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Shaping of the Next Generation: The Influence of Smart Devices and Screen Time on the Youth

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ABSTRACT

In 2023, U.S. Surgeon General Dr. Vivek Murthy released an advisory stating that youth mental health is an urgent public health issue. Teenagers today face many issues regarding mental health, including increased stress, emotional instability, anxiety, and more. The current generation is the first to have never known the world pre-Internet; the increased accessibility to smart devices and online social media led to the early and constant influence of social standards and mass media on the youth. It is now seen that the excessive use of smart devices and social media has led to a generation that is reliant on such stimuli; stimuli that, unfortunately, degrade their mental health. The effects of excess screen time have been well-documented. This paper provides a critical assessment of various research in this area that highlights the generation-defining impact of screens; it covers the new concept of Digital Emotional Regulation, the impact of screens on childhood development, as well as the resulting mental and physical deficits. From its ability to take over a mind to its pervasive nature in early development, the screen is an exceptionally problematic tool as its endless possibilities to help come with endless possibilities to harm.

Introduction

Currently, smart device use by adolescents and teens is higher than ever, though, this should not be shocking as this technology is practically necessary to survive in developed countries worldwide. However, this phenomenon has been blown out of proportion, with tweens spending about 5.5 hours and teens spending about 8.5 hours per day on screens on average, as shown in Figure 1 (Rideout et al., 2022). Teens not only use their screens as a primary source of interaction but also as a primary source of information; news, trends, fads, and social movements all have far-reaching impacts because of the new digital age.

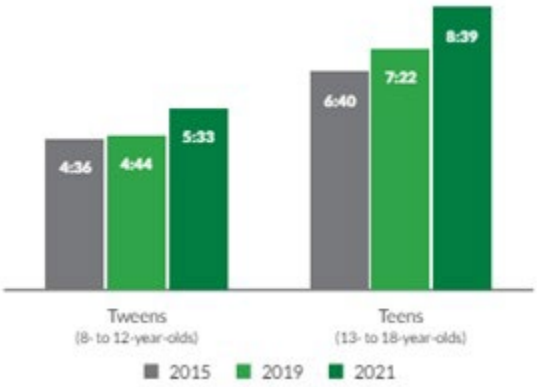

Figure 1. Total Daily Entertainment Screen Use Among Tweens and Tweens, 2015 to 2021.

Note. This graph shows the high teen screen time in 2021 and demonstrates how the 2-year growth between 2019 and 2021 was greater than the 4-year growth between 2015 and 2019. The measured 'entertainment screen use' includes time spent watching TV, online videos, playing video games, using social media, browsing websites, e-reading, and other digital activities. From "Common Sense Census: Media Use by Tweens and Teens, 2021" by V. Rideout et al, 2022, p. 3 (https://www.commonsensemedia.org/sites/default/files/research/report/8-18-census-integrated-report-final-web_0.pdf). Copyright 2022 by Common Sense Media.

It is also important to point out the variety of screen time between demographics, as illustrated in Figure 2 and Figure 3; for children ages 0 to 8, those in lower-income households tend to spend significantly more time on screens daily. Similarly, for tweens and teenagers (ages 8 to 12 and 13 to 18 respectively), those in middle and lower-income households spent more time on screens daily on average. Additionally, race/ethnicity also played a role, as Black or Hispanic/Latino youth had a higher average screen time than White youth. Parents, especially those ages 0 to 8, have quite positive views about their child's screen use, as they consider it educational, however, screens are volatile in their ability to take over the mind, with young children being especially susceptible.

