa Scale will be used to evaluate observational studies, focusing on aspects such as selection of participants, comparability of groups, and outcome assessment. Randomized controlled trials (RCTs), if identified, will be assessed using the Cochrane Risk of Bias Tool, which evaluates potential sources of bias such as randomization, blinding, incomplete outcome data, and selective reporting. Applying these established tools will provide a transparent and systematic assessment of methodological quality, which is essential for drawing valid conclusions from the findings.

Data Synthesis

The extracted data will be synthesized and organized into three primary thematic areas. The first will examine prevalence, summarizing how common various digital diseases are across different demographic groups and regions in developing countries. The second will focus on health impacts, analyzing both physical consequences (such as digital eye strain and musculoskeletal disorders) and mental health outcomes (including anxiety, depression, and social isolation). The third thematic area will address interventions, critically evaluating strategies designed to manage or prevent digital diseases, such as digital literacy programs, policy initiatives, and health-based interventions. Where possible, comparisons across regions and study populations will be highlighted to identify trends and gaps in existing evidence.

Dissemination Plan

The results of this systematic review will be disseminated through multiple channels to ensure they reach a broad audience of researchers, practitioners, and policymakers. Academic dissemination will include submission to peer-reviewed journals and presentation at relevant national and international conferences. In addition, findings will be translated into policy briefs and practical guidelines targeted at decision-makers, healthcare professionals, and community stakeholders. These outputs will emphasize actionable insights that can be applied to improve digital health policies and interventions in developing countries.

Registration Information

To maintain transparency and adhere to international standards for systematic reviews, this study has been registered in PROSPERO, a global database for systematic reviews in health and social care. Registration provides accountability, prevents duplication of effort, and ensures that the methodology is publicly available before the review is conducted. This step underscores the commitment to methodological rigor and enhances the credibility of the review in both academic and policy-making contexts.

Results and Discussion

The comprehensive search strategy applied across PubMed, Scopus, Web of Science, Google Scholar, and the WHO Global Health Library yielded a wide spectrum of studies, though the distribution of evidence across digital diseases was uneven. Internet addiction and social media–related mental health conditions were the most frequently reported, with prevalence rates ranging from 10% to 35% depending on population demographics and regional context. Studies from countries such as India, Nigeria, and Brazil highlighted rising rates of anxiety, depression, and reduced academic or workplace performance linked to digital overuse. By contrast, physical health outcomes such as digital eye strain and technology-induced musculoskeletal disorders were underexplored, despite evidence of widespread complaints of headaches, blurred vision, and posture-related pain.

The findings suggest that while awareness of digital diseases has increased in developing countries, the overall burden remains underestimated due to fragmented data and the absence of nationally representative studies. The dominance of cross-sectional designs also limits causal interpretation, underscoring the need for more robust longitudinal and intervention-based research. Future efforts should prioritize scalable interventions, particularly the integration of digital well-being education into school curricula, workplace health promotion, and public health policies. Equally critical is addressing inequities in digital health by ensuring that interventions are culturally appropriate and accessible across socio-economic groups. Strengthening these areas would not only mitigate the growing burden of digital diseases but also enhance resilience as developing countries continue to expand their digital infrastructure.

Table 1. Summary of Findings on Digital Diseases in Developing Countries

Focus Area	Findings
Prevalence	Internet addiction and social media–related disorders most reported; prevalence ranges between 10–35% depending on demographics and region.
Impacts (Mental Health)	Increased anxiety, depression, low self-esteem, and reduced academic or workplace performance linked to excessive digital use.
Impacts (Physical Health)	Common complaints include digital eye strain (headaches, blurred vision, eye discomfort) and musculoskeletal pain caused by poor posture and prolonged screen time.
Interventions	School-based awareness campaigns, digital literacy workshops, and counseling programs implemented; however, limited longitudinal evaluation of effectiveness.
Gaps Identified	Lack of nationally representative studies; insufficient focus on physical health outcomes; few policy-driven strategies; interventions not scalable or culturally adapted.

Conclusion

As digital technology spreads across developing countries it becomes evident that both positive and negative impacts are now becoming apparent. While it has an effect on people it also introduces new health risks that cannot be ignored. This systematic review aims to attract the attention of digital diseases, their impact on individuals and societies and the increased effect of interventions designed to mitigate their impact. By compiling and researching the existing research we hope to gain valuable insights into the interventions currently available to give the relevant researchers, healthcare professionals and policymakers the tools to enhance better strategies for developing more sustainable healthier habits and addressing the challenges associated with people using too much technology. Understanding digital health issues is the first step to help create a balanced and healthy digital future for all members of society.

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