**Screen Time and its Impacts on Youth Health and Brain Development**

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**ABSTRACT**

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| **Introduction:** Excessive use of social media can heighten feelings of loneliness and body dissatisfaction, worsening psychological distress. These effects are intensified by factors such as age, gender, self-esteem, and family and school contexts, which call for a multisectoral and preventive approach. The advancement of digital technologies has significantly transformed adolescents' daily lives, making devices like smartphones and computers central to their routines. However, excessive screen use has been linked to negative effects on mental health and brain development. Studies highlight a correlation between high screen time and increased symptoms of depression, anxiety, stress, sleep disorders, and body dissatisfaction. Factors such as age, gender, and family context influence these impacts, making it crucial to investigate how these dynamics affect vulnerable school populations. **Aim:** The aim of the study was to investigate the effects of excessive digital screen use on the mental health and neuropsychological development of adolescents and young people. **Methodology:** A bibliographic study with a descriptive nature and qualitative approach was conducted by reviewing scientific articles from 2020 to 2025, available in PubMed. The descriptors used were "Screen Time," "Mental Health," and "Teenagers." After screening and critical analysis, the data were organised into ten thematic axes that guided the discussion and theoretical reflections of the study. The searches were carried out using the Health Sciences Descriptors (DeCS) from the Regional Library of Medicine (BIREME). **Results and Discussion:** The analysed data reveal that prolonged screen use is associated with changes in brain areas related to attention, memory, and emotional control, as well as negatively impacting sleep quality. The type of content accessed is crucial: passive media like social networks are associated with greater impulsivity and depressive symptoms, while interactive and educational media may have neutral or beneficial effects. The COVID-19 pandemic worsened these impacts. Moderating factors such as family support, physical activity, age, and gender influence the intensity of the effects. Older students and girls tend to be more vulnerable, and the lack of effective public policies exacerbates this situation. **Conclusion:** It is concluded that the negative effects of excessive screen time on adolescent mental health are complex and multifactorial. The influence depends not only on the amount of time but also on the type of content consumed, usage patterns, and social context. Medical education and public policies should critically and interdisciplinarily address this issue, encouraging a balance between technology and healthy habits. Strategies involving family, school, and community are essential to mitigate impacts and promote digital well-being among young people. In summary, a broader understanding of psychological suffering in the digital age demands an ethical, multidisciplinary approach that is sensitive to contemporary sociocultural transformations. |

*Keywords: Screen time; Mental health; Brain development, COVID-19, entertainment, social media*

**1. INTRODUCTION**

The advancement of digital technologies has significantly transformed the daily lives of adolescents, especially with the growing use of devices such as smartphones, tablets, and computers. These tools have become not only a means for study and entertainment but also central platforms for social interaction among young people. However, the excessive and unregulated use of screens has raised concerns in the field of public health, particularly due to its association with adolescents’ emotional and psychological well-being (Twenge et al., 2021). Children's heavy reliance on screen media has raised serious public health issues since it might harm their cognitive, linguistic, and social-emotional growth (Muppalla et al., 2023). In this context, understanding the effects of this phenomenon on the mental health of this population becomes essential, especially in a scenario where psychological disorders rank among the leading causes of morbidity in adolescence (Orben et al., 2020).

Many youth (individuals aged between 10 and 24 years) are spending significant time watching videos, being engrossed in games on tablets, or messaging friends as common recreational activities (Paulus et al., 2023). Recent studies show that high screen exposure is correlated with increased levels of depressive symptoms, anxiety, stress, and sleep disturbances among adolescents (Boer et al., 2020; Twenge & Campbell, 2018). Despite evidence that excessive screen use may contribute to negative health, developmental, emotional, and behavioural outcomes, more children are engaging in increasing amounts of screen-related activities. For children with neurodevelopmental conditions, increased screen use could exacerbate emotional/behavioural difficulties (EBDs) by interfering with sleep quantity and quality (Lin et al., 2019). Sleep quality, in particular, appears to be negatively affected by nighttime use of electronic devices, which compromises young people’s cognitive and emotional functioning (Scott et al., 2022). Furthermore, excessive use of social media can heighten feelings of loneliness and body dissatisfaction, worsening psychological distress (Marques et al., 2023). These effects are intensified by factors such as age, gender, self-esteem, and family and school contexts, which call for a multisectoral and preventive approach (Delgado et al., 2023; Throuvala et al., 2021).

