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Addicted to Pixels: Understanding Screen Addiction and Strategies for Prevention

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Abstract

The study sought to define screen addiction and identify its different types, along with its global and regional prevalence, specifically in children and adolescents. By exploring the different causes of screen addiction, the study examined its consequences on physical health, mental health, and societal effects within these age groups. The efficacy of various interventions and treatments used to treat screen addiction was also investigated, and areas requiring future research were proposed. A qualitative literature search was conducted to explore different aspects of screen addiction in children and adolescents using databases such as Google Scholar, PubMed, and Science Direct. Peer-reviewed, free full articles relevant to the topic from 2014 to 2024 in English were selected. The findings indicated that screen addiction in children and adolescents, characterized by excessive use of digital devices, leads to significant physical, mental, and social outcomes. Prevalence rates varied, with higher rates observed among teenagers compared to younger children. Psychological factors such as anxiety, depression, and personality traits; social factors including peer influence and family dynamics; and technological factors such as device design and accessibility were identified as contributors to screen addiction. The physical health problems included sleep disturbances, eye strain, and reduced physical activity; mental health issues encompassed increased anxiety, depression, and attention deficits; while social impacts involved strained family relationships and academic challenges. Various interventions, such as cognitive-behavioral therapy (CBT), mindfulness practices, screen time monitoring apps, and educational programs for parents and children, showed varying levels of efficacy. The study concludes that although technology offers many advantages, it also presents challenges like screen addiction in children and adolescents, leading to numerous physical, mental, and social problems. A more holistic approach is needed to increase the effectiveness of interventions in clinical practice. Further research, including longitudinal studies in diverse populations, is required to better understand and reduce the prevalence and impacts of screen addiction in young people.

Keywords: *Screen addiction, children and adolescents, physical health, mental health, intervention strategies*

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1.0 Introduction

Screen addiction or technology addiction is the excessive and compulsive use of technology involving smartphones, tablets, laptops, television, etc. to the point that a person becomes dependent on it. Like all addictions people disregard the negative impact it has on their lives. Different types of screen addiction include addiction to video games, social media, the internet, and pornography [1]. Each of these types is unique but they all share a common feature of excessive screen time.

Screen addiction is constantly on the rise in humans in all age groups. Children and teenagers have been shown to have a significant impact on their physical health such as sleep problems, eye strain, and low physical activity, mental health such as increased anxiety, depression, or attention deficits; as well as social impacts like strained family relationships or academic challenges due to this immerging problem [2].

Understanding the different causes of screen addiction in children and adolescents is crucial for the development of effective preventive and treatment measures in this population. This literature review aims to explore the different causes that lead to the development of screen addiction in this age group; and investigate its potential consequences and current available preventive measures and treatments. By doing so, we aim to propose comprehensive strategies to address this growing problem and mitigate its impact on young people's lives.

2.0 Methodology:

The literature search in this study was extensive, drawing on databases such as Google Scholar, PubMed, and Science Direct. The following search terms were used: "screen addiction", "digital addiction", "technology addiction", "screen time", "adolescents", "children", "mental health", "physical health", and "interventions". Inclusion criteria comprised peer-reviewed articles published from 2014 to 2024, research conducted in English, studies focusing on the psychological, social, and technological factors causing screen addiction, literature on the physical, mental, and social impacts of screen addiction, and papers discussing interventions and treatments for screen addiction. Exclusion criteria included non-peer-reviewed articles and grey literature, studies focused solely on adults or the elderly population, articles published before 2014, and papers in languages other than English. The selected studies were carefully reviewed, and data were extracted regarding study design and methodology, population and sample size, key findings related to the causes, consequences, and interventions for screen addiction, as well as the limitations and strengths of each study. The extracted data were categorized and synthesized to provide a comprehensive framework for the current state of research into screen addiction. These findings were grouped under themes such as prevalence, psychological factors, social factors, technological factors, physical health consequences, mental health consequences, social impacts, and interventions

3.0 Results and Discussion:

The following Table 1 summarizes key studies on screen addiction included in the review, highlighting their reference, year, population, type of study, and primary results:

