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Review
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Screen Time, Sleep, and Social Isolation: A Triad of Emerging Public Health Risks

ABSTRACT

Digital devices have become a consistent part of life, and their utilization is increasing. Research has shown that the use of electronic devices has a variety of physical and mental effects, both positive and negative, and that several factors determine these effects (Small et al., 2020). These factors include who owns the devices, where the devices are kept, the type of device being used, the purpose for which the device is used, and, most relevant to this study, how long the devices are used, or screen time (Nakshine et al., 2022). In terms of physical effects, eye strain, neck, shoulder, and back pain seem to have a causal relationship with prolonged screen time according to the Journal of Education and Health Promotion (Devi & Singh, 2023), and extended screen time can affect your mental state by disrupting the circadian rhythm, a cycle that regulates sleep (Nakshine et al., 2022). This disruption of the circadian cycle can quickly lead to social isolation, confusion, depression, and other mental conditions and disorders. It is notable, however, that there have been some benefits to taking a restrained approach to using devices, as this prevents excessive screen time, the main cause of the previously stated effects, and can also provide a high level of mental stimulation, increasing focus and providing other positive mental effects (Small et al., 2020).

KEYWORDS: *Screen time, social isolation, technology, physical health, psychological health, sleep, social media*

INTRODUCTION

Since the introduction of digital devices, people have been taking advantage of online information and communication. Most adults use the internet daily, and nearly one out of four report being online most of the time (Small et al., 2020). With the introduction of new emerging data on the positive and negative effects of screen time, scientists are linking the extensive use of digital devices to physical, mental, and psychological symptoms. According to the National Institute of Health, “The excessive use of screens during the pandemic led to numerous consequences for children and adolescents, with a higher incidence of visual damage, sedentary lifestyle, inadequate eating habit and increased weight gain, in addition to impaired sleep quality and mental health” (Zablotsky, 2024). This global health risk skyrocketed in early 2020 due to COVID-19, prompting more screen time usage due to the quarantine mandated by the World Health Organization, resulting in lasting damage to individuals through social isolation and negative sleep patterns (Nakshine, 2022).

On the contrary, some research shows that limited screen time use can have positive impacts on brain health, especially for an older brain (Small et al., 2020). Scientists have observed that text reading on the internet can activate brain regions controlling language, reading memory, and visual abilities (Small et al., 2020).

This research was conducted through an analysis of multiple sources, as well as a survey conducted through Google Forms. For the literature review, 5 studies and their data were collected for further analysis. Researching and analyzing the direct consequences of the overconsumption of technology will assist health professionals in addressing the ever-growing health risk that this issue poses.

Below, how screen time negatively and positively impacts adolescents' and adults’ sleep habits and social structures through different methods of their

behaviors will be discussed and presented with data and statistics.

METHODOLOGY

This thematic review aims to shed light on both the positive and negative impacts of screen time on adolescents' health. Using keywords relating to the topic, an extensive search was conducted using Google Scholar and PubMed to select sources related to the effects of screen time. The keywords included: 'screen time', 'social isolation', 'technology', 'physical', 'mental',' psychological health', 'sleep', and 'social media'. In addition to the research articles observed, a survey was conducted asking participants about the impact that screen time has on them and about their demographics.

A Google Forms link with questions asking for participants' age, occupation, and their opinions on their screen time usage was sent through Dr. Rao and Ms. Wells to anyone they might know, and we sent it to our friends and family to complete. The questionnaire included questions about sleep, social isolation, screen time, disclosure, and other relevant demographics discussed later in this study. Collected data from the participants shows that not only did people become negatively impacted by screen time, but some, positively affected.

Figure 1: "Age?" The majority of the participants, 79.2 %, are between 16-25 (n=38), while 10.4 % (n=5) are 10-15, 4.2 % (n=2) are 56-65, 4.2 % (n=2) are 46-55, and 2.1% (n=1) are between 26-35.