Research also indicates that girls tend to be more vulnerable to the negative effects of screen use, especially when the content accessed is related to social comparison and validation through likes and comments (Throuvala et al., 2021). Among boys, screen use is more often associated with aggressive behaviours or attention difficulties. These findings show that the impact of screens on mental health can vary by gender, reinforcing the importance of targeted strategies that are sensitive to the specificities of each group.

Despite scientific advances in understanding the consequences of intensive screen use, important gaps remain concerning the reality of adolescents in public schools located in underprivileged regions. Many studies focus on large urban centres, neglecting the cultural, economic, and social diversity present in other areas. There is still a shortage of effective educational interventions in the school environment aimed at promoting conscious technology use and preventing its negative impacts on mental health (Mahato & Upadhyay, 2020; Marques et al., 2023). Thus, outreach initiatives that directly involve students and the school community prove essential to foster a healthier and more balanced environment.

Given this context, this study aims to investigate the impact of screen use on the mental health and brain development of adolescents and young people. The research will consist of an extensive qualitative study based on a state-of-the-art analysis of articles and research on this topic.

**2. Materials and Methods**

This was a descriptive bibliographic study with a qualitative approach, using data collected for the elaboration of the scientific article. Data collection was based on a literature review of scientific publications related to the proposed topic, covering the period from 2020 to 2025. The inclusion criteria for content selection were: full-text publications aligned with the topic of the impact of screen use on mental health and brain development in young people, including documents, regulations, health authority guidelines, scientific articles, and institutional directives, all published in English.

Exclusion criteria included: articles not directly related to the topic, duplicate materials, incomplete texts, reviews, abstracts, debates, and content not available in full. The literature search was conducted in the PubMed database. The searches were carried out using the Health Sciences Descriptors (DeCS) from the Regional Library of Medicine (BIREME), as shown in Table [01]: Screen Time AND Mental Health AND Teenagers.

The methodology adopted in this study began with the careful selection of descriptors in DeCS, followed by searches in indexed databases. Using the main terms and their equivalents, tables were created listing the articles found in each database. Duplicate articles were removed, and then a relevance screening was performed based on the titles. After this step, abstracts were read, and finally, full readings were carried out for the articles that met the established criteria.

For data analysis, ten thematic axes were defined, constructed based on the specific objectives and formulated as guiding questions. These questions guided the reading and critical analysis of the selected articles, forming the conceptual basis for the discussion and interpretation of the data. The answers obtained provided the theoretical foundation for the construction of the results and the reflections proposed in this study.

**discussion**

Neurological and Cognitive Impacts of Excessive Screen Use in Childhood

Studies indicate that excessive use of digital media during childhood can negatively impact brain development, affecting areas responsible for reading comprehension and social interaction. Structural changes in the limbic system, white matter, and cerebral cortex have been observed in children with high screen exposure (Hutton JS, Piotrowski JT, et al.). These structural changes may lead to slower development of cognitive and emotional functions. Furthermore, screen use exceeding three hours per day is associated with mental and behavioural disorders, such as memory loss and difficulty concentrating, similar to early stages of dementia (Laurie A. Manwell et al., 2021). Conversely, reducing screen time can improve concentration, promote social interaction, and reduce anxiety and depressive symptoms, benefiting mental health (Laurie A. Manwell et al., 2021).

Scientific literature also shows that different types of media exert distinct effects on specific brain regions. Some media, due to their high "Learning Potential," can stimulate creativity and sociability, while more passive media may be harmful (Hutton JS, Piotrowski JT, et al.). Passive media, such as television and social networks, negatively affect the volume of sensory, motor, visual, prefrontal, and temporal regions (Li, M. et al., 2024). In contrast, active media use—such as reading or cognitively stimulating video games—can have positive effects on the brain, contributing to increased brain volume in key areas (Li, M. et al., 2024). Therefore, the type of media is a key factor in its influence on the developing brain.

Sleep, in turn, is a major mediating factor in the effects of screen time on the brain. Children and adolescents exposed to screens for long periods tend to have poorer sleep quality, which is associated with cognitive and structural impairments (Paulich KN et al., 2021). Studies indicate that decreased sleep quality is linked to structural changes in the prefrontal cortex, thalamus, and brainstem (Zhao et al., 2024). These changes are associated with more erratic, atypical, and externalising behaviours, especially in youth with high screen use starting from age nine (Zhao et al., 2024). Literature also highlights that improving sleep can help mitigate the negative impacts of screen exposure (Nagata et al., 2024).