Table 1: Table of Characteristics of the studies included in this system review

Reference	Year	Population	Type of Study	Results
Ani Petrosyan [3]	2022	Internet users in US	Cross-sectional Internet Survey	48% considered themselves addicted
Cheng et al. [4]	2014	Global population	Meta-Analysis	Screen addiction rates is 6% globally, highest in the Middle East (10.9%), lowest in Northern and Western Europe (2.6%)
Cui et al. [5]	2023	High school students (14-20 years)	Cross-sectional Study	Higher prevalence of screen addiction in males (15.3%) than females (3.5%)
Nagata et al. [6]	2022	Children (10-14 years) in US	Longitudinal study	Boys more addicted to video games, girls more to social media and mobile phones. Greater problematic screen in children from low income families as compared to high income families.
Khalili-Mahani et al. [7]	2019	Various	Cross-sectional Internet Survey	There is a significant association between self-admitted screen addiction and quantitative stress levels, as well as stress-specific usage of screens.

Saikia et al. [8]	2019	440 students from Kamrup district in Assam	Cross-sectional study	There was a significant association between Internet addiction and stress (odds ratio=12), depression (odds ratio=14), and anxiety (odds ratio=3.3).
Langøy et al. [11]	2019	4509 Norwegian students of age 11-16 years	Cross-sectional survey	Living with a single parent or in a reconstituted family was positively associated with total screen time.
Tajalli et al. [12]	2017	230 Medical students	Cross-sectional study	Family communication patterns influence screen addiction.
Staples et al. [15]	2021	611 30-month-old children	longitudinal observational study	Greater screen use was associated with more parent-reported sleep problems, later sleep timing and less consolidated sleep.
Mylona et al. [17]	2020	Adolescent	Narrative review	Multiple Eye pathologies were reported due to excessive screen use
Kaur et al. [18]	2022	252 participants from Mumbai	Cross-sectional study	The prevalence and scores of depressions, stress, anxiety, poor sleep quality & dry eye disease were

				significantly higher in screen addicted group ($p<0.01$).
Barros et al. [19]	2021	200 participants from a Brazilian hospital	Cross-sectional study	The following eye symptoms were reported after using screens: fatigue, dry eyes, gritty sensation or itching, redness and insomnia.
Carkaxhiu Bulut et al. [20]	2023	201 high school students from Turkey	Cross-sectional Study	The overall screen time was significantly increased during the lockdown, with the most common screen activities being social media use, communication, and watching movies/series.
Celis-Morales et al. [21]	2018	390,089 participants from the UK Biobank	Cohort Study	This study found that high discretionary screen time is linked to increased risks of all-cause mortality, cardiovascular disease (CVD), and cancer, but these associations are significantly lessened by higher levels of physical activity, cardiorespiratory

				fitness, and grip strength.
Pandya et al. [22]	2021	Varied	Systematic review	Screen time increase was associated with psychological problems and lower emotional stability.
Wang et al. [23]	2019	600 high school students from Guizhou Province of China	Cross-sectional study	Excessive mobile gaming use was strongly related to higher levels of depression, social anxiety, and loneliness; more in males than females.
Montagni et al. [24]	2016	4816 graduate students	Cross-sectional study	There is a dose-dependent associations between screen time and self-perceived levels of attention problems and hyperactivity
Primack et al. [26]	2017	1,787 U.S. adults aged 19–32 years	Cross-sectional Study	Young adults with high social media use seem to feel more socially isolated as compared to those with lower social media use.
Lepp et al. [27]	2015	536 undergraduate students	Cross-sectional Study	Cell phone use was negatively related to students' actual Grade Point Average (GPA)

			and positively related to anxiety.
Chadha et al. 2024 [28]	General	Literature Review	Outlines the various treatment modalities and their efficacies used for screen addiction.

3.1 Prevalence of Screen Addiction

A survey carried out in 2022 showed that among the users of the internet in the United States about 48% considered themselves addicted to digital devices [3]. Similarly, a meta-analysis by Cheng and colleagues found that the prevalence of internet addiction globally is around 6%, with the highest rates in the Middle East at about 10.9%, followed by North America at 8%, Asia at 7.1%, Southern and Eastern Europe at 6.1%, Oceania at 4.3% and the lowest in Northern and Western Europe at about 2.6% [4]. Figure 1 summarizes these findings.

