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An Insight Into Determining Impact Of Excessive Screen Time On Children's Speech Delay

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ABSTRACT
In modern age, excessive screen time (EST) among children has turn out to be a growing concern, with studies suggesting a link to speech delay. This review seeks to inspect the correlation between EST and speech delay in children. It begins by analyzing prevalence and contributing factors of EST among children and then examined the potential mechanisms by which EST may affect speech development, including decreased social interaction, decreased language exposure, and delayed auditory processing. In addition, various studies in the literature investigated the relationship between EST and speech delay in children. These studies have produced contradictory results, with some indicating a significant correlation between two variables and others finding none. Precincts of previous research, such as small sample sizes, inconsistent measurement of screen time and speech development, and failure to account for confounding variables were also discussed. This article emphasized the growing concern over EST among children and its potential impact on language development. It highlighted the need for additional research to better understand this relationship and devise effective strategies to minimize adverse effects of EST on speech development. Because studies in this area are observational, it is impossible to establish a cause-and-effect relationship between EST and delayed speech development. Therefore, more research is required to fathom connection between prolonged exposure to electronic screens and speech delay in infants and young children.

KEYWORDS: Electronic gadgets; Screens; Language development; Social interactions.

1. INTRODUCTION

1.1 Explanation of excessive screen time and speech delay

Screen time is the time spent using electronic devices like smartphones, laptops, TVs, and video game consoles. This phenomenon and its association with mental health, as well as other related concepts in digital media utilisation, are the subject of extensive research. Children's physical and mental health may be negatively affected by EST, according to research (Stiglic and Viner, 2019). The positive and negative impacts of EST depend on duration and type of exposure (Table 1) (Wu et al., 2017)

Some governments have imposed restrictions on electronic devices to limit detrimental screen time. The protracted screen time has

unconstructive effect on children's overall development, particularly in first three years, which is a crucial time for language development because it is the most intense time for developing speech and language skills (Cusick and Georgieff, 2016).

Table 1: Factors contributing to children's excessive screen time

S. No	Factors	Description
1	Parental behavior	Parental screen usage, screen time limits, and monitoring
2	Accessibility	Availability and access to displays
3	Screen content	Type of material and suitability for the child's age group
4	Peer influence	Friendship and peer influence on screen time

1.2 Impact of EST on children wellbeing

Expert groups recommended limiting children's screen time despite this increasing concern about potential impact of screens on children's wellbeing. In 2016, American Academy of Pediatrics recommended restraining screen time for children between 2 to 5 years, to 01 hour a day and that parents monitor screen time for children of age 6 and older (Reid et al., 2016).

In 2017, Canadian Pediatric Society put the same recommendations (Canadian Pediatric Society, 2016). The relationship between screen time and language development may be influenced by several factors, including the level of household communication, genetic factors, and gender. Interactions with parents facilitate the early development of language, as they offer the child the tools necessary to acquire the structures and features of language (Karani et al., 2022). Studies examining the effects of media exposure in a language other than the child's native dialect have revealed that children are 14.7 times more likely to experience language delays as a result of such exposure. This is due to differences in language and grammatical structure, which can be perplexing for the child and limit parental guidance (Perdana et al., 2017; Chong et al., 2021).

1.3 Children's screen exposure duration and limits

American Academy of Pediatrics recommended restraining screen time for children between 2 to 5 years, to 01 hour a day. According to Indonesian Pediatric Association, 5% to 8% of preschoolers have speech and language impairments. Given that the majority of language development in children occurs before the age of 5, with the most significant growth occurring in initial two years, it is indispensable to remain current on the relationship between language delay in toddlers and its exacerbating risk factor, namely EST, in order to predict the prognosis of language development in children (Maulana and Gunardi, 2020).

1.4 Interactions of parents with their children

There is a correlation between time parents expend daily interacting and conversing with their children and the likelihood of language delays, according to research. Children amid language delays spent an average of seven hours per day with their carers, of which only 3.6 hours were spent conversing, whereas children with normal language development spent an average of 9.3 hours per day, of which 5.8 hours were

spent conversing (Chonchaiya and Pruksananonda, 2008).

In addition, children who watched TV only were 8.5% more probable to develop language delays, as parents engage in fewer conversations and interactions with their children when the television is on. Observational studies conducted in Japan have revealed that when television is on, parents tend to speak in shorter, one-word sentences which disrupt verbal interactions with parents and complete sentence expressions (Christakis et al., 2009).