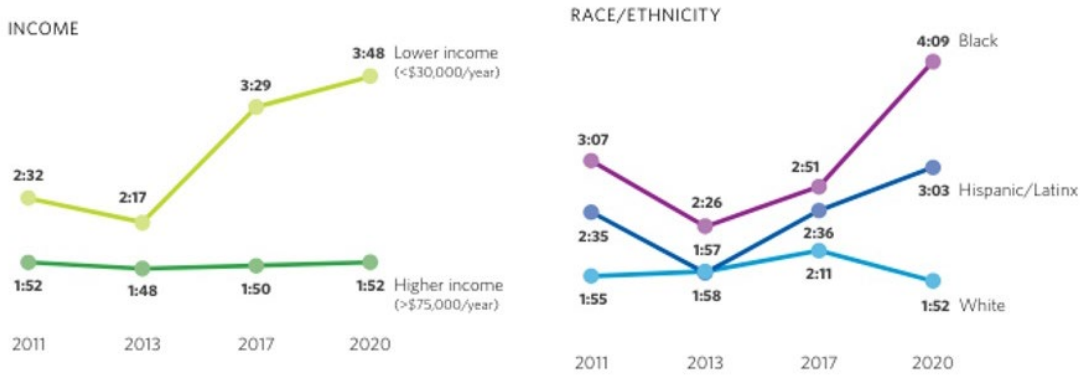

Figure 2. Average Daily Screen Media Use Among 0- to 8-year-olds by Demographic, 2011 to 2020.
Note. Adapted from "Common Sense Census: Media Use by Kids Age Zero to Eight, 2020" by V. Rideout et al, 2020, p. 5 (https://www.commonsensemedia.org/sites/default/files/research/report/2020_zero_to_eight_census_final_web.pdf). Copyright 2020 by Common Sense Media.

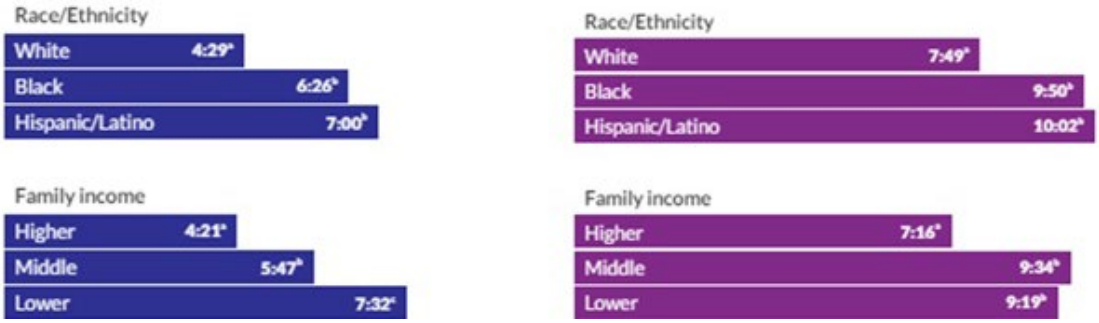

Figure 3. Average Daily Entertainment Screen Use Among 8- to 12-year-olds (left) and 13- to 18-year-olds (right) by Demographic, 2021.
Note. The income categories were classified as follows: the lower income is less than $35,000 annually, the middle is $35,000-$99,999 annually, and the higher is greater than $100,000 annually. Adapted from "Common Sense Census: Media Use by Tweens and Teens, 2021" by V. Rideout et al, 2022, p. 6 (https://www.commonsensemedia.org/sites/default/files/research/report/8-18-census-integrated-report-final-web_0.pdf). Copyright 2022 by Common Sense Media.

Digital Emotional Regulation

Emotional regulation (ER) is the ability to actively control one's emotional state. ER is a critical component of maintaining mental stability and reduces the impact of negative emotions and/or situations. How a student feels plays a major role in the way a student thinks. Emotions can promote learning by holding attention and deepening encoding, however, they can also hinder learning by blocking these processes in the face of threat. Developmental studies find that ER improves with age: in neuroimaging studies, ER abilities are associated with a set of prefrontal brain regions that mature late in development (Martin & Ochsner, 2016). Nowadays, in a world so reliant on digital technology, digital technology is used to influence our affective states (such as mood, stress, emotions, etc.) in a process called digital emotional regulation (DER) (Verma et al., 2024). Especially since the COVID-19 pandemic, many youths have gotten used to having an online life in addition to their real life. Online social media was the outlet to quench the lack of social interaction, which propagated the reliance on technology. Whether it's scrolling for distraction or posting about our day on our Instagram Story, "social media has become the emotional toolbox" (Verma et al., 2024).