Additionally, the "displacement hypothesis" suggests that excessive screen time replaces essential activities for healthy development, such as proper sleep, physical exercise, and social interaction (Nagata et al., 2024). Prolonged digital media use can interfere with family sociability, cause sleep difficulties, and hinder motor function (Hutton JS, Piotrowski JT, et al.). This replacement phenomenon also affects intellectual activities such as reading, further reducing beneficial brain stimulation (Li, M. et al., 2024). In short, the more time spent on screens, the less time is available for protective and health-promoting habits.

Finally, specific patterns of screen use show different impacts on the child's brain. In children whose usage focuses predominantly on video content, there are changes in functional connectivity across several neural networks, such as the visual, auditory, attention networks, default mode network (DMN), salience network, and amygdala (Song et al., 2023). These networks are fundamental for cognition, attention, executive control, motivation, and emotional processing. The study identified two groups: a high-frequency "video-centric" group (TV, videos, games) and a low-frequency group. The more exposed group showed poorer cognitive performance, greater impulsivity, and more pronounced changes in functional brain connectivity (Song et al., 2023). This underscores the importance of assessing not only screen time but also the type and pattern of screen use during childhood.

Influence of the Type of Digital Use on Socioemotional Development

Recent studies show that the type of screen use has a distinct influence on the cognitive, social, and emotional development of children and adolescents. Paulich et al. (2021), using data from the ABCD Study, identified that passive activities such as watching videos are strongly associated with negative impacts on mental health and academic performance, while interactive activities, such as educational games, have neutral or less harmful effects. Li et al. (2024) support this distinction, showing that passive media negatively affect the cerebral cortex, particularly in areas related to language and cognition, whereas active use, focused on educational games, can stimulate attention and decision-making circuits.

Song et al. (2023) found that digital use patterns directly influence brain connectivity and socioemotional behaviours. Adolescents exposed to passive media showed higher impulsivity, emotional difficulties, and lower self-control. Conversely, those engaged in interactive activities exhibited greater connectivity in neural networks associated with emotional regulation and executive cognition. Thus, even with similar screen time, active use was associated with greater emotional self-regulation and better social development. These results suggest that the nature of digital activity can modulate its effects on the developing brain.

In Plackett et al.’s (2023) study, frequent use of social media was strongly linked to symptoms of depression and anxiety, mainly due to mechanisms of social comparison and the search for validation. Passive entertainment, such as binge-watching series, was more weakly associated with negative outcomes. Wiguna et al. (2021) also emphasise that the negative impact lies not only in screen time but also in the digital experience, with cyberbullying on social media being related to self-harming behaviours. On the other hand, streaming content consumption showed a neutral effect, suggesting a potentially regulatory or emotional escape role.

Nagata et al. (2024), using longitudinal data from the ABCD Study, found that intense social media use correlates with higher levels of depressive symptoms, low self-esteem, and body image issues, particularly due to social comparison. In contrast, moderate use of streaming platforms showed neutral or mildly positive effects. Hutton et al. (2024) argue that the quality of digital content is more relevant than the total exposure time, with educational and interactive media promoting the development of neural networks, while passive and superficial use compromises these functions.

Finally, Huang et al. (2023) point out that the content accessed is more decisive for mental health than screen time itself. Smartphone use for educational purposes had little association with depression or anxiety, whereas social media and passive entertainment were correlated with worse well-being indicators. Odgers and Jensen (2020) review the literature and propose that digital guidelines move beyond screen-time limits and instead consider the context and quality of use. Thus, digital health policies should classify screen use as either positive (educational, creative, communicative) or risky (cyberbullying, social comparison, passive consumption).

Association Between Screen Time, Mental Health, and Risk Behaviours in Adolescents

The systematic review by Odgers & Jensen (2021) shows that excessive screen time is strongly associated with worse mental health outcomes in adolescents, such as increased symptoms of depression, anxiety, and emotional difficulties. These negative effects are more pronounced when screen use is passive—such as endless scrolling on social media—or when it replaces social interaction and physical activity. The relationship is bidirectional: adolescents with pre-existing mental health issues tend to use screens more as a coping mechanism. Certain activities, such as gaming and social media use, showed greater negative impact, with older adolescents being more vulnerable. The study highlights the urgency of early interventions, especially in high psychosocial risk groups.

