The Digital Generation and its Consequences:

An Interdisciplinary Perspective of the Technological Impact on Childhood Development

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Abstract

The topic of my paper is to investigate the impact and potential harm of the prevalence of devices, such as smartphones and tablets, in a modern child's life. This was done by asking questions such as how technology impacts a child's well-being, the health impact of using devices, and how technology influences a child's educational growth. Answers were reached through the research, analysis, and synthesis of academic studies employing the interdisciplinary research method. Generally speaking, modern devices appeared to negatively impact mental well-being and overall health but showed promise in improving educational outcomes. This work helps guide how we should view and approach digital technology's role in a child's life and development going forward. Though the subject matter is a recent phenomenon further study could provide additional insight and understand more long-term effects.

Keywords: *Modern Devices, Digital Generation, Child Development, Screen Time, Eye Strain, Socioemotional Well-being, Emotional Dependence, Visual Hygiene, Sleep Duration, Early Childhood Education, Technology Integrated Learning*

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The first Apple iPhone was released in the summer of 2007. Ever since that first release, smartphones, tablets, improved laptops, and other modern devices have become deeply intertwined into our daily lives, especially for those born around or after. It has changed how we communicate, how we learn, how we consume entertainment media, how we shop, and practically every element of our lives. Eric Schmidt, the former CEO of Google, once remarked, "the internet is the first thing that humanity has built that humanity doesn't understand, the largest experiment in anarchy that we have ever had." A child born on the day of the first iPhone release is currently in the midst of their high school career and looking forward to their seventeenth birthday. This means there is an entire generation of children born around or after the landmark release of the first generation iPhone, that only knows or only remembers a life as part of the largest experiment in anarchy ever. We are just starting to grasp the impact and harm this anarchy of the digital world has had on the development of children. While modern devices and technology can be a positive resource, without moderation they are a hurdle for a child's developmental progress into becoming a well-rounded and healthy individual, by harming their psychological, educational, and physical health.

Raising a well adapted child is not a simple task, nor is understanding the impact of technology on said task, which is why approaching the topic is best done through an interdisciplinary approach. The interdisciplinary approach is a method involving the combination

of numerous academic disciplines to gain a richer perspective of a subject. In this case, the interdisciplinary method is necessary because there is no one lens to view a child as healthy and progressing as a human. We cannot simply explore trends of screen time and a child's physical fitness and declare them as healthy or not. Physical health is not the only way to define what is good health. Mental, emotional, and intellectual health are also crucial elements of being healthy. Without employing an interdisciplinary approach, any attempts to find the potential harm caused by technological exposure in a child's development would be lacking in depth.

Psychology often takes a particular interest in childhood experiences as they help build and shape our emotional, behavioral, and cognitive responses to stimuli going forward. Today, the first exposure to modern devices often occurs at a very young age for a child. For infant and toddler-aged children a parent's use of modern devices as a pacifying technique can reinforce and encourage negative emotional regulatory behavior, as was the focus of the work of Coyne et al. (2021). The research team believed that the use of a device to control emotional outbursts, will create a dependence on said device, and only lead to additional emotional outbursts once the device is no longer made available. A similar study on children who were of early school age was conducted in Japan and also examined emotional symptoms related to devices. This study also considered other behavioral issues such as problems interacting with other children and considered the amount of time spent on a device (Hosokawa & Katsura, 2018). A common theme among these two works was that screen time was linked to negative behavior in some measure. They also recognized that other significant factors need to be considered. However, they differed in the other factors that they felt were noteworthy. The Coyne et al. article noted that biological factors could in part determine a child's temperament, while Hosokawa and Katsura highlighted the grander socio-economic status of the family of the child as a possible influence. A third piece

of research focuses on nine-year-old children in two cohorts born a decade apart and takes a comparative approach. While the previous two articles focused on early childhood Bohnert and Gracia (2020, p. 630) felt the middle stages of childhood were important because "this is a lifecourse stage in which children increasingly start to develop genuine and independent media and technology styles." The crux of the research is that the younger generation would report lesser socioemotional well-being when compared to the older generation due to the increasing role of technology in a child's daily life. They also looked at different psychological factors that the other two studies did not such as depression, negative self-image, and social isolation. This research concluded that gender and socioeconomic status had an insignificant impact, which differs from the concerns of the other research I covered (Bohnert & Gracia, 2020, p. 644). A common notion found throughout all of the pieces was that the quality of digital technology use was a factor in the repercussions of digital device use in children.

