

Systematic Review Article: Effects of Excessive Screen Time of Mobile on HealthVimal Chandra Bhagat¹, Dipti Bhatt², Kirtika Shrivastava³, Dibyanshu⁴¹Associate Professor Department of Psychiatry Late, Smt. Indira Gandhi Memorial Government Medical College, Kanker, Chhattisgarh²Associate Professor, Department of Physiology, Pt JNM Medical College, Raipur, Chhattisgarh, India³Assistant Professor, Department of Physiology, Peoples College of Medical Sciences and Research Centre, Bhopal, Madhya Pradesh, India⁴Assistant Professor, Department of Community and Family Medicine, AIIMS DEOGHAR, Jharkhand, India

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Abstract

The ubiquitous presence of mobile devices in everyday life has led to widespread concerns about the long-term health consequences of excessive screen time. This systematic review aims to explore the relationship between mobile screen overuse and various physical, mental, and behavioural changes. The review synthesizes evidence from 20 peer-reviewed studies, highlighting the significant health risks posed by mobile screen overuse. Findings indicate that while mobile devices offer numerous benefits, their overuse can have detrimental effects, particularly among adolescents and young adults. Public health guidelines are urgently needed to promote healthier mobile phone usage habits and reduce the risk of associated health problems.

Keywords: Excessive Screen time, Mobile phone Usage, Health Impacts, Digital Eye Strain, Mental Health.

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Introduction

The rapid technological evolution of mobile phones has made them indispensable to modern life. Originally developed as a means of communication, mobile phones have become multipurpose tools, allowing users to perform tasks such as browsing the internet, streaming media, engaging in social media, and participating in video conferences [1]. While the convenience provided by mobile devices is undeniable, there is growing concern regarding the health effects of their excessive use [2].

Recent reports indicate that the average global screen time for mobile phones has increased significantly, with many individuals spending between 3 to 5 hours per day on their devices [3, 4]. This high level of engagement has been associated with a wide range of health issues, from physical ailments like digital eye strain and musculoskeletal disorders to mental health problems such as anxiety, depression, and sleep disturbances [5]. Moreover, children and adolescents, whose brains are still developing, are particularly vulnerable to the negative cognitive effects of excessive screen time [6].

The purpose of this systematic review is to examine the health impacts of excessive mobile phone screen time by synthesizing the findings from multiple peer-reviewed studies. By categorizing the effects into physical, mental, and cognitive domains, this review aims to provide a comprehensive understanding of the risks posed by mobile overuse and offer insights into potential mitigation strategies. The review also discusses the implications of these findings for future research and public health policy.

Material and Methods

This systematic review follows the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines, ensuring a rigorous and transparent approach to the synthesis of existing research. A comprehensive search of peer-reviewed journal articles was conducted using databases including PubMed, Google Scholar, and Scopus. The search was confined to articles published between 2010 and 2023, focusing on the health effects of excessive mobile screen time.

Search Strategy: The search strategy was designed to identify relevant studies that addressed the health

impacts of mobile phone usage. Search terms included combinations of the following keywords: "mobile phone screen time," "health effects of mobile devices," "digital eye strain," "musculoskeletal problems," "anxiety and depression," "cognitive impact of screen time," and "sleep disturbances due to screen use." Boolean operators such as "AND" and "OR" were used to refine the search, and only articles published in English were considered.

Inclusion and Exclusion Criteria

Inclusion criteria for this review were as follows: (1) studies that investigated the relationship between mobile phone usage and physical, mental, or cognitive health outcomes; (2) peer-reviewed journal articles; (3) studies involving participants of any age group, with a particular focus on adolescents and young adults. Exclusion criteria included: (1) studies that focused solely on-screen time from televisions or computers; (2) non-peer-reviewed articles, editorials, or opinion pieces; and (3) studies that did not provide sufficient data on health outcomes related to mobile screen use.

Data Extraction and Synthesis

A total of 320 articles were initially identified through the database search. After removing duplicates and applying the inclusion and exclusion criteria, 45 articles were selected for full-text review. Of these, 20 studies met the inclusion criteria and were included in the final synthesis. Data were extracted from each study, focusing on the health outcomes related to excessive mobile screen time, including physical, mental, and cognitive impacts. These findings were then synthesized to provide a comprehensive overview of the health risks associated with mobile phone overuse.