During the pandemic, increased screen time was linked to disordered eating behaviours and impaired emotional regulation. Muscogiuri et al. (2020) observed that lockdown and excessive use of digital devices led to higher consumption of ultra-processed foods and reduced physical activity, increasing the risk of eating disorders. In children with ADHD, Sivapriya Vaidyanathan et al. found that those exposed to more than two hours of screen time per day displayed impulsive eating patterns and higher consumption of processed foods, likely due to impaired emotional regulation and disrupted hunger and satiety cues. These findings suggest that screen time functions as an indirect risk factor, especially in vulnerable populations.

Anderson et al. (2021) showed that adolescents with more than five hours of daily screen time were 1.8 times more likely to exhibit problematic substance use, such as alcohol and drugs. Depression mediated 32% of this association, indicating that the impact of screen time on mental health may facilitate risky behaviours. Zhang et al. (2023), in turn, found that adolescents genetically predisposed to longer screen use had a higher risk of suicidal behaviours, even after adjusting for psychosocial factors. The study suggests that biological pathways, such as dopaminergic dysfunction and sensitivity to social isolation, are also involved, highlighting a complex interaction between genetics and environment.

Prolonged screen exposure is directly related to suicidal ideation, as evidenced by Twenge et al. (2023), who identified a 20–30% increased risk of suicidal thoughts in adolescents, even after controlling for factors such as depression and socioeconomic status. Li et al. (2024) pointed to obesity and body dissatisfaction as important mediators of this relationship, since screen time is associated with poorer self-image and higher BMI. Expanding on this perspective, Robinson et al. (2024) emphasised the importance of examining the links between screen time, social media, and self-harming behaviours, suggesting the need for rigorous longitudinal research to understand the mechanisms behind these harmful effects.

Finally, Lee et al. (2024) revealed, through digital phenotyping, that adolescents with suicidal ideation exhibited more erratic smartphone usage patterns, with spikes in activity between 10 p.m. and 2 a.m. Time spent on social media emerged as the strongest predictor of suicidal thoughts. This nighttime usage pattern, combined with high variability in exposure time, represents a significant behavioural risk marker. These findings reinforce the urgency for public, school-based, and family-oriented policies that consider not only the total screen time but also usage patterns, accessed content, and the psychological context of young users.

Sedentary Behavior, Physical Health, and Risk Behaviors Associated with Screen Time

The study by Santos et al. (2023) revealed that high screen exposure is associated with elevated levels of anxiety, depression, and stress among adolescents. The combination of excessive screen time and low physical activity was identified as a critical factor contributing to the worsening of mental health in children and adolescents, a finding reinforced by Tang et al. (2021). Youth who do not meet recommended physical activity levels and engage in sedentary behaviours exhibit a higher prevalence of symptoms such as social withdrawal, anxiety, and depression. Tandon et al. (2021) also linked sedentary lifestyles and high screen time with declining mental health, emphasising the importance of an active lifestyle in preventing emotional disorders in youth.

Crowe et al. (2020) demonstrated that sedentary behaviour patterns—particularly excessive screen time—are strongly associated with overweight and obesity in adolescents. Teens who fail to engage in at least 60 minutes of daily physical activity and exceed the recommended two hours of screen time per day are more likely to develop excess weight, obesity, and increased body mass index (BMI). The combination of sedentary behaviour and physical inactivity was especially harmful, correlating with increased body fat accumulation. These findings underscore the direct impact of digital habits on the physical health of young people.

Jerome GJ et al. (2022) linked high levels of sedentary behaviour and obesity to adolescents undergoing mental health treatment, suggesting a worsening of clinical outcomes. Kontostoli et al. (2023) further confirmed that sedentary behaviours combined with prolonged screen use contribute to rising BMI and overall health deterioration. Shenoi et al. (2022) showed that playing sports and engaging in regular physical activity serve as protective factors: physically active adolescents report lower rates of substance use, aggressive behaviours, delinquency, and show greater emotional regulation. In contrast, excessive screen time was associated with an increase in risky behaviours.

Additionally, the study by Wiguna et al. (2021) demonstrated that excessive screen time—particularly in the context of exposure to cyberbullying—is linked to a higher risk of self-harm among adolescents. This relationship highlights not only the behavioural but also the more severe emotional consequences of screen use. Gao et al. (2024) showed that obesity mediates the relationship between excessive screen use and suicide risk, revealing that body dissatisfaction associated with elevated BMI can intensify suicidal thoughts. These findings point to the complex interaction between physical health, body image, and mental health in digital contexts.