The medical/health discipline was perhaps the one that offered to most diversified research. The field of medicine itself is the combination of the work of many disciplinary focuses such as biology, physiology, biochemistry, etc. Various academic sources examined the medical health impact of modern device use in the context of eye health, sleep patterns, and physical fitness. On the topic of eye health, Skoblina et al. (2020) found that most schoolchildren use a digital device daily for multiple hours a day and that most schoolchildren reported using them in dim environments with few breaks. They also found the children to be aware of the recommended practices to protect eye health but were willing to ignore the risks. Another study looked at the correlation between sleep duration and screen time among preschoolers. Lan et al. (2020, p. 50) found a strong correlation between longer device usage, less sleep time, and more "social jetlag." Another study examined screen time's relationship with a variety of health factors

such as obesity, activity levels, as well as eye strain, in Japanese schoolchildren. Less time spent looking at a screen was linked to lower obesity rates, fewer eye problems, and greater physical activity (Mineshita et al., 2021, p. 7). Something in common with these studies was the acknowledgment that many of the device-related medical impacts were rather indirectly caused by the devices.

The education discipline examines how the use of modern devices influences behavior and achievement in the classroom. It explores trends in the use of devices and learning ability, as well as the integration of said devices in school environments. This disciplinary perspective offered the best defense against adolescent exposure to modern devices. Multiple studies provided evidence that, when done carefully, the integration of technology into the classroom was beneficial in both academic achievement and improved classroom behavior. For example, Eutsler et al. (2020, p. 1747) found "Achievement within literacy domains demonstrates a fairly consistent pattern, where approximately half of studies indicate gains in literacy domains, meanwhile the other half reported either mixed results or no gains" concerning technology-integrated teaching methodology. The improved behavior can be collaborated from Ghavifekr & Rosdy (2015, p.188) which concluded that devices "improve classroom management as students are well-behaved and more focused. Moreover, this study proved that students learn more effectively with the use of ICT as lesson designed are more engaging and interesting." The previously discussed Mineshita et al. (2021) article linked the general use of devices to contribute to poorer classroom results. They argue that the availability of devices outside the classroom encourages behavior that is a distraction and takes away from the time to complete homework assignments and study.

I feel that it is worth noting that the phenomena of widespread modern devices in society and children's use of said devices are rather recent developments in the grand scheme of human existence. This sentiment was expressed by many of my research authors regardless of their respective disciplines as well. As time continues and further research can be done perhaps it shall grant us further insights into the topic, but as of now, the current perspectives are as follows.

As a whole the psychological perspective of the matter is that the introduction of modern devices into a young child's life can promote negative behavior at earlier ages and inflict a worsening mental state as the child ages especially when device use is not closely monitored.

The Coyne et al. research project included two major parts. The first is survey responses from participating families to garner a baseline understanding of the sample toddlers' average temperament and relationship to technology. The second experimental part involved the toddlers being presented with a cartoon clip that would suddenly shut off, while research assistants recorded the child's response over the following two minutes (Coyne et al., 2021, pp. 4–5). Their study concluded that the use of digital devices and digital media as an emotional control tool with linked to more problematic emotional responses. Their data also suggests that "difficult infants may develop an emotional dependence on media to regulate their emotions both in times of distress, and to avoid unpleasant emotions altogether through distraction" (Coyne et al., 2021, p. 6). To support this the toddlers who were more regularly given a device to calm down were often the ones who reacted the strongest once the media device was no longer present.

A Japanese-based study helps us understand the relationship between technology and children as they advance past the toddler stage through a parent/guardian-reported questionnaire from families of thousands of five and six-year-olds. Questions covered topics such as the child's time spent on devices, activity done on the device, general typical behaviors, parental

involvement, as well as other demographic questions (Hosokawa & Katsura, 2018, pp. 4–5). The duo found that frequent use of mobile devices, outside of educational purposes, was linked to externalized problems such as social isolation and behavioral misconduct such as hyperactivity. Ultimately they concluded that "the developmental effects of mobile device use is likely to depend on the amount of time spent and the content viewed by children" while also recognizing that "media technology can also be beneficial to child development, for instance, by enhancing cognitive skills…" (Hosokawa & Katsura, 2018, p. 11).