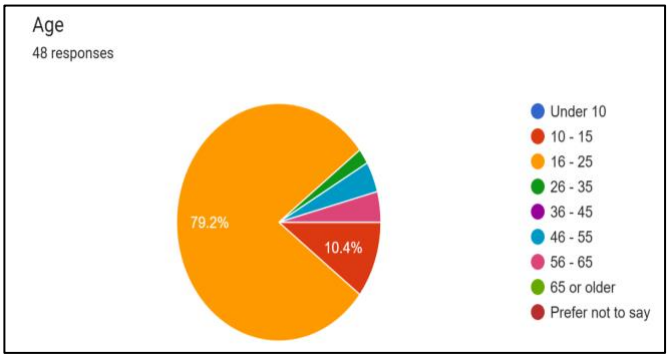
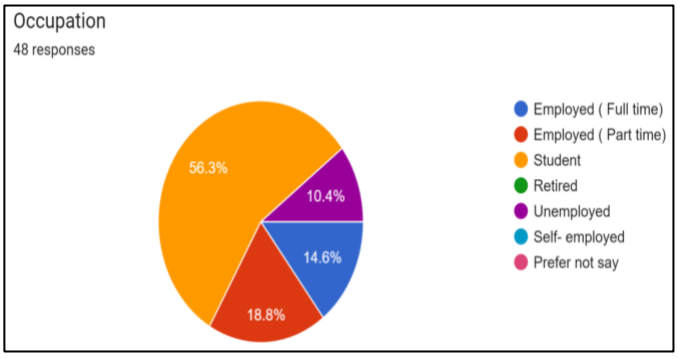


Figure 2: "Occupation?" The majority of the participants, 56.3 %, are students (n=27), while 18.8 % (n=9) are employed (part time), 14.6 % (n=7) are employed (full time), and 10.4 % (n=5) are unemployed.



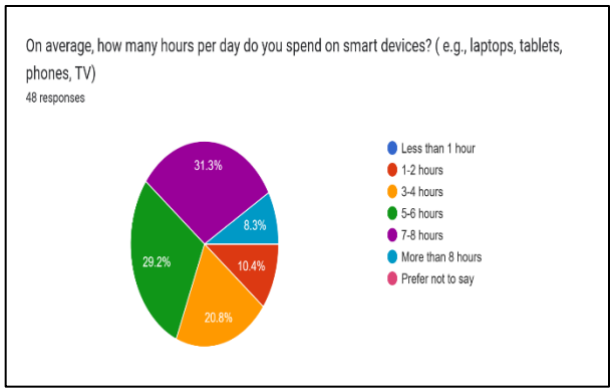
When selecting appropriate studies, we utilized a combination of papers that focused on an age range between 15-35, the incorporation of the physical and mental effects of screen time, and scientific studies that were written in English. The following exclusions were considered: studies requiring subscriptions to access and material that did not relate to or inform about the positive and negative effects of screen time.

The process of selecting studies involved a group of reviewers reading and determining the key takeaways from the abstracts. Each reviewer was responsible for choosing whether the following sources were eligible and relevant to the main topic. Relevant sources were deleted and replaced with credible sources.

The data was organized using a thematic narrative approach. Each source was reviewed collectively to identify the main takeaways related to screen time. Team members analyzed the selected research papers to identify common effects and key results on sleep, screen usage, and social isolation. Too much screen time impairs sleep quality, leading to social isolation and developing mental health issues such as anxiety, depression, and emotional stress. To back up our statements, we classified physical symptoms associated with excessive screen time, disturbances

in sleep patterns, effects on mental health, cognitive development, social isolation, and screen time's benefits. These thematic groupings broke down screen time into more detailed areas, helping us better understand how it affects all these factors.

Figure 3: "On average, how many hours per day do you spend on smart devices?" The majority of the participants, 31.3%, spend 7-8 hours on smart devices (n=15), while 29.2 % (n=14) spend 5-6 hours, 20.8 % (n=10) spend 3-4 hours, 10.4 % (n=5) spend 1-2 hours, an and 8.3% (n=4) spend more than 8 hours per day.