Finally, Cioffredi LA et al. (2021) concluded that high screen time is directly associated with increased substance use among adolescents. This finding confirms the role of excessive exposure to digital media as a risk factor for engaging in harmful behaviours, such as alcohol and drug consumption. Taken together, the reviewed studies indicate that screen time, when combined with sedentary behaviour and a lack of healthy activities, exerts a profound impact on the mental, emotional, and physical health of young people. Promoting physical activity and limiting screen use emerge as essential strategies in preventing multiple health problems during adolescence.

International Evidence on Screen Time and Youth Mental Health

In China, recent studies indicate that excessive use of technology among adolescents is associated with increased prevalence of depression, anxiety, and poor academic performance, particularly in rural areas with limited psychological and governmental support (Wang et al., 2023). Adolescents who use fewer electronic devices report better mental health and higher levels of physical activity (Zhang et al., 2020). Furthermore, excessive screen time has been correlated with other negative factors such as alcohol and cigarette use, and physical health problems (Cui et al., 2022). These findings highlight the importance of limiting screen exposure and encouraging healthy habits—like outdoor activities—to promote youth mental health in China.

In Canada, the pandemic intensified screen exposure among youth, with high use of social media, video games, and television, which was associated with increased cases of anxiety, depression, and poorer sleep quality (Duncan et al., 2022). Studies show that the greater the screen time, the lower the adherence to a healthy lifestyle free from mental health issues (Bang et al., 2020). Physical activity and outdoor time decreased among Canadian youth due to prolonged use of electronic devices (Michaelson et al., 2020). These findings emphasise the impact of screen time not only on psychological health but also on physical inactivity and the erosion of healthy habits among adolescents.

In India, excessive use of electronic devices—particularly among young women—has been linked to mental disorders, with a notable impact on sleep quality (Maurya et al., 2022). Children with ADHD are even more exposed to screen time, requiring both psychological and family support to minimise the harm associated with overuse (Vaidyanathan et al., 2021). The country accounts for approximately 16.93% of global smartphone users, and while studies on screen time impacts among youth aged 18 to 24 are ongoing, preliminary data suggest a strong link to issues like anxiety, stress, and depression (Deshpande et al., 2024). This highlights the urgency of public interventions for this age group and region.

In the context of the pandemic, Qin et al. (2020) found that individuals who maintained regular physical activity levels and limited screen time experienced better mental and psychological health during lockdown. This relationship underscores how prolonged digital screen exposure can negatively affect emotional stability, especially during periods of collective stress such as public health crises. Maintaining a balance between technology use and healthy habits proves to be a relevant protective factor in mitigating negative effects during adverse situations.

Thus, studies conducted in countries like China, Canada, and India reveal a consistent pattern of association between excessive screen time and negative impacts on mental health, sleep quality, physical activity, and overall well-being in young people. The lack of effective public policies and limited access to psychological support in vulnerable regions exacerbate these effects. Conversely, limiting screen use, promoting physical activity, and fostering healthy environments emerge as promising strategies to reverse this scenario. The international landscape demonstrates that this is a global phenomenon, requiring context-specific responses that account for the cultural and socioeconomic realities of each region.

Moderating Factors: Age Group, Gender, Family Support, Physical Activity, and Sleep

Studies indicate that the effects of screen time vary by age group, being more intense at specific stages of adolescence. Zhu et al. (2023) identified certain age ranges as more vulnerable to the impacts of excessive screen use. Li et al. (2024) reinforced this observation by showing that middle and high school students have higher exposure and a greater risk of depressive symptoms and sleep disturbances than younger children. McArthur BA et al. (2023) also pointed out that older adolescents are more susceptible to emotional difficulties, highlighting age as a relevant factor in how screen time affects mental health. These findings reveal the importance of tailoring interventions to specific stages of child and adolescent development.

Gender also acts as a moderator of screen time effects, making boys and girls vulnerable in different ways. Lin Q et al. (2022) showed that the impact on mental health varies by sex, while McArthur BA et al. (2023) observed that girls exhibited more emotional symptoms such as anxiety and sadness, whereas boys showed more agitation and aggression. This suggests that prevention and support strategies should be sensitive to gender differences. Alongside age, biological sex is a key component in understanding how screen time emotionally and behaviorally affects adolescents.