A study in Ireland compared the growing trends of technologies by comparing survey results between two generations. The first group was born between 1997-1998 and surveyed in 2007-2008. The second group was born between 2007-2008 and surveyed in 2017-2018. This means that both groups would have been around nine years of age when their experiences were considered. This allowed the researchers to compare the well-being of children growing up before widespread digital devices and the well-being of those growing up during and after it (Bohnert & Gracia, 2020, p. 631). The first insight from this was that screen time has increased and changed between the generations. Screen time for the older generation typically came in the form of watching TV, but for the younger generation TV was largely replaced by mobile devices, but overall screen time increased for the younger generation. The data also showed that high daily levels of screen time "to be associated with significant declines in child socioemotional well-being. The size of such effects was about twice as large for the 2008 cohort, compared to the 1998 cohort" (Bohnert & Gracia, 2020, p. 652). So, while rampant screen time, regardless of its form, is harmful screentime in the form of modern devices appears to be increasingly harmful to psychological well-being.

The general consensus from the medical/health perspective is that the high amount of time spent using modern devices by children combined with poor habits while using said devices, can contribute to adverse health outcomes. The main concerns were with ocular health, sleep disturbance, and general inactivity.

The first study concerning eye health by Skoblina et al. (2020) largely focused on how well school-age children knew and followed medically recommended practices to fend off eye strain associated with screen time. They found that "an awareness of the basics of a healthy lifestyle and the hygienic principles of vision protection was shown by more than 50% of schoolchildren" (Skoblina et al., 2020, p. 63). Despite recognizing the risks, the schoolchildren were still willing to ignore the recommended practices of using devices in well-lit environments and frequent breaks, out of desire to stay connected to their devices.

Mineshita et al. (2021) also looked at eye health as well as obesity, activity levels, and learning abilities in relation to screen time, the last of which will be discussed later. Data was based on questionnaire responses conducted in elementary school classes. They examined the data in terms of how much screen time occurred and when the devices were being used. In terms of duration, they found that "children with shorter ST durations were more likely to have normal body weight, higher physical activity" (Mineshita et al., 2021, p. 7). They also found late-night screen time to be more damaging to overall health with higher levels of obesity, eye irritation, and more sleep deprivation in the children who admitted to using devices near their bedtimes (Mineshita et al., 2021, p. 8).

The Lan et al. (2020) article provided additional research on the relationship between screen time and sleep duration, albeit with a slightly younger preschool-aged sample. To do so they combined questionnaire responses and tracking of sleep duration per child. The results

showed that 40% of the children did reach adequate levels of sleep (Lan et al., 2020, p. 50). More screen time resulted in less time spent sleeping and in the children experiencing more social jetlag. When compared to stationary TVs or computers Lan et al. (2020, p. 51) noted that portable electronic devices, such as phones or tablets, were more impactful on sleep health potentially due to them being "often held closer to the face, light exposure may be exaggerated potentially leading to a more potent suppression of melatonin."

The education discipline explores how devices impact a child's ability to learn and academic progress. This is done by examining the result of in-classroom integration of digital devices to present instructional materials, student engagement with device-integrated teaching, as well as other impacts to influence academic results.

Eutsler et al. (2020) examined the results of mobile technology-integrated educational materials focused on improving literacy achievement. They compiled data from other studies conducted between 2007 and 2019, thus providing insight into the change in results as technology seeped further into the classroom. The research considered different elements of literacy including vocabulary, reading comprehension, writing, etc. (Eutsler et al., 2020, p. 1746). How the devices were used was also considered. Studies showed positive results in the areas of phonics, vocabulary, and comprehension especially when the devices provide visual and auditory engagement for the child. Other datasets provided mixed results leading Eusteler and al. (p. 1761) to conclude that their research "demonstrates the importance of using mobile apps to ensure alignment between the app characteristics and the learning goals (e.g., literacy domain). Furthermore, multiple interventions and/or apps may need to be implemented to improve students' literacy over time." So, it shows that technology can be a boost in the classroom if approached in the right way but could be for waste if implemented poorly.

Similarly, (Ghavifekr & Rosdy, 2015) ran a survey with Indian public school teachers to get their experience with using technology and devices as a teaching tool. Largely, the teachers reflect that their lessons were more engaging for the students which resulted in better classroom management (Ghavifekr & Rosdy, 2015, p. 182). They also noted that the technology allowed students to explore and research topics on their own. Additionally, teachers felt that the devices in the classroom "allow students to be more creative and imaginative.." which "enables them to think out of the box and make the best use of their learning process" (Ghavifekr & Rosdy, 2015, p. 187).