There are possible positive benefits to DER: DER can help people manage challenging emotions and cope with stress, whether it's listening to music to shift one's mood, using social media for a "mental reset", or seeking support through online platforms (Verma et al., 2024; Wadley et al., 2020). Beyond individual well-being, understanding DER can enhance the design and implementation of technology. For instance, insights into how people use technology for DER can inform the development of tools specifically aimed at promoting emotional well-being such as mood-tracking apps and digital tools designed to support specific ER strategies (Verma et al., 2024; Wadley et al., 2020).

Childhood Development

According to Common Sense Media (2020), about 97% of children aged 0 to 8 have access to smartphones at home; additionally, children 8 or younger engage in approximately two and a half hours of screen time per day (with children from lower-income backgrounds having higher usage) on average (Rideout & Robb, 2020). As shown in Figure 4, most of this time is spent watching online videos or TV. This is greater use than advised, as the American Academy of Pediatrics recommends that parents/guardians limit digital media use for children 2 to 5 to no more than 1 hour per day (Hill et al., 2016). Preschool is a critical time in development when children are building and mastering their emotion regulation skills and there are longitudinal links between preschool emotional competence and later social competence (Housman, 2017). A child's process of working through the fear of menial obstacles grows into an ability for emotional regulation later in life. Prolonged screen time from a young age may inhibit a child's ability to master their emotion regulation strategies, and, as a result, may experience dysregulation which, in turn, may lead to hypervigilance, withdrawal, depression, and anxiety (Perez, 2023). Nowadays, all too often we see children who are acting out simply get a screen put in front of them by their parents to temporarily plug up their feelings rather than allowing them to naturally regulate their emotions. Research indicates a correlation between increased screen time and poorer social skills in children. This negative impact is often attributed to the phenomenon known as social displacement, which suggests that time spent on screens replaces time dedicated to more developmentally beneficial activities; for example, excessive screen time can limit opportunities for face-to-face interactions, which are critical for practicing social skills, understanding social rules, and learning appropriate behaviors (Hall & Liu, 2022; Perez, 2023). Children who miss these crucial interactions may experience difficulties acquiring and refining necessary social skills for healthy social development.

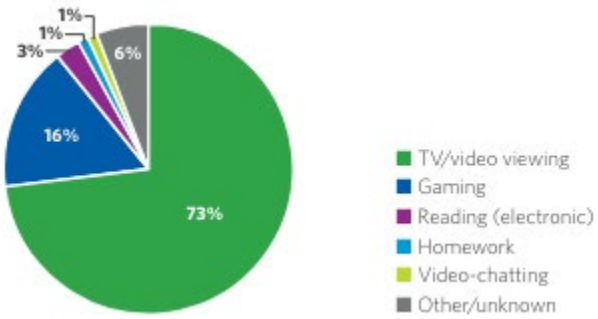

Figure 4. Screen Use Among 0- to 8-year-olds by Activity, 2020.
Note. This pie graph from the Common Sense Census (2020) illustrates how nearly 75% of screen use by children ages 0 to 8 is spent on TV/video viewing, with only 11% allocated to possible 'productive' activities. From "Common Sense Census: Media Use by Kids Age Zero to Eight, 2020" by V. Rideout et al, 2020, p. 3 (https://www.commonsensemedia.org/sites/default/files/research/report/2020_zero_to_eight_census_final_web.pdf). Copyright 2020 by Common Sense Media.

While some studies associate increased screen time with negative emotional regulation outcomes, there doesn't seem to be conclusive evidence to support a direct causal relationship between excess screen time and poor emotional regulation in children. Factors like parental mediation and the type of content consumed can influence the impact of screen time on emotional development. For example, a study was done by Rasmussen et al (2018) that compared children (ages 3-4) who interacted with educational television (*Daniel Tiger's Neighborhood*) and its corresponding app. They found that children who had both interacted with the app and watched episodes of the television program employed emotional regulation strategies taught by the media more frequently one month later than children in a control condition; preschoolers also exhibited higher levels of emotional knowledge (Rasmussen et al., 2019). Perez (2023) highlights a significant effect of excess screen time is its potential to hinder the quality of children's pretend play (also termed fantasy play, dramatic play, or imaginative play), a crucial activity for developing emotional regulation and social skills. Children exposed to excessive screen time tend to engage in more imitative pretend play than novel pretend play; instead of exploring their own ideas and emotions, their play becomes restricted to replicating scenes and characters from the media they consume (Fletcher & Nielsen, 2012). This lack of novel pretend play can be detrimental to the development of emotional regulation and social skills because children miss out on opportunities to process emotions, understand social cues, and develop coping mechanisms through imaginative play (Perez, 2023). It is important to consider factors beyond the mere quantity of screen time; the quality of content, parental mediation, and engagement in other beneficial activities like pretend play are crucial aspects that moderate the impact of screen time on a child's development.