Several limitations arose during this narrative. There was a natural bias towards the adolescent population since researchers mainly focused on younger people. Another limitation was the small sample size from the survey, which had n=48. The data included five different articles and a survey used for this research. The selected articles represent current and recent information on screen time and its effects on sleep and social isolation.

RESULTS

The results from the Google Form yielded important information related to the effects on sleep, screen time, and social isolation on the participants involved in the study. Some key takeaways that were observed from the results of the survey included that the majority of screen time is primarily used for social media, the phone affects moods both negatively and positively, participants were sometimes well-rested when woken up, and the majority felt that the phone did not replace in-person interaction. The survey consisted of 12 questions and 48 participants (n=48).

Thematic Review

The big question: What are the positive and negative effects of screentime?

The extracted data were organized into thematic domains, including physical symptoms associated with excessive screen time, interference with sleep patterns, effects on mental health, cognitive development, social isolation, and positive effects from screen time. The evidence provided for the physical symptoms of screen time among individuals explored the physical effects of technology on the human body, such as posture, health, and physical activity. This, in turn, plays a role in sleep patterns because of the physical toll it takes on the body. The 2nd domain discusses how technology hinders good sleep habits through uncontrolled use of electronics. Sources discuss examples such as a disrupted circadian rhythm and less than normal hours of sleep that are results of this overconsumption of screentime. Contrary to the other thematic domains, evidence for connections to mental health mention that there are positive effects along with negative effects on the mind of adolescents dealing with this health risk. Cognitive development is specifically targeted through the overuse of screen time because it prohibits correct functioning and language skills in children. The evidence for this topic relates to a study showing how brain development is at risk through uncontrolled technology. Excessive screen time also causes social isolation, as proven in a University of California study, shedding light on the growing health risk that electronics poses. Finally, the last domain switches from negative effects to positive, discussing the productive results of screen time through cognitive scans and a google survey form. Both the positive and negative effects are covered in these divided thematic topics, specifically

highlighting surveys and studies that best support the claim that technology is directly associated with productive and counterproductive outcomes involving screen time, sleep, and social isolation.

Physical Symptoms

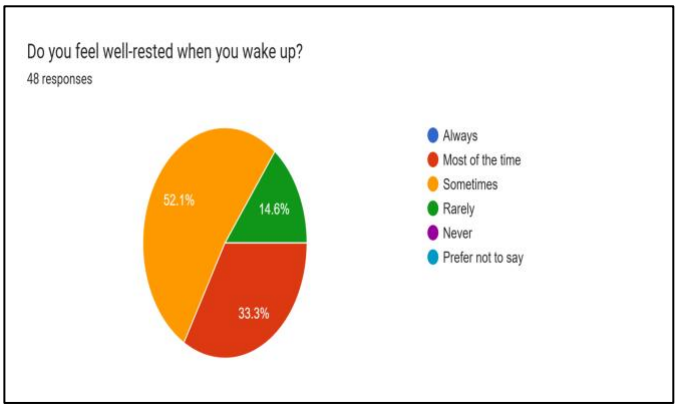
Screen time is related to the range of physical symptoms. As stated in "The hazards of excessive screen time: Impacts on physical health, mental health, and overall well-being", continuous use of devices can result in bad posture, which can cause neck and shoulder pain, as well as eye fatigue (Devi & Singh, 2023). These discomforts lower the ability to do physical or social activities, making a repeated pattern that encourages inactivity and social isolation. Even more than just posture related physical strain, and in these articles "Increased Screen Time as a Cause of Declining Physical, Psychological Health, and Sleep Patterns: A Literary Review" (Nakshine et al., 2022) they emphasize how screen exposure from phones, computers, and televisions has taken away the time that could have been spent on doing other healthy activities, including physical exercise, doing things outside, or interaction with others.