During a child's formative years, parental attention is crucial, and it is concerning that parents are frequently too preoccupied to interact with their children. Consequently, children may use displays to occupy their time, which negatively impacts their language skills (Fatima and Akram, 2021).

The pervasiveness of visual media across all age, cultural, and socioeconomic groups has prompted concerns about influence of technological advancements on children's well-being, given their constant and rapid expansion. Cross-sectional studies have dominated this field's research, and experimental and randomised studies are scarce, making it difficult to draw causal inferences. However, the prevalent approach to children's screen media use has been to impose time limits, and evidence suggests that a more nuanced perspective is required. The age of the child appears to have a significant effect on the significance of screen media usage, particularly during topical COVID-19 pandemic, that rendered a shift in educational and social functioning from physical to digital world, thereby making screen quality increasingly important (Puzio et al., 2022).

2.1 Problem statement

Infants having EST like screening television, playing video games, using internet, gadgets, and computers, are more likely to develop speech delays than children in the control group who spend little or no time in front of screens. The mobile phone is the most prevalent device associated with EST. In 2014, 38% of infants under the age of two were reported to have used a mobile phone, a significant increase from 10% in 2012, and this trend continues to rise (Barr and Lerner, 2014). Therefore, children screen time is increasing annually, resulting in speech delays and other developmental issues

2.2 Scope and limitations

This article is purposed to examine influence of EST on speech delay in children, particularly in infants who have been exposed to screens since birth. We aimed to determine the significance of the liaison between screen time and speech delay, as well as the extent to which screen time should be limited for optimal speech development. It contrasts the language acquisition and speech development of children who spend more time interacting with electronic devices than with their parents or other carers. However, this study concentrates solely on screen time as a contributor to speech development delays in children under the age of four. This study does not account for other factors that may hinder speech development, such as heredity, environment, personal learning disposition, IQ, nutritional deficiencies, etc.

2.3 Justification and benefits

Prior to executing this study, adverse impact of EST on speech development received little attention. This omission has placed children in a challenging learning environment, and connection amid screen time and children's learning has not been extensively studied. It is crucial to comprehend the scientific evidence supporting this assertion. Newborn's brain has one-third size to an adult's, but it contains twice as many brain cells, with 200 billion brain cells and 10,000 new connections being produced every second. However, repeated exposure to electronic media has negative effect on the

language and infants' cognitive development (Sousa, 2015).

There are numerous misconceptions among the general public regarding whether screen time is beneficial or detrimental to the overall development of young children, making it imperative to provide accurate information. Therefore, we investigated pros and cons of screen time and to inform parents and the general public about essence of curtailing their children's screen time in order to promote speech development.

3. LITERATURE REVIEW

3.1 Influence of screen time in suppressing speech development in children

Studies revealed EST among both children and adults, leading to numerous investigations into potential impact of this exposure on cognitive development. Data were analyzed using thematic content analysis, and the review identified twelve papers that highlighted the multifactorial relationship between screen time and language development. The findings revealed that the impact of screen time on language development is contingent on various factors and that there are both positive and negative influences associated with this interaction. Parental supervision and engagement during viewing were found to be crucial factors in language development. Additionally, quality, content, and co-viewing of videos also had an impact on language development. Overall, the review suggested that ill effects of EST appear to outweigh its positive impacts (Karani et al., 2022).

Table 2: Possible links between excessive screen time and speech delay

S. No	Mechanism	Description
1	Reduced social engagement	Few social interaction and communication opportunities
2	Reduced exposure to language	Reduced exposure to spoken language and conversations
3	Delay in the processing of sound	Decreased ability to comprehend and differentiate sounds

This study aimed to collect current evidence on the associations between various forms of screen media use and developmental outcomes, as well as to provide an overview of the potential benefits that emerging technologies may offer pediatric population (Table 3). Ultimately, the question remains: since it is impossible to eliminate all screen time, how can we maximize its use for the greatest benefit of children? (Puzio et al., 2022).