Another fundamental moderator is family support. Jörren HL et al. (2023) emphasised that a positive family environment—with attentive and emotionally available parents—helps protect children's mental health. McArthur BA et al. (2023) reinforced this by showing that youth with greater emotional support from parents displayed fewer psychological distress symptoms, even with high screen time. Kurz D et al. (2023) added that family support, combined with regular physical activity, is linked to lower levels of mental health deterioration. These findings highlight the family’s role as a protective network.

Physical activity emerges as another crucial mediator in the relationship between screen time and mental health. Duncan MJ et al. (2022) found that adolescents with good sleep patterns and higher levels of physical activity had fewer adverse symptoms, even with elevated screen time. Kjellenberg et al. (2022) confirmed that regular exercise is associated with better mental health indicators. Kurz D et al. (2023) emphasised the protective effect of physical activity, even when sleep quality wasn't directly considered. Therefore, maintaining an active lifestyle can significantly reduce the harm caused by prolonged screen exposure.

Sleep disorders are recurring mediators of the negative effects of screen time. Li et al. (2024) showed that excessive screen use is linked to shorter nighttime sleep duration, greater social jet lag, and increased depressive symptoms. Vézina-Im LA et al. (2022) observed that adolescents with more recreational screen time had greater difficulty falling asleep, more daytime fatigue, and poorer sleep quality—factors closely tied to declining mental health. These findings emphasise the need for interventions that consider sleep habits and promote balance among screen use, physical activity, and proper rest.

International Recommendations and Intervention Strategies on Screen Use

The World Health Organisation (WHO) recommends that children under the age of 5 have less than one hour per day of recreational screen time—ideally none. For children and adolescents above this age, although there is no strict limit, the WHO advises balanced, supervised screen use that does not compromise essential activities such as sleep, physical activity, and social interaction (Odgers & Jensen, 2020). The focus of the guidelines is on the quality of consumed content and the encouragement of a healthy, active lifestyle across all ages. Hutton J. S. (2024) reinforces that excessive screen use in early childhood negatively affects brain development, highlighting the importance of adhering to these recommendations.

Multiple studies show that structured interventions—both school- and family-based—are effective in reducing screen time and promoting mental health. School-based interventions have succeeded in reducing sedentary behaviours and improving students' overall health (Janani S. S., 2024). In the family sphere, the FAME program yielded positive outcomes in reducing problematic screen use among children with clinical issues (Werner M., 2024). McArthur B. A. (2023) adds that healthy family routines and parental supervision are decisive factors in improving child mental health while also helping reduce screen exposure.

Parental behaviour also directly influences children’s digital habits. Jörren H. L. (2023) showed that parents with positive attitudes and low stress levels tend to have children with less screen time and better mental health. This suggests that effective intervention strategies must include parental support components. Additionally, Haile S. R. (2023) demonstrated that children and adolescents who follow international screen time guidelines have a higher health-related quality of life, reinforcing the importance of systematic and practical family guidance on the topic.

Excessive screen time—especially beyond two hours per day—is associated with increased symptoms of depression and anxiety, as indicated by Tang S. (2021). This underscores the need for public policies and school actions that promote adherence to WHO recommendations, focusing on prevention and well-being. School-based interventions, such as the one cited by Janani S. S. (2024), have shown direct impacts in reducing sedentary behaviour, proving that the school environment can be a powerful driver for healthy behaviour change among students.

Ultimately, when children and adolescents follow screen time guidelines—with moderate and supervised use—improvements are observed in both mental health and overall quality of life (Sarah R. Haile, 2023). This demonstrates that practical measures—such as setting limits, organising healthy routines, and promoting digital literacy—can have significant effects. A combination of institutional, family, and individual strategies is essential for building a more conscious and balanced use of technology among young people, aligning with WHO recommendations and contemporary studies on digital well-being.

Legacies of the Pandemic: Screen Time, Digital Routines, and Psychological Well-Being

Studies conducted during and after the COVID-19 pandemic indicate that the combination of excessive screen time and low physical activity was particularly harmful to the mental health of children and adolescents. Tandon et al. (2021) emphasised that this combination was the most detrimental in isolation contexts, highlighting the importance of healthy habits even during periods of restriction. Kurz et al. (2023) supported these findings by showing that children with consistent physical activity and family support experienced less mental health decline, even with increased screen use. These data reinforce the need to maintain balanced routines to mitigate the negative effects of prolonged digital use.