Some of the previously discussed articles also provided some insight in terms of the education discipline that is worth considering. For example, Mineshita et al. (2021, p. 8) found that increased screen time "can influence individual behavioral styles that impinge on academic understanding and performance and contribute to poor grades" by being a distraction away from studying and completing homework. Furthermore, the studies linking screen time to poor sleep also linked poor sleep to worse academic performance. This was agreed upon by both Mineshita et al. (2021) and Lan et al. (2020). So, while devices could improve the classroom, the generalized use of modern devices by children could set them up for failure before entering the classroom.

While all these disciplines offer a unique perspective on their own, it is once we step back and take them all in together that their insight truly shines through. Taking this step back allows us to see the spider web of connections between all the insights. This interdisciplinary view is what allows a deeper understanding of the consequences of mobile device usage on children. The harms identified from one discipline can be tied into those highlighted by a separate discipline. Introducing a mobile device into the life of a toddler can promote negative emotional response

behaviors that they carry into the latter stages of childhood and perhaps even into adulthood. Screen time was also disruptive to a young child's ability to get the necessary amount of sleep. The lack of sleep can also contribute to emotional volatility. Combined insufficient sleep and poor emotional coping skills can lead to problematic behavior once the child enters preschool and elementary. This could help explain why higher screen time leads to poorer academic grades. Getting into trouble and struggling in the classroom, as well as the lack of sleep, can then be a contributing factor to the fall in mental well-being seen in the Ireland cohort study. Stress can inhibit good sleep and compound into poor physical health, which can just cause even more stress. The children are feeling stressed and fall back onto the coping mechanism they were taught at an early age, which is the use of modern devices. This just drops a child right back into this spiderwebbing cycle of consequences.

Coyne et al. (2021, p. 6) proposed that "difficult infants may develop an emotional dependence on media to regulate their emotions both in times of distress, and to avoid unpleasant emotions altogether through distraction." One word of this statement particularly stood out, which was the use of the word 'dependence'. This word is often heard within the context of alcohol or other substance addiction. These harsh words of 'dependence' and 'addiction' are unfortunately very appropriate to the relationship of technology with the lives of children today. The use of modern devices can be so prevalent for children that they neglect other critical areas of their lives such as education and overall physical health. It is not even a subconscious problem in most cases. Skoblina et al. (2020) showed us that school-aged children were well aware of the visual damage that extended screen time could cause as well as the habits to minimize the damage, such as taking breaks, but were simply willing to just accept this harm if it meant more

time spent using modern devices. The addictive appeal of modern devices outweighs the pain caused.

This is the rather bleak reality faced by the children of today, and of the future if changes are not made. It is not like we can just halt all use of the devices by children. Pandora's box has been opened, and the experiment in anarchy that Eric Schmidt alluded to is ceaseless. This does not mean that we should fear technology, but instead to keep progressing to make it better, as is human nature. While this paper has largely focused on the harm done, we must consider the positives as well. Never in human history has a child had such immediate access to the vast depths of human knowledge or been able to connect with family and friends no matter the miles between them. Not all impacts of the device use were negative for children. For example, the educational studies showed that device usage with purpose can boost academic achievement. Additionally, the sleep and behavioral impacts were most strongly associated with prolonged use of modern devices. This suggests there is a middle ground for device usage with minimal harm done, and that modern devices can have a positive influence as well.

Looking at all these insights leads to some recommendations for raising the digital generation in such a technology-dominated world. The first recommendation would be to avoid using devices as an emotional outburst suppressant during the toddler stage so that healthy coping mechanisms can be developed instead. As the child reaches around pre-k age, I believe this is when we should instill the importance of digital device safety such as taking breaks to allow the eyes to rest. This is around the age where we teach other important safety lessons, such as looking both ways before crossing a street, which carry over well into adulthood. Parents and guardians will take a more active role in the quantity as well as the quality of modern devices used by children. Screen time can be managed with time limits, a feature included already in

many modern devices, but if a child is going to be using such devices, then the activities should be engaging and promote cognitive and problem-solving skills, instead of just throwing on a cartoon to make the child complacent. I think that greater importance is placed on creative and physically enriching activities, which devices could be a tool to facilitate. This could be finding videos demonstrating more artistic projects for the child, or videos encouraging children to follow along in a dance or other physical activity. By further implementing these practices and continuing to study the impact of device use on children, we can promote a positive relationship with technology in the lives of children going forward.

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