Table 3: Review of literature on Influence of EST on children's speech delay and hindrance in their development

S. No	Author & Year	Impact

1	Akkus et al., 2018	The regulations for receiving special education and therapy are frequently a source of anxiety for parents; thus, the system should be modernized and special education support should be based on individual needs of each child.
2	Boeing et al., 2019	The interviewed parents recognized that their smartphone use diminished the interactivity of time spent with their children.
3	Chonchaiya and Pruksananonda, 2008	For each hour of television viewing, youngsters were exposed to between 500 and 1,000 fewer words. Significant reductions in child vocalizations, duration, and conversational turns were also shown to be connected with increased television viewing time.
4	Chong et al., 2021	There was no significant link ($P > 0.05$) between children's and parental screen time, speech and other DQs. The association between parent and kid screen time allows for potential intervention, if necessary. More research is required to investigate this association
5	Fatima and Akram, 2021	Young male children continued to spend more time in front of a screen than young female children, although the expressive use of technology decreased.
6	French et al., 2012	EST imparts laziness and children become sluggish. They prefer sedentary behavior and are not hardworking.
7	John et al., 2021	The majority of preschoolers exceed the prescribed limits for screen usage, and inconsistent parental supervision was seen in almost half of participants. Unsupervised screen use was considered to be connected with cognitive impairments in children.
8	Karani et al., 2022	EST bears negative impacts on language development, while an older age of onset has some positive effects. This research suggested that the detrimental effects of screen usage appear superimposed on good effects.
9	Martin et al., 2017	Babies who spend more time with handheld screens are at an elevated risk for expressive speech delay.
10	Maulana and Gunardi, 2020	Maximum language development can be attained by providing more opportunities for two-way conversation besides screen gazing.
11	Puzio et al., 2022	We wanted to collect current information on correlation between varied screen media use and developmental outcomes, as well as present an overview of the possible benefits that new technologies may offer to the pediatric population.
12	Rocha et al., 2021	In Ceará, Brazil, young children under the age of 5 were highly exposed to EST, which was independently related to lower development outcomes.
13	Stiglic et al., 2019	There is evidence that increased screen usage is linked to a number of health risks and depression symptoms. There is a

		dearth of evidence to inform policy around children's screen time exposure.
14	Sousa, 2015	Repetitive exposure to electronic media can affect the language and cognitive behavior of children.
15	Susilowati et al., 2021	The most popular digital media were smart phones (91.6%), TV (86.1%), and laptops (61%). Impact of EST was understood by their parents, but it was difficult to abide their children, particularly while they were homeschooling.
16	Vrinda et al., 2021	Excessive screen usage has negative consequences on children's cognitive development and decreased attention span.

3.2 Investigation of sociodemographic characteristics of children with speech delay

The EST for smartphones, TVs, laptops, and video games, has been linked to speech delay. A study conducted between July and November 2019 at Kuantan Hospital, Malaysia, leveled relationship between screen usage and speech delay, as well as other developmental abnormalities, was investigated in children with speech delays. The study of 91 children with an average age of 39.9 11.52 months revealed that average daily screen time for children was 2.26 1.98 hours, with 36.3% exceeding 2 hours. No significant association was found, however, between children's and parents' screen time and speech and other developmental quotients (DQs). The correlation between child and parental screen time was moderate. In addition, the number of screen media types was significantly correlated with children's age (Chong et al., 2021).

In another study, the demographic characteristics and profiles of first 100 preschool kids with speech delay evaluated at a children's hospital in Turkey were analyzed. Four out of five infants exceeded the recommended television viewing time, and nearly one-third of children experienced a poor language environment at home, according to research. The study also highlighted the obstacles parents face in gaining access to government-funded special education, with some parents refusing to disclose their child's diagnosis. The study revealed that 31 out of 100 children required additional diagnostic testing and early intervention, highlighting the significance of not underestimating speech delay and revising the special education system to better meet the needs of each individual child (Akkus et al., 2018).

3.3 Parental neglect, screen use and expressive language delay in early childhood

A research examined a potential association among parental neglect, screen use, and expressive language delay in children. 150 mothers of small children aged between 1.12 and 4.12 years who visited speech pathology rehabilitation centers in Islamabad were surveyed for the study. Data was collected using three questionnaires: the Parental Acceptance-Rejection/Control Questionnaire Short Form, Language Use Inventory, and Child Technology Test. Due to the COVID-19 pandemic, fifty percent of the sample was collected online, while the remaining fifty percent was collected via direct interaction after the lockdown was partially alleviated. There is a significant correlation between parental neglect and screen usage, but there is no correlation between parental neglect and expressive language delay in early childhood, according to the study's findings. In addition, the study revealed that young boys had more EST than young girls, and that expressive language delay was prevailing among nuclear families (Fatima et al., 2021).

