

The Impact of Digital Technology Use on Child Development: A Comprehensive Literature Review

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ABSTRACT

In recent years, the pervasive presence of digital screen media has become an integral part of children's lives. The increasing accessibility of smartphones, tablets, and televisions has raised concerns about their potential effects on child development. This comprehensive literature review aims to explore the multifaceted relationship between digital screen media and various aspects of child development. We examine findings from several studies that shed light on cognitive development, social interactions, language acquisition, and the impact of screen time on children aged two and younger. Effects of the digital technology on the children depends on the various factors. Those factors include the socioeconomic status of the family, ecological environment, child attributes, interaction with various type of digital platform, content of the digital media and many others. It is evident that all of those factors are not associated with the experimental groups at the same time. So, there are many points which are missing in the findings from the previous studies and we cannot eliminate every gap because there would be number of permutations are present which cover various factors. There are certain things which are negatively impacting the child development and should be avoided whereas with the precaution and on the moderate level if feeded to children then the cognitive development would increase significantly in the children on the linguistic bases as well as on the cognitive bases.

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Introduction

In this comprehensive review we are looking forward to analyzing the child development on the basis of the linguistic grasping and excellence of toddlers, and cognitive capabilities affected by the digital media. At last, we analyzed the effects of the digital media in the brain functioning of the children. Apart from that, we also focused on the recommendations to the parents to improve their children's childhood. Before jumping of the topic, we need to understand and define the definition of very fundamental concept of the child development. So, right from the beginning of the birth to the adolescence time of human being considered as a child development phase [1]. During child development phase, infants pass through various stages which contain continuous changes in the biological, psychological, and emotional aspects. During this period, child is constantly gathering the information about the surrounding environment, social encounters with adults. Child spends major time with the mother and this social encounter decides how child's development takes place. If we focus on a linguistic side of child development, there are numerous studies have been performed and analyzed toddlers' capability to link very basic associations among objects and the related words, or which words is associated with which actions. Those actions cover nouns, verbs, prepositions, and an ability to generalization of words to novel exemplars. [2].

If we put focus on the cognitive development. Certain part of population thinks that children's media, like dime novels, can make kids not think as much and not learn well. They also think to believe that it is reducing the time from activities that help them grow on the cognitive level. On the good side, some people believe these media are helpful because they let kids imagine and see things they don't usually get to see. So, it is indirectly increasing the cognitive functionality of the children to identify and understand the new objects and to get familiarized themselves with those new objects [3]. Some studies showed that if identification process is directed by any adults or parents, then it would increase the chances of learning process.

Research Method- Literature Searching Strategy

In our literature search, a comprehensive keyword search strategy was employed to gather relevant studies from major electronic databases: Science Direct, Research gate, PubMed, ncbi and jama network. This strategy involved the use of keywords such as 'television' or 'attention problem' or 'internet' or 'sleep disturbance' or 'development' or 'memory' or 'media exposure' or 'behaviour' or 'language' or 'interactive media' or 'screen exposure' and various combinations thereof. The search extended up to May 2007.

Inclusion Criteria and Selection of Studies

This screening was carried out independently and in duplicate by the authors. Initially, the titles of the articles were screened,

followed by the screening of the their abstract. Any discrepancies between the authors were resolved through consensus. As a result of this process, abstracts were identified as potentially relevant and were selected for full text review to assess their eligibility for inclusion in the final review.