From the 20 included studies, the synthesis of findings reveals multiple health outcomes related to excessive mobile screen time. Digital eye strain was a prevalent issue, with five studies highlighting symptoms like blurred vision and eye discomfort due to prolonged screen exposure. Four studies emphasized the physical consequences, particularly musculoskeletal problems like neck and shoulder pain, stemming from poor posture during extended mobile use.

Table 1: Table Chart summarizing the key findings from the included studies on Effects of Excessive Screen Time of Mobile on Health:

Outcome	Number of Studies	Key Findings
Digital Eye Strain	5	Prolonged mobile screen use leads to digital eye strain (Computer Vision Syndrome) with symptoms like blurred vision, headaches, and eye discomfort
Musculoskeletal Problems	4	Extended use of mobile phones, particularly with poor posture, causes neck and shoulder pain (text neck), as well as other musculoskeletal disorders.
Anxiety	3	High levels of mobile phone use, particularly for social media, are linked to increased anxiety, especially among adolescents and young adults.
Depression	3	Excessive screen time contributes to feelings of depression, exacerbated by social comparison and constant connectivity.
Sleep Disruptions	4	Late-night mobile use disrupts sleep cycles, mainly due to blue light exposure, leading to insomnia and poor sleep quality
Attention Deficit	2	Children and adolescents with excessive screen time show signs of attention deficit, reduced focus, and impaired cognitive function.
Social Isolation	2	Overuse of mobile phones reduces face-to-face interactions, leading to social isolation, especially in younger populations.
Cognitive Decline	2	Mobile phone multitasking is associated with reduced cognitive control, impairing memory and decision-making.

Data Synthesis

From the 20 included studies, the synthesis of findings reveals multiple health outcomes related to excessive mobile screen time. Digital eye strain was a prevalent issue, with five studies highlighting symptoms like blurred vision and eye discomfort due to prolonged screen exposure. Four studies emphasized the physical consequences, particularly

musculoskeletal problems like neck and shoulder pain, stemming from poor posture during extended mobile use.

Mental health outcomes, including anxiety and depression, were examined in three studies each, with findings indicating that constant connectivity, especially via social media, exacerbates these conditions. Sleep disturbances were noted in four

studies, linking sleep disruptions to blue light exposure from mobile devices, contributing to insomnia and poor sleep quality. Additionally, two studies found a connection between excessive screen time and attention deficit in children, with decreased focus and cognitive issues.

Lastly, issues such as social isolation and cognitive decline were discussed in two studies each, highlighting the broader social and cognitive impacts of excessive mobile phone use.

Study Design

This systematic review followed the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) guidelines to ensure a rigorous and transparent process. The review focused on synthesizing existing research on the health impacts of excessive mobile phone screen time. Databases including PubMed, Google Scholar, and Scopus were searched for studies published between 2010 and 2023. Articles were screened based on eligibility criteria related to mobile phone usage and health outcomes. Duplicates were removed, and a comprehensive screening of titles, abstracts, and full texts was conducted. Only peer-reviewed studies reporting on physical, mental, or cognitive health impacts were included. The study selection process is outlined in the following PRISMA flow diagram and methodology chart.

PRISMA Flow Diagram for Study Selection:

The PRISMA guidelines were followed to ensure systematic and transparent selection of studies. The process involved four stages:

1. Identification

During the identification phase, a comprehensive search was conducted across several academic databases, including PubMed, Google Scholar, and Scopus. The goal was to capture all relevant literature related to mobile screen time and its health impacts. A total of 320 records were identified through database searches. In this phase, no additional sources (e.g., grey literature or manual searches) were used, and all articles came directly from the databases.

2. Screening

After the initial identification, the next step was to remove any duplicate records. In this case, 50 duplicates were identified and excluded, leaving 270 unique records for further screening. The screening process involved reviewing the titles and abstracts of these records to determine their relevance to the research topic. This screening step focused on whether the articles met the basic inclusion criteria, such as focusing on mobile phone usage and health outcomes. Based on this, 225 records were excluded because they did not align with the study's objectives or were irrelevant to the research question.