The way digital media is used also influences its impact on psychological well-being. In a systematic review, Marciano et al. (2022) observed that excessive use is related to emotional problems, especially when it lacks positive social interactions. Wu et al. (2024) pointed out that abrupt changes and uncontrolled use were factors that negatively affected well-being, suggesting that not only quantity, but also quality of screen use, is a key determinant. The same study revealed that for many adolescents, excessive use persisted as a form of emotional and social escape even after the end of isolation.

The pandemic accelerated the integration of screens into adolescents’ daily lives, making this relationship less reversible. Marckhoff et al. (2022) reported that many young people internalised screen use as part of their routine, contributing to sustained high levels of exposure. Wiguna et al. (2023), when comparing three distinct time periods (pre-, peak-, and post-pandemic), found that although screen time decreased after isolation, it remained higher than pre-pandemic levels. These findings indicate lasting changes in digital habits among youth, requiring interventions adapted to this new behavioural reality.

As for the direct effects of screen time, Li et al. (2021) found that greater exposure was associated with higher levels of depression, anxiety, and irritability in Canadian children and adolescents. Descarpentry et al. (2024) complemented these findings by reporting links between high screen time and both internalising behaviours (such as depression and withdrawal) and externalising behaviours (such as aggression). These behavioural manifestations indicate that excessive digital exposure can affect emotional regulation and hinder socialisation, with significant consequences for psychological development.

On the other hand, several studies identified protective factors. Camerini et al. (2022) highlighted that outdoor time (“green time”) had a protective effect against depressive and anxious symptoms, even in youth with high screen use. Cheung et al. (2022) showed that adolescents with greater family support and socioeconomic stability reported better quality of life, indicating the moderating role of environmental factors. These findings emphasise that adolescent mental health in the digital context does not depend solely on screen time but also on the presence of protective elements such as emotional support, physical activity, and contact with nature.

Differences in Effects Based on Device, Content, and Use Context

Recent studies indicate that excessive screen use is associated with poorer mental health indicators in children and adolescents, though the intensity of these effects varies depending on the device and the activity. Santos et al. (2023) found that smartphones were the most used devices among adolescents, and weekday use was linked to reduced well-being, especially among girls, who showed a higher risk of developing mental health conditions. Tang et al. (2021) noted that while the association between screen time and emotional symptoms may be modest, increasing exposure still contributes to the development of depressive symptoms, emphasising the need for continuous monitoring.

Paulich et al. (2021) reported that each additional hour of screen time was associated with a 12% increase in anxiety symptoms and a 9% increase in depressive symptoms. Adolescents with more than four hours of daily exposure were 2.5 times more likely to develop depression or anxiety compared to those who spent less than two hours connected. The study also linked watching television to internalising symptoms like anxiety and depression—especially when screen time exceeded two hours daily—and associated video games with inattention and hyperactivity in boys, and social media use with stress and low self-esteem in girls.

The type of screen activity directly influences its effects on mental health. Odgers & Jensen (2020) observed that watching TV is linked to increased emotional symptoms such as anxiety and stress. In contrast, moderate interactive use—such as gaming—can foster healthier peer relationships, although excessive use may lead to behavioural problems. Nagata et al. (2024) reinforced that excessive screen use is linked to emotional distress and reduced overall well-being, whereas moderate gaming use may have mixed effects, including cognitive benefits in some cases.

The content and context of screen use also play a fundamental role in its mental health impact. Oswald et al. (2020) identified that symptoms of anxiety and depression are more common when screen time involves social media and gaming, though the presence of social support and time spent outdoors can modulate these effects. Li et al. (2023) emphasised that different uses yield different outcomes: social media is associated with increased anxiety and depression, whereas educational use has a weaker association with negative outcomes. This underscores the importance of considering the purpose and intentionality behind screen use.

Finally, studies show that exceeding screen time guidelines—more than two hours per day—is associated with poorer mental health outcomes (Sampasa-Kanyinga et al., 2021). Brauer et al. (2021) highlight that while it's difficult to separate effects by device type, overall screen exposure time correlates with increased behavioural problems in children. These findings suggest that while screen time quantity is relevant, it must be interpreted alongside the type of use, family context, and compensatory habits—such as physical activity and emotional support—to fully assess the real risks of screen use in childhood and adolescence.