Table 1

Study	Authors	Design	Participants	Results	Conclusion
Television and DVD/Video Viewing in Children Younger Than 2 Years [1].	Frederick J. Zimmerman, PhD; Dimitri A. Christakis, MD, MPH; Andrew N. Meltzoff, PhD	Telephone survey of 1009 parents of children aged 2 to 24 months.	Random sample of parents of children born in the previous 2 years (excluding households where English was not spoken and children with major disabilities).	TVDVD viewing among toddlers' skyrockets from 40% at 3 months to a whopping 90% by age and for those little viewers, screen time nearly doubles between 1 and 2 years old, from 1 hour to over 1.5 hours daily.	With 90% of toddlers tuned to screens by age 2, parents need to be empowered media mentors.
Screen-based media and young children: Review and recommendations [2].	Arumugam, C. T., Said, M. A., & Farid, N. D. N.	Narrative review	52 studies on screen-based media and young children's health, development, and learning	Screen-based media had positive, negative, and mixed effects on young children, depending on the type, content, quality, and context of media use	Screen-based media guidelines should be evidence-based, developmentally appropriate, and culturally sensitive.
The impact of screen media on cognitive development of preschool-aged and older children [3].	Huber, B., Yeates, M., Meyer, D., Fleckhammer, L.,	Kaufman, J.	Meta-analysis	43 studies on screen media and cognitive development of children aged 2 to 12 years	Screen media had a small but significant positive effect on cognitive development, especially for educational and interactive media & Screen media can enhance cognitive development if used appropriately and in moderation.
Infant Media Exposure and Toddler Development [4].	Dr. Suzy Tomopoulos, MD, Dr. Benard P. Dreyer, MD, Dr. Samantha Berkule, PhD, Dr. Arthur H. Fierman, MD, Dr. Carolyn Brockmeyer, PhD, and Dr. Alan L. Mendelsohn, MD	Longitudinal study	Infants from low socioeconomic backgrounds	Higher media exposure at 6 months correlated with lower cognitive scores at 14 months. Reduced language development associated with greater media exposure at 6 months.	Echoes American Academy of Pediatrics' recommendations: no media exposure prior to age 2 years. Further research needed to explore nuances.
Screen media and language development in infants and toddlers: An ecological perspective [5].	Linebarger and Vaala	Comprehensive narrative review	The participants in the study are infants and toddlers within the age range of 0 to 3 years	Examined prevalence, correlates, and patterns of screen viewing. Explored how infants process information from screens. - Investigated the impact on cognitive domains: language, executive functions, imitation, parent-child interactions, and school readiness. - Emphasized the role of contextual factors in modulating effects, including content type, caregiver behavior, screen interactivity, and background noise	Screen-cognition relationships. - Addressed methodological challenges and proposed future research directions for a more comprehensive understanding. Screen exposure effects are context dependent, with outcomes ranging from positive to negative. Highlighted the importance of considering contextual elements in understanding.

Screen-based media use and socio emotional development among infants and toddlers: An ecological perspective [6].	Madigan, S., Browne, D., Racine, N., Mori, C., & Tough, S.	Longitudinal study	2448 Canadian children aged 0 to 5 years and their parents	Higher screen time was associated with lower socio-emotional development, especially for expressive communication, sociability, and self-regulation	Screen time should be limited and supervised for young children to support their socio-emotional development
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Table 2

Study	Authors	Design	Participants	Results	Conclusion
Interactive Media Use at Younger Than the Age of 2 Years [7].	Dimitri A. Christakis, MD, MPH			The effects of interactive media on young children’s cognition depend on the context of the viewing, rather than the quantity	The article emphasizes the need for informed discussions and consideration of policy implications regarding interactive media use in children under 2 years old.
Children’s and Parents’ Perspectives on the Effects of Children’s Digital Technology Use [8].	Ana Z`ulec, Vanesa Varga, and Luka S`tefanic`	Qualitative approach	The study involved 24 children and 24 parents, who were recruited through convenience sampling from different schools and regions in Croatia. The children and parents were divided into six groups each, based on the children’s age and gender	The study found that both children and parents perceive different positive and negative effects of digital technology use on emotional, behavioral, physical, social and cognitive development and functioning in children, and problematic digital technology use as a general effect of excessive digital technology use in children.	The study concludes that digital technology use has various impacts on children, and that there is a need for more awareness and education on how to use digital technology in a healthy and balanced way.
The effects of interactive media on preschoolers’ learning: A review of the evidence [9].	Georgene L. Troseth, Rachel E. Flynn, and Megan M. Saylor	Meta-analysis	Number of participations is 5,147 between age of 2-6 years	Interactive media had a positive effect on preschoolers’ learning, especially when the media were designed to be developmentally appropriate, engaging, and educational	Interactive media can support preschoolers’ learning, but more re- search is needed to understand the opti- mal conditions and mechanisms of learn- ing
The impact of screen media on cognitive development of children from birth to age 5 [10].	Koeun Choi, Hyun- Jin Jeon, and Soeun Kim	Systematic review	Number of participations is 23,650 between age of 0-5 years	Screen media had both positive and negative effects on cognitive development, depending on the type, content, context, and amount of screen media exposure	Screen media use should be tailored to the child’s age, interests, and needs, and parents and practitioners should be aware of the developmental implications of screen media use

Digital Screen Media DVD and Cognitive Development [11].	Daniel R. Anderson, PhD; Kaveri Subrahmanyam, PhD	Narrative review	Children using digital screen media	For children under 2 years old, television viewing has negative associations, particularly affecting language and executive function.	Understanding the impact of screen media on cognitive development is crucial as we navigate the digital age. Future research will provide further insights.
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Table 3