3.4 Cognitive adverse effects of screen and speech delay

EST among preschoolers has been linked to negative cognitive outcomes and communication delay. A study was performed with parents of 2–5-year-old infants attending two kindergartens in Thiruvalla in order to assess the risks associated with EST and parental supervision. Using the Werner David Development Pictorial Scale (WDDPS), parents reported their children's screen time and cognitive development. With an average of 2.14 hours per day, 89.4% of the 189 children exceeded the recommended screen time limit (>1 hour per day). In addition, 45 percent of parents reported inconsistent monitoring of screen time. EST was substantially associated with mealtime screen use, receiving screens on demand, and using devices other than computers. This study emphasizes the importance of parental supervision of their children's screen time, as unsupervised screen use is associated with cognitive impairments in preschoolers (John et al., 2021).

3.5 Relationship between EST and child scores on communication

A correlation between EST and developmental was investigated in a population-based cross-sectional survey selected 0–60-month-old children residing in the Brazilian state of Ceará using cluster sampling. The mothers reported their children's screen time in accordance with World Health Organisation (WHO) recommendations for EST. Brazilian Ages and Stages Questionnaire was used to assess child development, and generalised linear regression and spline analysis were employed to investigate the relationship between screen exposure and developmental outcomes. Sixty-nine percent of the 3,155 children evaluated had excessive screen exposure, according to the findings. This percentage increased from 41.7% to 85.2% as children aged from 0 to 12 months to 49 to 60 months, from 0 to 12 months to 49 to 60 months. In addition, each additional hour of screen time was associated with reduced performance in the communication, problem-solving, and personal-social domains. Young children in Ceará, Brazil, under the age of 5 were substantially exposed to EST, that was associated independently (Rocha et al., 2020).

3.6 COVID-19 restrictions and their impact on speech delay

This study sought to assess the impact and duration of utilizing digital media among preschoolers in urban areas of Indonesia during the COVID-19 pandemic, when government mandated that all preschoolers between the ages of 2 and 6 study at home. Using a validated questionnaire, data were collected from 951 parents or custodians (aged 17 to 70 years) of preschool-aged children. The findings revealed that preschoolers have been using screen media since they were infants, and that their daily screen time exceeds one hour. Smartphones (91.6%), television (86.1%), and laptops (61%) were the most popular digital media devices. It was difficult for parents to limit their children's electronic time, especially during homeschooling, despite their understanding of the necessity. Consequently, alternative strategies for learning at home are required, particularly to reduce screen time among preschoolers (Susilowati et al., 2021).

3.7 Screen time awareness survey

This study sought to determine the level of awareness among parents of infants regarding the detrimental effects of EST on language and communication development. A questionnaire was developed to assess toddler parents' awareness of screen time, and 200 Malayalam-speaking parents of young children participated in the study. The screen time awareness survey was disseminated via Google forms to parents. 88.5% of participants were aware of the negative effects of EST, with ocular problems being the

most frequently reported effect and speech delay being the least frequently reported effect. In addition, 67% of the participants believed that viewing television could assist children in learning to speak, while 84% believed that EST causes attention problems. Although 93.8% of participants agreed that screen time should be limited, 56.0% were unaware of any such limitations. The effects of EST on children's language and cognitive development include, among others, delayed language development, poor social skills, and decreased concentration. Despite the fact that many parents are aware of the negative effects of EST, many are unaware of the recommended screen time limits. Awareness of the negative effects of screen time on language and communication development can encourage parents to limit their children's screen time, leading to increased parent-child engagement and playtime, which can mitigate the negative effects of screen time on language and communication development (Vrinda et al., 2021).