Screen Time Measurement Methodologies and Their Impact on Scientific Outcomes

Various studies have shown that the way screen time is measured directly affects findings regarding its impact on mental health. Barbosa (2023) highlighted that self-reports tend to overestimate screen time by up to 2 hours per day, compromising the accuracy of research results. Riehm et al. (2021) confirmed that self-reports only moderately correlate with objective data (r between 0.3 and 0.5), potentially distorting outcomes related to anxiety and depression. Huang et al. (2021) added that self-reports overestimate actual usage by approximately 30% and fail to capture time-of-day patterns, unlike automated methods. Therefore, combining objective measures with self-reports is essential to enhance the validity of conclusions.

Studies using digital monitoring achieved greater precision and revealed actual behavioural changes. Schmidt-Persson et al. (2024) found that family interventions limiting screen time to 3 hours per week led to significant reductions in internalising symptoms and increases in prosocial behaviours. Automated data collection was crucial for capturing these changes, something self-reports might have missed. The study also emphasised that memory and perception biases influence self-reporting, whereas objective data are less prone to these distortions. This reinforces the need for rigorous methodologies when assessing the impact of digital media.

The need for more detailed and specific measures is also addressed by Nagendrappa et al. (2024), who developed an adapted questionnaire to map app and social media usage patterns among young adults in India. This approach, combined with advanced statistical methods, aims to clarify how different measurement strategies affect the association between screen time and mental health indicators. Zhang et al. (2023) integrated neuroimaging and longitudinal modelling to identify causal pathways between screen use, sleep, and psychopathology. Their study showed that higher levels of externalising symptoms at age 10 predicted increased screen use and poorer sleep the following year, highlighting the bidirectional relationship between variables.

The impact of the pandemic has been widely documented as a factor that intensified the negative effects of recreational screen time. Liu (2023), analysing data from the National Survey of Children’s Health (2018–2021), observed a significant increase in both recreational screen use and psychological well-being issues (PWBIS) among children and adolescents aged 6 to 17. The study showed that the pandemic acted as an independent adverse factor, exacerbating the association between recreational screen time and mental health, with statistical significance (p < 0.01). The analysis stressed the importance of excluding instructional screen use to more clearly assess the effects of digital leisure.

Finally, longitudinal studies reveal that adolescent screen use patterns can have lasting effects. Pham et al. (2024) applied latent growth modelling to track use of TV, video games, and the internet between ages 11 and 17, linking these patterns to outcomes such as depression, suicidal ideation, and delinquency at age 20. Kelly et al. (2019) found that excessive use of social media—more than five hours daily—was associated with a higher prevalence of depressive symptoms, particularly in girls, mediated by body dissatisfaction, low self-esteem, and online harassment. Smith, Taylor & Johnson (2023) also noted that self-esteem can partially mediate the relationship between social media and mental health, although other factors may attenuate this association over time.

**4. Conclusion**

The reviewed scientific literature reveals a robust association between excessive social media use and the worsening of mental health indicators, particularly among adolescents and young adults. The main negative outcomes identified include increased symptoms of anxiety and depression, impaired sleep quality, impulsive behaviours, eating disorders, body dissatisfaction, and a heightened risk of suicidal ideation. Moreover, these effects are not solely determined by the amount of screen time, but also by the quality of content accessed, usage patterns, available social and family support, and physical activity levels. These elements act as mediators or moderators of the observed impacts.

Given this scenario, it is essential that medical education critically and consistently addresses the effects of digital technologies on mental health. Clinical, preventive, and educational approaches must integrate knowledge from neuroscience, public health, and behavioural sciences to adequately respond to the complexity of the phenomenon. Furthermore, intersectoral strategies involving digital education, screen time limitation, promotion of healthy habits, and the strengthening of emotional bonds are crucial to mitigating the harmful effects identified.

In summary, a broader understanding of psychological suffering in the digital age demands an ethical, multidisciplinary approach that is sensitive to contemporary sociocultural transformations.

**Disclaimer (Artificial intelligence)**

Option 1:

Author(s) hereby declare that NO generative AI technologies such as Large Language Models (ChatGPT, COPILOT, etc.) and text-to-image generators have been used during the writing or editing of this manuscript.

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Details of the AI usage are given below:

1.

2.

3.

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