Study	Authors	Design	Participants	Results	Conclusion
Effects of Screen Exposure on Cognitive Development [12].	Bahia Guellai, Eszter Somogyi, Rana Esseily, Adrien Chopin	Literature review	Various studies involving young children (ages 0-6) and screen exposure	Screen viewing can have positive, neutral, or negative effects on infants' cognition, depending on the content.	The context of screen viewing includes the behavior of adult caregivers, the content of the screen, the interactivity of the screen, and whether the screen is in the background or not. The article provides some recommendations for parents and caregivers on how to use screens in a beneficial way for young children.
Screen time and young children: A systematic review of literature [13].	Natalia Kucirkova, Lydia G. M. Hedges, Annette K. Messer, Karen Littleton, and David K. Scanlon	Systematic review	Number of participation is 106,620 between age of 0-8 years	Screen time had mixed effects on young children's physical, social, emotional, and cognitive development, and the effects varied by the quality and quantity of screen time, the age and characteristics of the child, and the family and environmental factors	Screen time is a complex and multidimensional phenomenon that requires more nuanced and contextualized research and policy
The Negative Effects of Digital Technology Usage on Children's Development and Health [14].	Mustafaoglu, Zirek, Yasaci, Razak Ozdinc, ler	Literature review		The use of digital technology by children is associated with developmental, behavioral, musculoskeletal, physical, and sleep problems.	Parents should monitor and limit the time, frequency, and content of their children's technology use and ensure a balanced lifestyle.

Internet Use and Child Development: The TechnoMicrosystem [15].	Genevieve Marie Johnson	Mixed methods, including surveys, inter-views, and observations	91 children aged 9 to 12 years old from two schools in Australia	The Internet was part of the children’s microsystem, influencing their development in various domains. The children used the Internet for communication, information, and recreation purposes, and had different levels of access, skills, and preferences. The Internet also affected the children’s relationships with their parents, peers, and teachers, as well as their academic performance, self-esteem, and identity formation.	The article proposed a theoretical framework for understanding how the Internet influences child development, based on the ecological systems theory of Bronfenbrenner. The article also suggested some methods and measures for validating the ecological technomicrosystem, and reported some preliminary findings from a study of 91 children aged 9 to 12 years old.
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Table 4

Study	Authors	Design	Participants	Results	Conclusion
Digital Childhood: Electronic Media and Technology Use Among Infants, Toddlers, and Preschoolers [16].	Vandewater, Rideout, Wartella, Huang, Lee, Shim	Survey	1,065 parents of children aged 0 to 6 in the US	Most children aged 0 to 6 watch TV and videos/DVDs on a typical day, and many use new media such as computer and digital toys. Many young children have a TV in their bedroom. Few young children meet the AAP media-use guidelines. Media use is related to demographic and family factors, and to reading and playing outdoors.	Media and technology are pervasive and influential in the lives of young children. More research is needed on the developmental impact of media and technology use.
Associations Between Screen Based Media Use and Brain White Matter Integrity in Preschool-Aged Children [17].	John S. Hutton, MS, MD; Jonathan Dudley, PhD; Tzipi HorowitzKraus, PhD; Tom DeWitt, MD; Scott K. Holland, PhD	cross-sectional design	47 healthy children aged 3 to 5 years	Screen use beyond the AAP guidelines was associated with lower measures of microstructural organization and myelination of brain white matter tracts, as well as lower scores on cognitive assessments	Screen use may have negative effects on brain development and cognitive outcomes in preschool-aged children
The effects of interactive media on preschoolers’ learning: A synthesis of the research [18].	Hirsh-Pasek, K., Zosh, J. M., Golinkoff, R. M., Gray, J. H., Robb, M. B., & Kaufman, J.	Narrative review	31 studies on interactive media and pre-schoolers’ learning outcomes	Interactive media, such as apps, games, and e-books, can support preschoolers’ learning if they are designed based on four principles: active, engaged, meaningful, and socially interactive	Interactive media can be integrated into early childhood education as a tool for enhancing learning and motivation.

Violent Video Game Effects on Children and Adolescents: Theory, Research, and Public Policy [19].	Craig A. Anderson, Douglas A. Gentile, Katherine E. Buckley	Experimental	Children and college students	Even children's games with cartoonish violence increased aggression	Consideration of video game effects on youth is crucial
Commentary: Mobile and interactive media use by young children: The good, the bad, and the unknown [20].	Jenny S. Radesky, MD	Commentary article		Mobile and interactive media have potential benefits and risks for young children's development, but more research is needed to understand them	Pediatricians and parents should be aware of the developmental implications of mobile and interactive media use and promote positive and mindful use.