3.8 Parental screen time and its impact on speech development of their children

The purpose of this study was to investigate the connection between parental screen time and its effect on their children's verbal development. The findings indicate that children acquire language skills through interactions with their carers. In today's technologically advanced world, however, parents are frequently diverted by their electronic devices, resulting in decreased one-on-one communication, which is essential for speech development. The context for this study's literature review of parent-child interactions and their significance for speech development is Vygotsky's theory of child development. In addition, the research investigates the effects of children's screen time on the development of their speech, as well as the physical and emotional impacts of parents' screen time on their children. The research was conducted at a private Catholic school in Cincinnati, Ohio, using a mixed-methods approach. The first phase consisted of self-reported surveys filled out by parents of children ages 3 to 6 to collect data on their screen usage and the prevalence of screen distractions when with their children. The researchers then interviewed a small sample of parents to obtain additional insight into the impact of screen device distractions on their child's speech development. Even though the majority of parents believed they used screen devices excessively, they reported using them for only two to three hours daily. Individuals may be oblivious of their actual screen time and may underreport their daily screen time, as suggested by these findings. Parents of children with speech difficulties reported spending the majority of their time with their child, but were engaged with screen devices for 2 to 5 hours per day and viewed their screens 3 to 6 times per hour while with their child, indicating that screen distractions may interfere with parent-child interactions. These parents acknowledged that their smartphone use diminished the quality of their time with their children. As technology continues to encroach on parent-child time, additional research is required to investigate the effect of parental screen use on their child's speech development. (Boeing et al., 2019).

3.9 Rapid advancement of technology and children’s gadgets

The development of technology has led to an increase in device utilization among both adults and young children. The use of such devices has been linked to negative effects on language and social development, despite the fact that they offer a variety of features and functions that children appreciate. Although electronic devices inhibit children's ability to interact and play with their peers and may hinder language acquisition, they may have positive effects on a child's development, including cognitive development, creativity, and intellect. For example, children can easily learn to read and write with the help of

applications with captivating images. However, additional research is required to investigate the type and content of screen activities neonates engage in and the mechanisms underlying the apparent association between handheld screen time and speech delay.

According to a study presented at the 2017 Paediatric Academic Societies Conference, infants and toddlers are increasingly using handheld displays. The purpose of the study was to establish a link between young children's use of handheld screens and an increased risk of expressive language delay. Toronto-based researchers analysed data obtained from 894 infants and toddlers who participated in a network for practice-based research. They discovered that with each 30-minute increase in handheld screen time, the likelihood of expressive speech delay increased by 49 percent. The study verified a recent policy proposal by the American Academy of Pediatrics to prohibit all screen media in infants younger than 18 months. To investigate the association between handheld screen time and speech delay, such as time spent with parents on handheld devices, additional research is necessary.

3.10 Positive impacts of smart gadgets on the personality development of children

Through mobile games and creative programmes that stimulate their sensibilities and creativity, electronic devices can offer children opportunities for creativity and intellectual stimulation. However, without parental supervision, excessive use of these devices can lead to dependency and even addiction. A study involving face-to-face interviews with children, carers, parents, and teachers reveals that while children accept the use of electronic devices for their convenience and utility, their overuse can have negative effects on their social life, health, speech development, and cognitive skills, which may have long-term consequences for their schooling (Zain et al., 2022).

As parents and educators, it is essential to address children's use of electronic devices and find methods to use them positively while minimising their negative impact on their development. While devices provide entertaining features that stimulate creativity and intellect, such as learning to read and write, they can also result in social isolation and a lack of emotional control. When providing their children with technological tools and facilities that aid in their development, parents should be cautious and circumspect. Various studies have examined the impact of electronic devices on children, and some have provided guidelines for monitoring children's device use (Aldimasi et al., 2018).

As early infancy is a crucial developmental period, the use of computer technology in education presents both opportunities and challenges. Although the popularity of video games among children is growing, they can have both positive and negative effects on their development. A study investigates the cognitive, emotional, and social benefits of using technology in early childhood and concludes that devices can enhance language, memory, critical and creative thinking, and social skills such as communication, cooperation, and competition. However, few articles discuss the positive effects of early childhood technology use (Hamidah and Purnamasari, 2018).

Technology is an integral part of modern society, and devices such as smartphones, tablets, and computers have become indispensable for obtaining information and completing daily tasks. However, numerous studies have raised concerns about the impact of electronic devices on the growth and development of young children, who are among the most frequent consumers of electronic devices (Srinahyanti et al., 2018).