SLEEP

A particularly alarming consequence of screen overuse is its interference with sleep. The blue light emitted by screens is known to suppress melatonin production, which disrupts the body's circadian rhythm and leads to sleep disturbances (Maria, 2023). Many individuals keep phones or laptops near their beds, and even brief notifications can interrupt sleep cycles. Poor sleep quality is associated with brain changes, such as reduced functional connectivity and decreased grey-matter volume, as well as an increased risk for age-associated cognitive impairment and Alzheimer's disease (Small et al., 2020). The collected data from the survey that was conducted supports these concerns related to sleep. According to the data that was analyzed, 50% of the participants from Figure 7 reported getting 7-8 hours of sleep, while the other 50% were under 7-8 hours,

Figure 4: "On average, how many hours of sleep do you get per night?" Half of the participants, 50% (n=24), get 7-8 hours, 41.7% (n=20) get 5-6 hours, 4.2% (n=2) get 3-4 hours, 2.1% (n=1) get more than 7-8 hours, and 2.1% (n=1) prefer not to say.

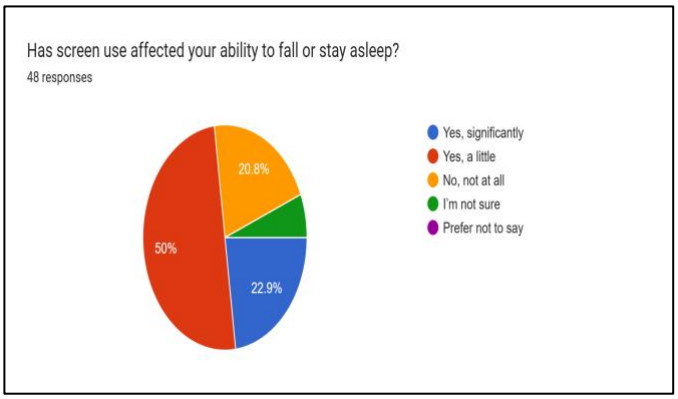
Figure 5: "Do you feel well-rested when you wake up?" The majority of the participants, 52.1 %, answered (n=25), while 33.3 % (n=16) are well-rested most of the time, and 14.6 % (n=7) are rarely well-rested.



which is below the recommended amount of sleep. In Figure 8, when the participants were asked if they felt well rested, more than 50% said "sometimes", 33.3% said "most of the time", and only a handful of participants selected "rarely". Lastly, in Figure 9, participants were asked whether screen time affected the ability to sleep. Out of the 48 participants, 50% said "yes, a little", 22.9% said "yes, significantly", and more than three-quarters have been affected

negatively. These observations highlight the cycle that a lack of sleep can cause.

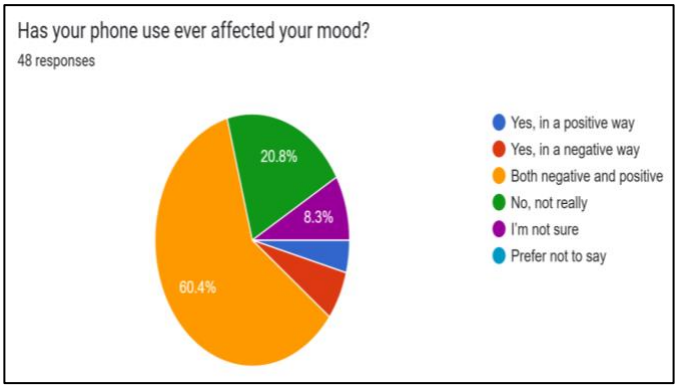
Figure 6: "Has screen use affected your ability to fall or stay asleep?" Half of the participants, 50% (n=24), chose yes, a little, 22.9% (n=11) said yes, significantly, 20.8% (n=10) said no, not at all, and 6.3% (n=3) chose I'm not sure.