Discussion

Various recommendations from the various world re- knowned organizations had published related to the digital media usage for the infants and toddlers and are as follows:

World Health Organization

The "Guidelines on Physical Activity, Sedentary Behavior and Sleep for Children under Five Years of Age" by World Health Organization (WHO) state that children within the first two years of life should not have any screen- based media exposure at all. For children aged two to four, screen time should not exceed more than an hour.

American Academy of Pediatrics

Children below the age of two are not encouraged to be exposed to any screen time at all. Now in this literature review we will discuss about the various effects of various platforms covering the various factors of combinations and ties to fill the gaps as mentioned above.

How big the issue is?

In one of the paper's research projects on 1009 families, who were participated in the survey regarding the children and their interactions with the television and DVD/Video. One notable thing which comes up was, there are argumentsor point of view that watching television, or any understand them media may induce the better relation between the parents and children. So, researchers asked the same question to the parents as a response to that 26% to 47% parents believe that it is true and due to that reason, they let their children watch television. There is very interesting finding comes up during this study is that around 32% of parents are watching media with their children all time. This means 32% of the time children is expose to a well-regulated content approved by their parents [4].

According to the study and the response gathered from the parents, it is evident that among all the children 40% of them started watching television at the age of 3 months. By the time of 24 months among all of them 90% of them are watching the television. Median age of children who watch the television is the 9 months. So, it is evident that the standards or recommendation from the AAP is clearly not followed in actual world. Another interesting thing which comes out is that families with more than one child is very less likely to state that their children are spending their time in front of television. This is due to the fact that they have sibling to play with. Television is basically working as an electronic babysitter for the parents. Parents are desperately looking for the educational content on the TV. In the study it is

observable that 1 in 5 parents need to their work done at home therefore it is very great and obvious way to distract their children by engaging them in the television

Till now we saw various studies which are not mentioning the frequency whether they are exposed on daily bases or once a week or when. Now, let's talk about the frequency during how many times children are exposed to the digital medium and how that will affect them. A recent large study conducted with a French population shows that 84% of 2-year- old toddlers watch television at least once a week, and 68% every day. The average time of exposure to television for 2- to-24-month-old infants is 40 min per day and only half of the programs are educational programs, according to the parents [5].

Cognitive Development and Effects

There is one study conducted to directly conduct the neuroendocrine responses from the infants with the age of 15 to 18 months. That study tried to collect the data of the serial salivary cortisol levels while playing the block game and while watching the DVD. Tasks were assigned randomly to infants. Noticeable thing was there is no perfect standard set at the infant age of the cortisol levels and performance level. Due to some previous examinations and tryouts researchers know that block play has a great result in the language development. If anything comes near to such levels, then it is considered to be a healthy and agreeable. Infants who played block play has measurably higher level of cortisol, on the counterpart infants with the DVD videos had comparatively lower levels of cortisol. The main reason behind such result is that block play gave the sense of achievement to the infants whereas such factor is not present in the DVD videos. Due to this sense of achievements children are become addicted to the video games, because after finishing every level of the game they fill that they achieve something and eager to play more increases automatically. Cognitive development can be seen different for the different age group children. For instance, infants and toddlers who watch television, or another kind of interactive media can make a significant impact on the quality and quantity interaction with the parent and child. Meanwhile on the positive side children watching television specifically intended to child-directed purpose may tend to have a richer vocabulary, while watching the show or imme- diately after the show. Another thing which is also impact the child development is the interaction of the parents with the digital technology. As the interaction of parents go higher with such interactive medium then they are compromising the time with their children. During the infancy and toddler age background television plays significant role as well because of the background audio interference with