Mental Health

Studies show a direct correlation between increased digital media use with higher rates of depression and suicidal thoughts among adolescents. A comprehensive analysis by George et al (2023) indicates that adolescents who engage with screens for over three hours daily are 34% more likely to exhibit depressive symptoms. Online social media platforms also contribute to increased anxiety in young people; adolescents who frequently check platforms like Instagram or Snapchat (over 20 times a day) have a higher risk of developing acute anxiety disorders compared to those who use these platforms less often (George et al., 2023). The constant exposure to notifications and messaging fosters a state of hypervigilance, keeping the nervous system in a heightened state of alert, which can be detrimental to mental health. In addition to general anxiety and depression, screen usage of greater than 1 hour per day was associated with lower psychological well-being, including less curiosity, lower self-control, more distractibility, more difficulty

making friends, less emotional stability, being more difficult to take care of, and an inability to finish tasks (Twenge & Campbell, 2018). The more an individual uses the Internet without experiencing a sense of fulfillment or satisfaction, the higher the feeling of frustration and loneliness (Besschetnova et al., 2021). Furthermore, the idealized lives presented on online social media can lead to feelings of inadequacy and depression, especially among teenage girls, as they internalize unrealistic beauty standards (George et al., 2023).

A study was done surveying students at an engineering college where 84.9% agreed that they have become lazy because of online social media/mass media (Patawat & Balamurugan, 2018). However, even if the youth is aware of the dangers, it's still difficult to stop themselves. The paper by George et al (2023) breaks down how beyond social media, excessive screen time, in general, can increase impulsivity and the risk of addiction in young people, similar to substance addiction. This can lead to compulsive use of social media, Internet pornography, and online gaming, activating neural responses in the brain that reinforce these behaviors despite negative consequences similar to drug rewards. This can create a vicious cycle of negative impacts on mental health and well-being. Notably, some neuroimaging studies suggest a possible link between excessive screen time and changes in brain structure, including reduced gray matter volume and suppressed functional connectivity in areas of the brain responsible for empathy, goal-setting, and risk assessment; however, more research is needed to confirm these findings (George et al., 2023).

The Fear of Missing Out

The Fear of Missing Out (FoMO) is a concept especially rampant in today's youth due to the prevalence of online social media; FoMO can be defined as the pervasive apprehension that others might be having rewarding experiences from which one is absent and is characterized by the desire to stay continually connected with what others are doing (Przybylski et al., 2013). FoMO can be understood from the self-determination theory perspective, a macro-theory of human motivation, through the psychological need for connectedness being a factor in effective self-regulation and psychological well-being (Fabris et al., 2020; Ryan & Deci, 2000). Since social media applications provide virtually unlimited possibilities for getting information and making connections, they may increase the possibility for people to feel as if they will 'miss out' on events that might be psychologically or practically relevant to them, which itself increases FoMO (Wegmann et al., 2017). Additionally, it seems that adolescents with higher levels of FoMO tend to make greater use of online social media to compensate for their psychological needs as well as possibly having an increase in emotional symptoms because of the heightened feeling that they are missing out on important shared experiences or that they do not belong (Fabris et al., 2020). These factors lead into a 'trap' of sorts: social media increases the prevalence of FoMO and increased FoMO leads to greater use of social media; it's quite the unforgiving cycle.

FoMO can lead to increased sensitivity to stress, where indicators of popularity— such as likes, comments, and followers— hold significant weight for teenagers; the fear of not receiving these indicators of acceptance, or of receiving negative reactions instead, can be a highly stressful experience for adolescents, leading to a decline in their perceived emotional well-being (Fabris et al., 2020). Accounts of FoMO showcase how excessive online social media use derived from the fear of missing out may be linked to general unhappiness, partly because it "undermines the sense that one has made the best decisions in life" (Przybylski et al., 2013). More research needs to be done on how exactly FoMO affects or translates to emotional states and symptoms.