MENTAL HEALTH

Mental health impacts are especially pronounced in adolescents. "The associations between screen time and mental health in adolescents: a systematic review" (Maria, 2023), which reviewed over 50 studies, confirmed strong links between screen time and adolescent mental health issues. This effect was intensified during the COVID-19 pandemic due to increased remote schooling and recreational screen use. Khumukcham Devi and her colleagues study elaborates on the psychological toll of screen time, connecting it to mood disorders such as anxiety and depression.

Figure 7: "Has your phone use ever affected your mood?" The majority of the participants, 60.4% (n=29), claimed that they are both negatively and positively affected, while 20.8 % (n=10) are not affected, 8.3 % (n=4) chose I'm not sure, 4.2% (n=3) were affected negatively and 4.2 % (n=2) were affected positively



These conditions can isolate individuals from their peers, interfering with typical patterns of social engagement and emotional development (Devi & Singh, 2023).

According to the data correlated to Figure 6, 60.4 % of participants said that phone use has affected them both negatively and positively, and 6.2% reported that it negatively affected them. This shows that frequent screen time can drastically impact people's moods and cause emotional distress to themselves.

COGNITIVE DEVELOPMENT

Cognitive development is another area negatively influenced by screen use. Children exposed to even a few hours of daily screen time show poorer executive functioning and language skills. For children under one year old, screen exposure has been linked to delayed language development and weaker brain connectivity in areas responsible for cognitive control. The study "Daily Screen Time Among Teenagers: United States" (Zablotsky, 2024), during the latter Covid-19 pandemic years of 2021-23, notes screen time peaks between ages 8 and 14, a critical period for brain development and

identity formation. Children in this age group may spend up to nine hours daily on screens, reducing opportunities for real-life social interaction and the development of interpersonal skills.

SOCIAL ISOLATION

In addition to passive screen consumption, certain screen-based activities, such as video gaming, can further contribute to social isolation. Many children use screens primarily for gaming, which, when excessive, can lead to emotional desensitization and reduced ability to interpret social cues. A University of California study cited in "Brain health consequences of digital technology" (Small et al., 2020) found that children with limited screen exposure performed significantly better at recognizing nonverbal emotional and social cues. Excessive screen use is also associated with internet addiction, which further distances individuals from in-person social networks.

In conclusion, screen time exerts widespread influence over various dimensions of health, most notably sleep and social interaction. The evidence shows that excessive screen exposure disrupts natural sleep patterns, undermines mental and physical well-being, and stifles crucial social development in adolescents. While some benefits may be possible with limited use, the research overwhelmingly supports the need for more mindful screen habits, especially during developmental years. Supporting these claims, Figure 10 shows the survey that was conducted asked participants if they often felt isolated from others. Out of the 48 participants, 39.6% sometimes felt isolated, 27.1% felt rarely isolated, 14.6% often felt isolated, and 18.8% felt never isolated. This shows that screen time can cause people to feel isolated at times.

Figure 8: "How often do you feel isolated from others?" The majority of the participants, 39.6% (n=19 selected 19, while 27.1 % (n=13) selected rarely, and 14.6 % (n=7) chose often.

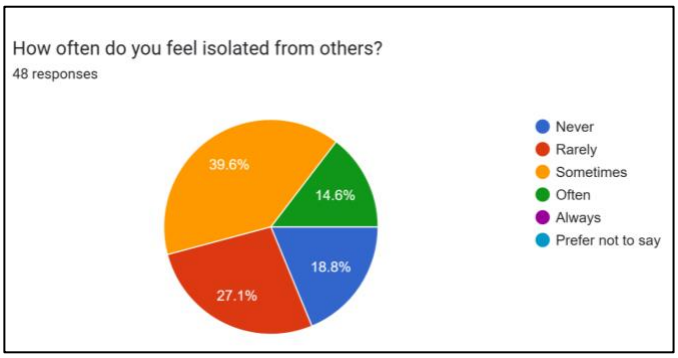


Figure 9: "Do you feel your phone or screen use has replaced in-person interaction?" The majority of the participants, 56.3 %, selected no(n=27), while 31.3 % (n=15) chose sometimes, 10.4% (n=5) selected yes, and 2.1 % (n=1) are not sure.