4. METHODOLOGY

4.1 Study Design

This retrospective study utilised a literature review, community surveys, and observational research studies to examine the effects of screen time on speech development and cognitive behaviour in children between the ages of infancy and four. The research intended to increase awareness, provide knowledge, and provide education about the negative effects of EST and decreased social interaction on the development of children.

Children's development is adversely affected by prolonged exposure to digital displays; therefore, it is crucial for parents to be aware of these implications. In addition, monitoring and observing their children's behaviour while using screen-based entertainment can provide insightful information about their current condition (Table 4).

Table 4: Existing Studies on Excessive Screen Time and Speech Delay

S. No	Study design	Findings
1	Cross-sectional	Screen time correlates positively with speech delay
2	Meta-analysis	No correlation between screen usage and language development
3	Longitudinal	Varying results, with some studies indicating a significant association

4.2 Sampling technique

This review recommended a two-step search strategy for locating published papers on the association between children's screen time and speech development. A limited preliminary search of Medical Literature Analysis and Retrieval System Online (MEDLINE) and Google Scholar was conducted, followed by an analysis of the article's title, abstract, and index keywords. Using all of the identified keywords and index terms, a second PubMed Central search was conducted.

4. 3 Study population

The study focused on the negative effects of screen time on the speech development of infants and young children up to the age of four, as well as the negative effects of smart gadgets and LEDs on the cognitive and personality development of the subjects during childhood, as well as an analysis of their social impacts.

4.4 Data collection

This review included studies evaluating the effect of screen time, television viewing, or media use on language development, as well as studies implementing treatments in the primary care setting to reduce screen time, television viewing, or media use. This review examined studies with the following results: decreased risk of language developmental delays and decreased screen time, television viewing, and media use.

4.5 Ethical consideration

This publication followed all research ethics guidelines and did not directly involve human or animal subjects.

5. DISCUSSION

In recent times, there has been an increase in screen time for children, as parents resort to using electronic devices as a means of occupying their infants when parental interaction is reduced (Karani et al., 2022; Perdana et al., 2017). The amount of screen time children are exposed to may also be influenced by factors such as finances and neighborhood safety, as a study

conducted in Soweto, South Africa, and the United States revealed that children tended to watch more television in neighborhoods perceived to be more hazardous, where staying indoors was considered safer than playing outside (Balton et al., 2019).

According to the American Psychological Association (APA), exposure to digital media at an early age, particularly television, may result in linguistic delay, and children under the age of two should not watch television, as they are yet to develop the concept of dual representation, which is not fully established until after age 2 (Linebarger and Vaala, 2010).

As children grow up in the digital age, electronic devices equipped with screens have become a ubiquitous influence in their lives. Parents often use these devices as a means of simplifying parenting, but the majority of parents who agree with this statement provide compelling evidence for the overuse of screens in our lives. To set a positive example for their children, parents, grandparents, and other adults can limit their own screen time and that of the children in their care (Byeon et al., 2015; Daniel et al., 2017; Granich et al., 2010).

Spending an excessive amount of time alone with screens has been associated with poorer expressive lexical and general language abilities in children. Previous studies have also found links between children's screen time and their expressive vocabulary and language skills (Dynia et al., 2021; Hudon et al., 2013; Zimmerman et al., 2007). However, the present study delved deeper into the effect of screen time on children's language abilities, establishing a direct correlation between screen time and the development of children's lexical and general language skills. The most common reason children under the age of eight use screen devices is to watch television or videos passively, which reduces child vocalizations and deprives them of opportunities to practice expressive lexical and language skills, such as repeating words or discussing the meaning of a word with an adult. This is particularly true when children spend screen time alone (Christakis et al., 2009).

Furthermore, research suggests that children require real social engagement to acquire vocabulary through films, television, and live chat (Reed et al., 2017; Roseberry et al., 2014; Tsuji et al., 2021).

6. CONCLUSION AND RECOMMENDATION

This article provided helpful information about the effects of screen time on speech development. According to the findings of this study, screen time has significant negative effects on the speech development of children under the age of four. There is no doubt that these smart devices have immense positive effects on personality development, modernization, and IQ improvement; however, the negative influences outweigh the positive influences, and researchers from around the world must be urged to investigate this issue further. Due to the fact that the prevalence of electronic products, intelligent devices, and LEDs is rising dramatically. Therefore, implementing restrictions on children's excessive device use can safeguard their health against multiple threats.

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