A study done among high school students between the ages 14-20 in Henan province of China, showed that the prevalence of excessive screen time was higher in male teenagers (15.3%) as compared to female teenagers (3.5%) [5]. This is depicted in the figure 2 below. A longitudinal study conducted in the United States among children aged 10-14 years also demonstrated that boys had greater screen use by playing excessive video games while girls were more addicted to social media and their mobile phones [6].

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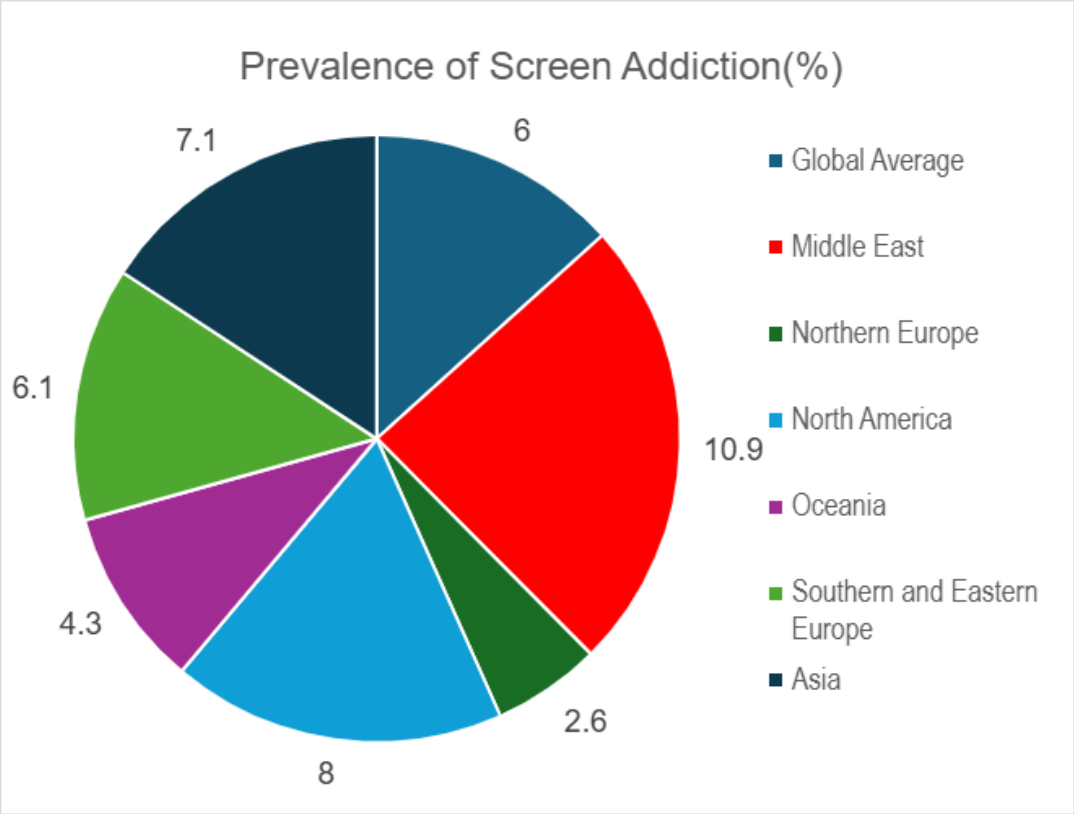

Figure 1: Prevalence rates of Screen Addiction Globally and different regions of the world

Figure 2 further shows the prevalence of screen addiction among gender.