3. Eligibility

Following the title and abstract screening, 45 full-text articles were assessed for eligibility. This eligibility assessment involved a more detailed review to ensure that the articles met all inclusion criteria, such as being peer-reviewed, addressing relevant health outcomes (e.g., physical, mental, or cognitive impacts), and providing quantitative or qualitative data on mobile phone screen time. In this stage, 25 articles were excluded for several reasons. Common reasons for exclusion included studies that focused on unrelated outcomes (e.g., computer or TV screen time rather than mobile phones) or articles that did not meet the peer-review standard.

4. Included Studies

Finally, after the eligibility assessment, 20 studies were deemed suitable for inclusion in the qualitative synthesis. These studies were selected based on their focus on physical, mental, and cognitive health outcomes related to mobile phone usage, ensuring that they contributed relevant findings to the systematic review. These studies were then synthesized to provide insights into the health effects of excessive screen time, including conditions such as digital eye strain, anxiety, depression, and attention deficits.

Table 2: The PRISMA flow diagram below outlines the study selection process: Effects of Excessive Screen Time of Mobile on Health

Step	Description	Number of Studies
Records Identified	Articles identified through database searches (PubMed, Google Scholar, Scopus).	320
Duplicates Removed	Duplicate records removed after screening for repetition.	50
Records After Duplicates Removed	The total number of unique records remaining after duplicate removal	270
Records Screened	Records screened by title and abstract for relevance.	270

Records Excluded	Articles excluded based on title/abstract screening and inclusion/exclusion criteria.	225
Full-text Articles Assessed	Full-text articles assessed for eligibility based on inclusion/exclusion criteria.	45
Full-text Articles Excluded	Articles excluded after full-text review for reasons such as irrelevant health outcomes or non-peer-reviewed studies.	25
Studies Included	Studies included in the final qualitative synthesis (met all eligibility criteria).	20

Discussion

Physical Health Impacts: Excessive mobile screen time has been associated with various physical health problems, ranging from mild discomfort to chronic conditions. The most commonly reported physical health effects are digital eye strain and musculoskeletal issues, but emerging evidence suggests that extended screen time can also contribute to cardiovascular problems and obesity due to sedentary behaviour.

Digital Eye Strain (Computer Vision Syndrome): Digital eye strain, also known as Computer Vision Syndrome (CVS), is one of the most prevalent physical health issues linked to prolonged mobile screen use. CVS encompasses a range of eye- and vision-related problems caused by staring at digital screens for extended periods. Symptoms include blurred vision, eye discomfort, dry eyes, headaches, and difficulty focusing [7] [8].

A study conducted by Singh and Kaur (2021) found that more than 70% of participants who used mobile phones for more than two hours a day reported symptoms of digital eye strain [9]. The small screen size of mobile devices, combined with the need for frequent scrolling and reading of small text, exacerbates these symptoms [10]. Research has shown that blue light emitted from mobile screens can also disrupt the eye's natural circadian rhythms, leading to further discomfort [11]. As mobile phone use continues to rise, especially during late-night hours, the prevalence of digital eye strain is expected to increase.

Musculoskeletal Problems: Prolonged mobile phone use often leads to poor posture, resulting in musculoskeletal problems, particularly in the neck, shoulders, and upper back. The term "text neck" has been coined to describe the forward head posture that occurs when individuals look down at their phones for extended periods [12]. This posture places significant stress on the cervical spine, contributing to discomfort and long-term damage.

A 2020 study by Lanthier found that adolescents who spent more than three hours per day on their mobile devices were more likely to report neck and shoulder pain [13]. The constant downward gaze required for mobile phone use increases the strain on the spine, with research indicating that for every

inch the head tilts forward, an additional 10 pounds of pressure is placed on the spine [14]. Moreover, the sedentary behaviour associated with prolonged mobile phone use can lead to other musculoskeletal issues, such as lower back pain and wrist discomfort due to improper hand positioning [15].

Cardiovascular and Obesity Risks: Although musculoskeletal problems and digital eye strain are the most immediate physical effects of excessive mobile phone use, there is growing concern about the long-term health risks posed by sedentary behaviour associated with extended screen time. Studies have shown that individuals who spend more time on their mobile phones are less likely to engage in physical activity, increasing the risk of obesity and cardiovascular disease [16] [17].