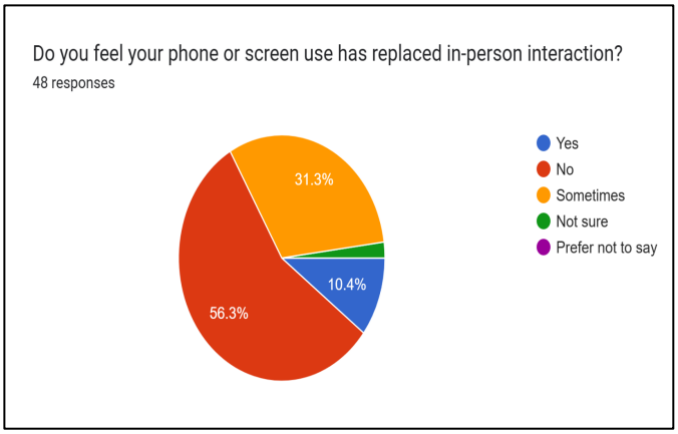
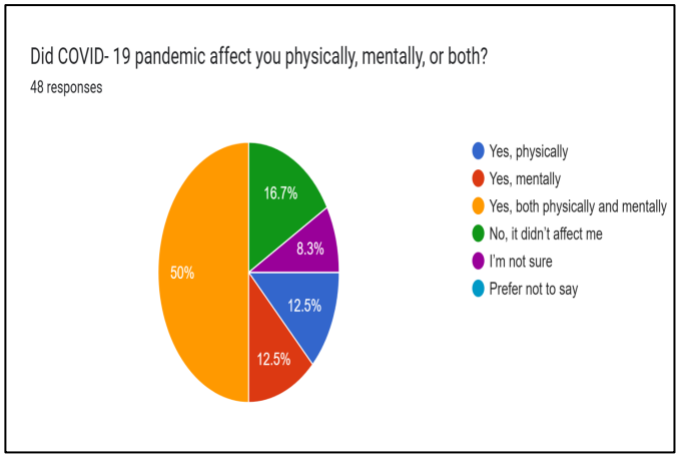


Figure 10: "Did the COVID-19 pandemic affect you physically, mentally, or both?" Half of the participants, 50% (n=24), said yes, both mentally and physically. The other half consisted of 16.7% (n=8) selected no, it did not affect them, 8.3% (n=4) chose I'm not sure, 12.5% (n=6) selected yes, physically, and 12.5% (n=6) said yes, mentally.

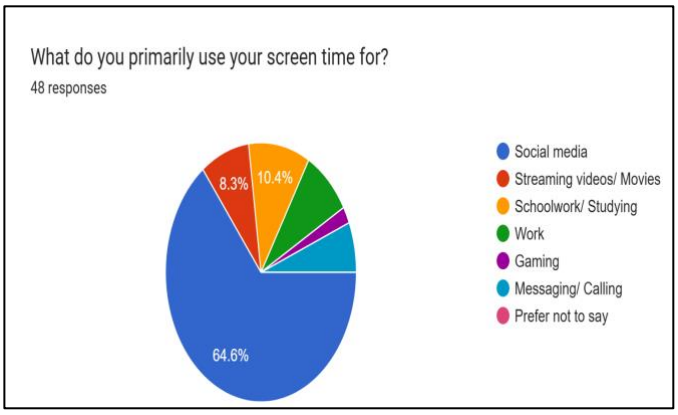


COUNTERARGUMENT

Though there are consequences, some studies are said not to be harmful. Small's MRI scan study shows that when screen use is kept within recommended guidelines, it may even support positive psychosocial outcomes. These effects include a high potential in multitasking skills, memory ability, and visual attention (Small, 2023). In 2020, cognitive scans were carried out by a team of researchers on older adults who were new to technology to explore how certain internet searches and computer programs can positively affect their minds. In this study, it was found that particular video games and text reading helped trigger brain development and exercise, leading to positive brain function in older generations (Small, 2023). These findings indicate that rather than eliminating screens, purposeful usage is key to maintaining proper sleep cycles, physical, and physiological health.