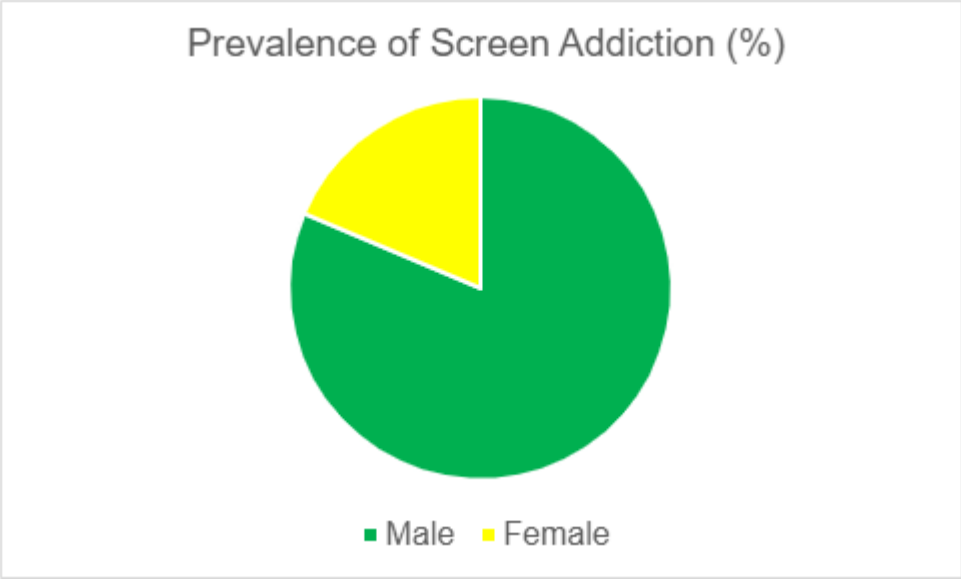

Figure 2: Difference in the prevalence rates among male and female population

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3.2 Causes of Screen Addiction

Psychological factors play a crucial role in screen addiction, and understanding these causes can help in developing targeted clinical practices for control and prevention. The association between screen addiction and psychological factors such as stress, depression, and anxiety is bi-directional. Individuals experiencing significant psychological stress often use TV, smartphones, or other devices to distract themselves from their problems, which can lead to addiction and further exacerbate stress, depression, and anxiety [7][8]. Certain personality traits also increase susceptibility to screen addiction. Impulsive individuals may struggle to resist the urge to check their devices constantly, while thrill-seekers might be drawn to the excitement of video games or social media. Those high in neuroticism, who are either overly anxious or emotionally unstable, may use screens to cope with their stress or escape reality, particularly if they have experienced early childhood trauma or have a family history of addiction [9]. These underlying factors affect one's relationship with technology, leading to compulsive behaviors that disrupt daily life, indicating that the problem lies not with the screens themselves but with how these psychological factors influence screen use.

3.2.1 Social Factors

Our social and cultural influences play an important role in the rise of the prevalence of screen addiction among our younger generation. Nowadays in our fast-paced society, it is preferred that people are quick to respond to all forms of communication such as emails and text messages. This leads to people compulsively checking their phones [10]. Another important social factor is the peer pressure to be highly active on multiple social media sites to be accepted in society nowadays, which again leads to people spending long intervals of time on their phones and devices [10].

Family dynamics have a role in the screen addiction of adolescents. The family structure—living with one or both parents, a single parent, and reconstituted families—can be related to increased screen time and decreased physical exercise and sports participation among adolescents [11]. Besides, parenting style, family relationships, and socioeconomic status are other family-related factors that have been found to correlate with social media addiction in adolescents, underlining the role of communication and functional family relations in the protection from addictive behaviors [12]. A communicative and supportive family context provides a very important aid in minimizing the potential for screen addiction and supporting healthy screen use practices among adolescents.

The socioeconomic status of the household in which the child is brought up is found to be an important factor in development of screen addiction. A study done with 8753 participants concluded that children from low-income families were more likely to have problematic screen use as compared to children from high income families. This is most likely because parents with lower incomes are more likely to be essential workers and so unavailable to check on their children’s screen use. Another reason that was pointed in this study was that the people with lower income households usually live in neighborhoods that are deemed unsafe for children to play outside and so they have lesser options recreational activities, making them more likely to be addicted to video games and social media sites [6].

3.2.2 Technological Factors

The devices have certain design features that can promote their compulsive use. Social media websites use variable-ratio reinforcement schedule which uses rewards such as likes and

notifications at unpredictable times, to keep the users engaged and repeatedly check for updates [13]. These updates have been shown to release dopamine which reinforces the repeated checking behavior and thus habit formation [14].

The constant availability of digital devices and access to the internet makes it very easy to be online at any time [10]. Thus, the ubiquity of technology eliminates most barriers to screen time, especially those related to accessing screens in the first place. People are rarely without access to screens, which thus enables frequent and prolonged use. Moreover, modern devices are user-friendly and intuitive, convincing one to spend even more time looking at their screens [10]. Apps and websites enhance user engagement with personalized content, autoplay features, and endless scrolling to make users continue looking at content and come back to a platform.