A study by Roberts et al. (2019) found that adolescents who spent more than five hours per day on their mobile phones had a higher body mass index (BMI) and were more likely to lead a sedentary lifestyle compared to their peers who used mobile devices less frequently [18]. This lack of physical activity not only contributes to obesity but also increases the risk of developing metabolic syndrome, a cluster of conditions that raise the risk of heart disease, stroke, and diabetes [19].

Mental Health Effects: Excessive mobile phone screen time has been linked to a wide range of mental health problems, particularly among adolescents and young adults. The most commonly reported issues include anxiety, depression, and sleep disturbances, all of which can have long-term consequences for mental well-being.

Anxiety and Depression: Research has consistently shown a strong association between excessive mobile phone use and increased levels of anxiety and depression. The constant connectivity provided by mobile devices, particularly through social media platforms, creates an environment where individuals are constantly exposed to social comparisons, negative news, and cyberbullying, all of which contribute to feelings of inadequacy, loneliness, and low self-esteem [20].

A longitudinal study conducted by Chiu and Lin (2018) found that adolescents who spent more than three hours per day on social media were significantly more likely to develop symptoms of

anxiety and depression over a two-year period. The study also found that frequent social media users experienced higher levels of FOMO, a phenomenon characterized by a persistent fear of missing out on social events or experiences. This fear drives compulsive checking of mobile phones, exacerbating feelings of anxiety and contributing to a vicious cycle of mobile phone addiction.

Sleep Disruptions and Insomnia: Excessive mobile phone use, particularly before bedtime, has been shown to disrupt sleep patterns and contribute to insomnia. The blue light emitted from mobile screens interferes with the body's production of melatonin, a hormone that regulates sleep-wake cycles. This disruption makes it more difficult for individuals to fall asleep and can lead to shorter sleep durations and poorer sleep quality.

The National Sleep Foundation's 2020 Sleep in America Poll found that 95% of respondents reported using their mobile phones within an hour of going to bed, and more than half of these individuals experienced sleep difficulties. Additionally, studies have shown that individuals who spend more time on their mobile phones during the evening hours are more likely to experience daytime fatigue, reduced cognitive function, and irritability.

Cognitive and Behavioural Effects: The cognitive and behavioural effects of excessive mobile phone use are particularly concerning for children and adolescents, as these individuals are still undergoing critical stages of cognitive development. The most commonly reported cognitive issues include attention deficit, impaired memory, and reduced academic performance, while behavioural effects range from increased irritability to social isolation.

Attention Deficit and Cognitive Impairment: Excessive mobile phone use has been linked to reduced attention spans and impaired cognitive function, particularly in children and adolescents. The constant switching between apps, notifications, and tasks on mobile devices encourages a form of media multitasking that has been shown to reduce sustained attention and cognitive control.

A study by Bradley and Tennant (2019) found that children who spent more than two hours per day on mobile devices were more likely to exhibit symptoms of attention deficit, including difficulty concentrating and impulsive behaviour. This form of media multitasking not only impairs attention but also reduces working memory, making it more difficult for individuals to retain information and complete complex tasks.

Behavioural Changes and Social Isolation: Excessive screen time on mobile devices can also result in negative behavioural changes, including

increased irritability, aggression, and social withdrawal. Adolescents who spend more time on their phones are less likely to engage in face-to-face interactions and outdoor activities, leading to social isolation and impaired social skills. Furthermore, the addictive nature of mobile phone use can lead to compulsive checking behaviours, which have been associated with increased feelings of stress and frustration when access to the phone is restricted.

Conclusion

The evidence synthesized in this systematic review highlights the wide-ranging health impacts of excessive mobile phone screen time. From physical health issues such as digital eye strain and musculoskeletal problems to mental health concerns like anxiety, depression, and sleep disturbances, it is clear that prolonged mobile use can have significant negative effects on overall well-being. The cognitive and behavioural consequences of mobile overuse are particularly concerning for children and adolescents, whose developing brains may be more susceptible to the harmful effects of screen time.

Given the increasing prevalence of mobile phone use in modern society, it is essential for individuals to adopt healthier mobile usage habits, such as taking regular breaks, practicing good posture, and limiting screen time before bed. Public health initiatives should focus on raising awareness of the risks associated with excessive mobile phone use and promoting the development of screen time guidelines that encourage responsible usage. Future research should continue to explore the long-term health effects of mobile overuse and identify effective interventions to mitigate these risks.

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