Hindrance to Social Skills

Screens' potential to hinder social skills reaches beyond social displacement during childhood as described earlier. Teens glued to their screens spend less time engaging in face-to-face interactions with family and friends, which can lead to weaker social skills and feelings of isolation; for example, studies show that there has been a substantial drop in family-centered activities, such as having meals together or talking because children and teens are spending that

time on screens (George et al., 2023). While young people may communicate with their peers more through texting and online social media, those types of communication lack the nuance of in-person interactions, such as body language and tone of voice, that are critical for building strong and intimate bonds. Furthermore, spending less time interacting with people in the real world makes adolescents feel more awkward and uncomfortable during face-to-face interactions. They struggle to make eye contact and have difficulty interpreting and responding to subtle social cues, such as facial expressions, tone of voice, and body language (George et al., 2023).

Physical Deficits

Excessive screen use can negatively impact the physical health of teenagers in various ways. A "National Health and Nutrition Examination Survey in the U.S. showed that boys 6–19 yr of age accumulate 6.0–7.9 h of daily sedentary behavior (with the oldest children being the most sedentary); girls are slightly more sedentary accumulating 6.1–8.1 h daily (again with the oldest being the most sedentary)" (LeBlanc et al., 2017). During this crucial developmental stage, extended sedentary time brought about by excessive technology use limits physical activity, leading to several physical ailments. One major concern is the rise of obesity, where prolonged periods spent watching TV, playing video games, and using smartphones have been shown to raise the risk for unhealthy weight gain in youth populations (Besschetnova et al., 2021; George et al., 2023). It has also been shown that adolescents who spent more than 2 hours of recreational screen time daily had a much higher risk of being overweight or obese compared to those who spent fewer than 2 hours daily (George et al., 2023).

Excessive sitting with improper posture while using devices increases the risk of spinal abnormalities, hip disorders, and weak bones, especially during growth spurts; specifically, conditions like scoliosis, kyphosis, limited hip mobility, and tendonitis in thumbs and fingers are linked to heavy technology use (George et al., 2023). Another area of concern is vision impairment, as continuous exposure to high-energy visible blue light from screens strains developing eyes. This can lead to myopia, dry eye, headaches, blurry vision, and computer vision syndrome (George et al., 2023).

One of the most glaring physical deficits of excessive screen use is the effect on sleep. About 75% of adolescents sleep for less than 8 hours on a regular school night; adolescents who engaged in excessive screen use were 1.34 times more likely to have insufficient sleep when compared to those who did not engage in excessive screen use (Baiden et al., 2019). Sufficient sleep is critical to physical and mental well-being. Insufficient sleep has been shown to have various adverse impacts on health, including poor diet, obesity, substance use, mental health outcomes such as depression and anxiety, and suicidal behaviors; it has also been found to lead to a lack of concentration in class and poor academic performance (Baiden et al., 2019). The blue light exposure mentioned previously also has an impact as exposure in the evening disrupts circadian rhythms and impairs sleep quality and duration (George et al., 2023).

The combination of sedentary behavior, sleep loss, and heightened anxiety or depression associated with excessive screen use results in metabolic dysfunction; this chronic stress activates pathways that increase the risk of chronic diseases later in life (George et al., 2023).

Conclusion

The ubiquity of smart devices has impaired the youth. Suppose an individual who could walk decides to start using a wheelchair; they would slowly decondition their ability to walk to the point where (after a considerable period) they would have trouble walking by themselves. In this way, smart devices have deconditioned us to think for ourselves. Through awareness and limitations, we can conquer our devices instead of letting them rule us. Technology has the high potential to be an effective tool to assist in education and development; however, it's necessary to not let it interfere with natural interactions and growth. Excess screen use has a considerable adverse impact on the mental and physical health of youth, from general anxiety and FoMO to depression and suicidal thoughts; however, though these

effects are known, it is still a challenge to restrain oneself. Possibly more research can be done on the impact of the screen from a neuroscience perspective that could give us greater insight into how to mitigate the issue of screen addiction.

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