Generative AI technology—such as that used to create AI-generated VR pornography, social media, and video games increasingly exploit human reward circuits through supernormal stimuli. AI-driven experiences can be better than real-world experiences in providing fulfillment and run the risks of pronounced addiction and detachment from reality. Future progress in AI could strengthen the impact even more by covering a wider range of human needs, drastically changing human behavior and societal norms [15].

3.3 Consequences of Screen Addiction

3.3.1 Physical Health

The excessive use of screens can lead to a number of physical health issues such as sleep disorders, eye problems, and diseases that develop as a result of a sedentary lifestyle. Pre-bedtime screen use is found to be associated with later sleep timing, shorter sleep duration, later sleep onset latency, and a less mature sleeping pattern characterized by high variability in sleep duration and timing [16]. This is because the blue light emitted by screens decreases the production of melatonin in our bodies and disrupts the body's circadian rhythms [16].

Screen addiction has been linked to various consequences on eye health. Some studies have shown that individuals addicted to screens suffer from a higher occurrence of eye pathologies, including dry eye disease, myopia, astigmatism, and resulting diseases such as keratoconus, which are often symptomatic of red eyes, tiredness, dryness, gritty sensation, and blurred vision [18][19][20]. The younger generation has become more sedentary as their interaction with screens has increased [21]. A large study from the UK with 390,089 participants concluded that increased screen time is associated with decreased physical strength, cardiorespiratory fitness, and physical activity, leading to a rise in all-cause mortality, cardiovascular diseases, and cancer incidence and mortality [22].

3.3.2 Mental Health

Excessive use of the screens is associated with major mental health problems, notably depression and general anxiety. According to the literature, increased use of screens for more than the recommended hours for continuous social media, gaming, or any other cyber activity can increase anxiety and depression.

During the COVID-19 pandemic, the dependence on digital devices has drastically increased, exacerbating the issue. Constant screen use for education, work, and socializing increases anxiety and depressive symptoms in people, mainly in those who have impulsive usage of digital devices

and do not have the tendency of self-regulation. Screen time increase was therefore associated with psychological problems and lower emotional stability [23].

One particular research into addiction to mobile gaming showed that excessive mobile gaming use was strongly related to higher levels of depression, social anxiety, and loneliness. This trend was more striking among male adolescents who had more severe mental health problems compared to their female counterparts [24].

Screen addiction has also been linked to attention deficits. A large cross-sectional study among French-speaking students showed that high levels of screen use are associated with self-perceived problems in attention and hyperactivity. This suggests that the use of screens for more than the recommended time can cause decreased attention and hyperactivity, which can in turn lead to cognitive and behavioral issues [25].

3.3.3 Social Impacts

Screen addiction can set a huge burden on personal relationships [26]. Excessive use of screens might make an individual disregard face-to-face interaction, making family members and friends feel neglected. Intensive use of digital devices has a relationship with the disruption of family ecosystems and reduced quality of familial relationships. This most of the time leads to conflicts and a feeling of emotional detachment between a person and his or her family members.

Long hours of screen time are linked to high levels of social isolation. Spending much time on the screen means spending less on social activities and face-to-face interactions that result in feelings of emptiness, loneliness, and isolation. A 2017 study by Primack et al. conducted that clearly showed social media use, in particular, to be correlated with perceived social isolation among young adults [27].

Excessive screen use negatively impacts academic and work performance. Addiction to the screen commonly means procrastination, distraction, and later a decrease in a person's productivity. In a study, Lepp and colleagues have shown that college students who spent more time on their smartphones had a lower GPA, meaning screen time cuts down on academic success [28].

The major consequences of screen addiction are summarized in Table 2 below.

Table 2: Consequences of screen addiction

Physical Health	Mental Health	Social Impact
Eye Problems	Depression	Strained Relationships
Sleep Problems	Anxiety	Decreased Academic Performance
Sedentary Lifestyle	Attention Deficits	Social Isolation

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3.4 Interventions and Treatments for Screen Addiction

Figure 3 is a flowchart that depicts the main interventions and treatments that have been used for the management of screen addiction.