the playing time with the toys. Now as per the educational point of view, it is perceived that increasing the vocabulary and learning words are correlated with the education video or TV, but studies found that 12-to-18-month infants are not learning any words by watching the educational videos. To test the infants, researchers asked infants to direct to the things meanwhile they were exposed to the names of those same things. In this case-control study, the authors also evidenced that children at age 2 who had language delay usually started watching television earlier than a control group, and also spent more time watching television than other children (around 3 h per day vs. less than 2 h per day). Children who started watching television during their first year and who watched television more than 2 h/day were approximately six times more likely to have language delays than the ones who did not. On the negative side, interaction of children with the other human being per say with the parents reduce due to the watching television, whereas conversation and interactions are essential driver of the language development. So, talk about the language development there are two factors which we look towards. One is quantity and other is quality, so there is no correlation between the quantity and language development, but bad quality may cause the less vocabulary. Bad quality refers to the fact the shows are not intended for children, solitary viewing, background television. Children pay less attention to the television programs unless those shows are intended for them, because children less than 24 months of age barely understand the words. So, for younger than 24 months children all the adult shows play a role of background television. Background television also plays significant role in the child development. According to one of the studies performed on the background television indicates that parents are more likely to talk less with the child and engage passively with the infants with the age of 12 to 24 months. Whereas in the other study, performed on the 13 months of infants while turning on the television in the background, shows that mother use minimal vocabulary while playing with infants. Basically, background television increases the chances of less interaction between parents and child. Apart from that it also distracts child from their ongoing activity. Reason behind the change in attention is changes in the audio and visuals. Screen viewing is associated with lower cognitive development when viewing is unsupervised, when content is not appropriate for the age, or when in the background. Studies have been performed on many children, but according to this study it becomes evident that toddlers with the age of less than 2 years with the low socioeconomics family background are more likely to exposed to severe effects of the digital platforms. This led to the adverse effect in development at the earlier stage of the reading capabilities and academic prowess [6].

Linguistic Development and Effects

According to several, research indicates that toddlers with the age of less than 24 months are unable to comprehend the child directed television program and have negative affect on the language and executive function level. Meaning they are getting negative impact on a cognitive level. Whereas children with the age more than 2 years start to understand the child-directed television shows. Majority of the research indicates that educational television has a positive impact on cognitive development. Parent-child interaction is the main driving factor of the cognitive, language, and executive function in child. There are few evidence suggests that, during preschool aged children are developing the ability to read and increasing the vocabulary of the language, but increasing or interaction with the television reading ability of the children may be compromised, because children pay less attention to the reading. On the positive side, numerous evaluations of preschool educational television programs such as “Sesame Street” have

found a positive impact on vocabulary, literacy, social behavior, and academic knowledge. This can be understood, toddlers with 2 years of age with “Sesame Street” exposure has the wider letter, number, shape, color knowledge on the readiness level whereas comparing with the 3 – 4 years who are exposed to the adult directed television program have general measure of school readiness [7].

Positive Effects of the Digital Media

Till now we talked enough about the adverse effects of the digital platforms on the development on the infants and toddlers, now we will see the flip side the coin and focuses on the brighter side of those platforms. It turns out, if babies watch shows with any adult that would make a significant impact on the language development on the positive end. According to Bronfenbrenner, ecological atmosphere imposes a significant impact on the learning capabilities for the toddlers. Bronfenbrenner further included that controlled environment negates the interdependent complexities and variation of the surrounding space and social interactions. Sometimes this will lead to a misleading and not conclusive results. Language development depends on the biologically (age of the child) as well as the surrounding environment. Studies can be divided into various categories. Most importantly in order to develop the lingual skill it is very important that whatever the digital media children are exposed but those media contain certain characteristics. As infants has very less background knowledge about the language or any signs presented in front of them, so it become more important that digital media create the content use the simple sentences, have a really slow and understandable speech, very clear and precise paraphrased content repetitions, significant time between two sentences and phrases in order to understand clearly [8].

Negative Effects of the Screen Media

The rapid rise of screen-based media usage among children, starting in infancy and continuing throughout childhood, has raised concerns about its impact on child development and health. The American Academy of Pediatrics (AAP) has recommended limits on screen time due to these concerns. To better understand the effects of screen time on early brain development, this study used diffusion tensor imaging (DTI) to investigate the relationship between screen-based media use and white matter integrity in preschool-aged children, focusing on brain tracts related to language, executive function, and literacy. The study found that greater screen use was associated with reduced integrity of these critical brain tracts and poorer cognitive outcomes. The research involved 69 parent-child pairs, with behavioral analyses conducted using SAS software. The ScreenQ survey assessed screen use adherence to AAP guidelines, while standardized assessments measured language and literacy skills. The study revealed that children with higher screen time had lower white matter tract integrity, particularly in areas crucial for language and literacy development. Correlations between screen time and cognitive test scores were also observed. Excessive use of mobile devices, tablets, and increased screen time in children can have both short-term and long-term effects on the brain, including changes in white matter and gray matter [9].

Altered Connectivity in White Matter

- Prolonged screen time may lead to changes in the connectivity of white matter tracts in the brain.
- White matter is crucial for transmitting signals between different brain regions.
- Excessive screen time could potentially disrupt the normal development of these neural connections.