A Google form sent out to teens and adults by our team found data that supports the positive effects that screen time has on sleep and social relations.

Figure 11: "What do you primarily use your screen time for?" The majority of the participants, 64.6%, use it for social media (n=31), while 8.3 % (n=4), stream videos and movies, 10.4 % (n=5) study and do schoolwork, 8.3% (n=4) work, 2.1% (n=1) game, and 6.3% message or call.



Two questions that were asked directly relate to how screen time affects sleep and social isolation.

Question 1: Has it affected your ability to fall asleep? 20.8% answered no, not at all, and 50% answered yes, a little.

Question 2: How often do you feel isolated from others? 39.6% answered sometimes, 27.1% answered rarely, 18.8% answered never." Figure 4 showcases that the majority of our participants felt that even though technology was being used, it did not affect their sleep time and feelings of social interaction at all, or at least as much as the public would think.

DISCUSSION

Research shows that excessive screen time leads to a domino effect on health, which leads to potential social isolation. This domino effect starts with a lack of sleep and leads to physical and mental health decline, which leads to people being socially isolated as they are dealing with their health issues (Small, 2022). Mental health issues such as anxiety, depression, and other mood disorders, in particular, have been observed (Devi, 2023). Physically,

prolonged use often places people in unnatural, hunched positions, leading to neck, shoulder, and back pain (Devi, 2023). These physical and psychological effects are especially concerning given their impact on sleep, both in duration and quality. The issue isn't just the amount of time spent on devices; blue light emitted from screens disrupts the body's circadian rhythm, tricking it into thinking it's still daytime and preventing restful sleep (Small, 2022). This sleep disruption only worsens other health problems, as the body is unable to properly recover (Peter, 2019 via Small, 2023). For example, health issues such as insomnia can be introduced to the human body due to sleep deprivation.

These negative outcomes span across ethnic groups (Zablotsky, 2024) and age groups, but adolescents are particularly vulnerable (Maria, 2023). Screen addiction, beginning in early childhood and continuing into adulthood, reinforces long-term exposure. Teens, in particular, face the dual challenge of managing physical health issues and navigating social development. As these health issues intensify, many individuals, especially youth, withdraw socially, either due to lack of energy, fear of judgment, or simply a preference for staying home with screens. The desire to socialize weakens, creating a feedback loop of isolation.

That said, screen time is not inherently harmful. When used with intention and moderation, it can offer benefits, such as cognitive stimulation, enhanced memory (Small, 2023), and even social connection in times of crisis, such as during a pandemic. However, these benefits do not outweigh the risks when screen use becomes excessive and unregulated.

It is unrealistic to suggest avoiding screens altogether, but setting boundaries around usage, such as limiting time spent, choosing appropriate content, and reducing exposure before bed, can significantly reduce harmful effects. This is especially critical for adolescents, who are at a pivotal stage for both physical growth and social development. Importantly, many of the negative effects aren't caused by screens themselves but by how often they are used. Blue light exposure disrupts biological rhythms (Small, 2023), while poor posture and excessive use contribute to physical and mental strain (Devi, 2023).

CONCLUSION

Prolonged exposure to screen time has been shown to cause a wide range of negative health effects. Whether from small devices like smartphones or larger ones like televisions, excessive screen use triggers a chain reaction that affects both physical and mental health, often by limiting sleep, and often resulting in social isolation.

By addressing screen exposure by improving screen habits, promoting breaks, and encouraging in-person social interaction, the harms of screen time can be minimized, and the benefits it gives can be preserved.

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