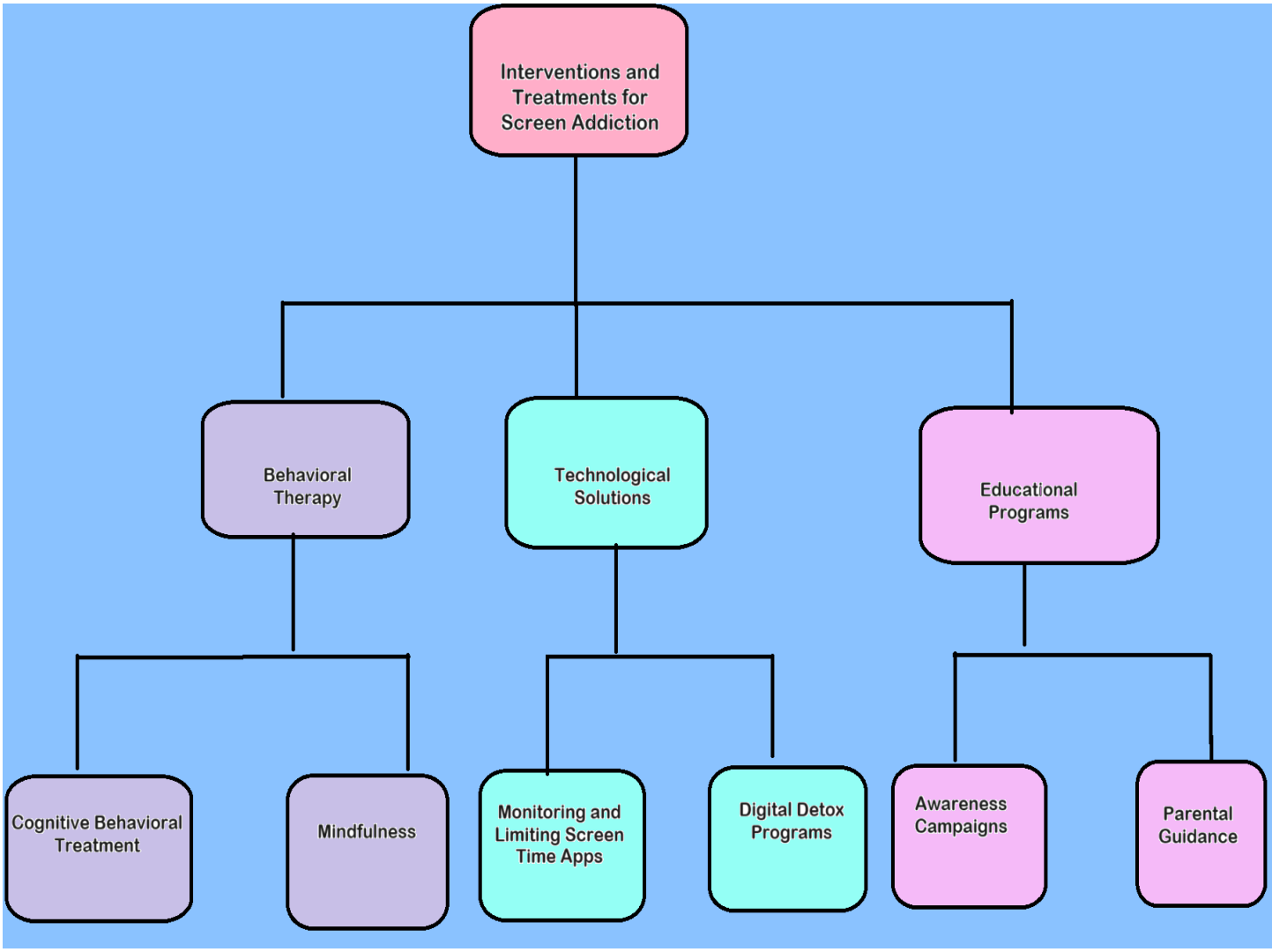

Figure 3 : The main interventions and treatments for screen addiction

3.4.1 Behavioral Therapies:

Cognitive Behavioral Therapy

One of the primordial treatments of screen addiction is Cognitive Behavioral Therapy (CBT), which deals with how thoughts, emotions, and behaviors interrelate. During CBT, a person will learn how to identify maladaptive thoughts and behaviors that add to excessive use of screens and change them. Through cognitive restructuring and behavior modification, CBT enables the development of coping abilities and skills for self-regulation, hence helping in making better decisions about the use of screens [29].

Mindfulness

Mindfulness-based treatments incorporate meditation and mindfulness-based cognitive therapy to assist in the efficient treatment of screen addiction. These practices will improve the degree of self-awareness by developing greater sensitivity to thoughts, emotions, and behaviors; it has been shown that mindfulness practices may help decrease impulsive online behavior, raising the ability for self-regulation and maturing a healthier relationship with digital devices, as that is similarly inclined to cultivate present-moment awareness [29].

3.4.2 Technological Solutions:

Monitoring and Limiting Screen Time Apps

The demand for screen time monitoring and limiting mobile apps has been increasing lately. These are tools that help users trace usage, set limits, and get feedback regarding their digital habits. Much of the time, they will have features such as blocking apps, tracing histories of use, and alerting the user to remain within set boundaries. These tools are practical and very accessible, hence providing empowering ways for better management of one's screen time [29].

Digital Detox Programs

Digital detox programs provide structured intervention into abstention from screens and rebooting one's relationship with technology [29]. More often than not, these programs are conducted with periods of abstinence from digital devices succeeded by guided re-exposure, thereby promoting mindful and balanced use of technology. Digital detox programs help clients regain control over online behaviors and develop healthier digital habits.

3.4.3 Educational Programs

Awareness Campaigns:

Community awareness campaigns go a long way in making the public understand the risks of addiction to screens and where to seek help if affected by this problem [29]. The campaigns detect the signs of addiction, and its possible consequences, and teach why there should be a balance in how technology is used. They create awareness and, in so doing, reduce stigma, promote early intervention, and responsible internet use.

Parental Guidance:

Furthermore, educational workshops shall be delivered to parents with a view to enabling them to understand the ways of monitoring and managing their screen use [29]. Such programs will enable parents to know the risks that come with excessive screen time, how to set limits, and, how to foster responsible digital habits. Effective parental guidance includes modeling healthy online behavior and keeping the channel of communication open with children about online activities.

All these heterogeneous interventions and treatments can provide multifaceted approaches toward treating addiction to screens. This work will help individuals build healthier relationships with digital devices using behavioral therapies, technological solutions, and educational, and parental guidance, reducing detrimental negative effects of extreme screen use.

4.0 Gaps and Future Research

Most literature on screen addiction and its linkage to anxiety and depression is derived from cross-sectional data, which captures a snapshot in time but does not portray the temporality needed to understand the long-term effects of screen addiction on mental health. Therefore, there is a critical

need for longitudinal studies that trace individuals over an extended period to establish how addictive screen use impacts mental health. These studies should be designed to establish the onset and development of screen addiction, track changes in mental health concurrently, and assess the long-term efficacy of various interventions.

Additionally, most studies on screen addiction focus on specific populations, such as adolescents or college students, within limited geographical areas. Future research should include diverse populations across different age groups, socio-economic classes, and educational backgrounds to understand how screen addiction affects various groups differently. There is also a need to investigate the implications of emerging technologies like virtual reality (VR) and artificial intelligence (AI) on screen addiction and mental health. Studies should explore whether VR and AI influence screen addiction differently than traditional screens and estimate the impact of these immersive technologies on mental health. Developing guidelines and interventions for the safe use of these emerging technologies is essential. Addressing these research gaps will enhance our understanding of screen addiction and improve strategies for prevention and treatment

5.0 Conclusion

The study concludes that screen addiction has become a diversified and increasingly prevalent problem across different age groups, mostly affecting children and adolescents. This literature review identified the critical need to investigate the various causes of screen addiction, resulting from psychological, social, and technological factors. The use of excessive screen time has an immense effect on physical health, mental well-being, and social interactions. Screen addiction could be effectively managed by means of behavioral therapies, technological solutions, and educational programs. However, significant gaps exist in the current research, highlighting the need for further longitudinal studies, research in different populations, and investigations into the effects of emerging technologies like virtual reality and artificial intelligence. Addressing these gaps is essential for developing comprehensive strategies aimed at reducing the harmful effects of screen addiction and fostering healthier relationships with technology.

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