Attention and Impulsivity Issues

- Increased screen time, especially in younger children, might be associated with attentional problems and impulsivity.
- Behavioral issues observed could be linked to alterations in white matter connectivity.

Structural Changes in Gray Matter

- Studies indicate that excessive screen time can result in structural changes in the gray matter of the brain.
- Particularly affects areas responsible for information processing and decision-making.
- These changes may have implications for cognitive and behavioral functions.

Reduction in Gray Matter Volume

- High screen time has been correlated with a decrease in gray matter volume.
- Impacts areas involved in language, memory, and spatial skills.
- Reductions in gray matter volume may influence cognitive development.

Sleep Disturbances

- Excessive screen time, especially before bedtime, can interfere with sleep patterns.
- Poor sleep quality may further impact overall brain function and development.

Impact on Cognitive Development

- Excessive screen time may limit the time children spend in active, exploratory play.
- Active play is crucial for cognitive development in children.

Physical Health Consequences

- Increased screen time is associated with a sedentary lifestyle.
- Sedentary behavior can lead to physical health problems such as obesity, potentially affecting brain function.

Social and Emotional Development

- Excessive screen time may reduce face-to-face social interactions among children.
- Impacts emotional development, potentially hindering social skills.

In a prospective cohort study of more than 16,000 children between ages of two and nine years, every additional hour of screen time showed an increase of 1.2- to 2-fold in the probability of emotional problems and poorer family functioning. In a systematic review of sedentary behavior and health indicators among school children and youths, 68% of longitudinal studies showed that greater amounts of television viewing at baseline were associated with steeper increases in body mass index (BMI), body weight and fat mass over time. The Malaysian National Health and Morbidity Survey 2016 reported that 52.2% of children nationwide experience excessive screen time exposure, defined as any electronic media usage among children below the age of two and screen time of more than two hours among children aged 24 to 59 months [10].

Results

Survey in UK suggests that around 21% of the toddlers around the age of three to four years have their own tablet. In 2017 one publication found that 274 out of 489 children age ranging from two to six years had their own media device. In a prospective cohort study that assessed the media usage of children at six months

old and then reassessed at 14 months old, lower cognitive and language development were displayed among children with early exposure to electronic media, even after adjusting for co-founders. Toddlers with 60 minutes of screen-based media exposure had lower developmental scores in both domains compared to their peers who had no exposure. There was significant study conducted based on the exposure time and the content of the digital platform at the end results were assessed when children were 14 months old. Results were shocking and totally opposite of the guidance issued by the AAP. It turned out that average exposure for the children to the media was 152.7 minutes, which is more than 2.5 hours. Not only that but children also watched adult oriented shows averaging 91.5 minutes. In the study it was cleared that children with absolute zero exposure to digital platform has the cognitive development (Bayley-III) score of 102.1 but with the one-hour exposure it directly dropped by the 7 points and became 95.9 worst of all with higher than one hour exposure infants got 93.2 score. For the language development point of view, they conducted PLS-4 test. Toddlers with none of the exposure from media got 103.0 score, with one hour exposure it became 98.2 and more than that even dropped to 96.0 [11].

Recommendations

There are plenty of studies have been conducted and many publications have look into the most probable health impacts of early exposure and excessive usage of screen-based media among children, there are very clear and evident links are interconnected between screen time and behavioral difficulties in the social activities, moreover delays can be seen in the development in the child, and risk of obesity is increasing day by day in the young children, there are many more issues are connected with this screen-based media.

A. Merge with The Above Child-Parent Interaction and Paraphrase

Excessive screen time among young children is associated with high chances of displacing parent-child interaction, which is fundamental to a thriving child's process of learning and development. Childhood is filled with the continuous learning with the adaptation of changes which are going around. Everything can be measured by the small and simple milestones, which can be tracked by the parents. Inadequate or inappropriate social and emotional experiences in a child's early life can compromise higher-level brain functioning that provides the processing information necessary to socially bond and respond. Various changes in childhood and parenting may affect the child's mind for a long period. In other words, environment in the childhood more of less develops the psychological mental state of the children. Specifically, poor relations between mother and child place child in an insecure mental state which have the long-lasting affect. Looking at the different side, if parents read together with their children, then their vocalization ability naturally increases as well as the attention to the minor details as well. It's important to note that while these potential effects have been observed in some studies, the research on this topic is ongoing, and more studies are needed to fully understand the long-term consequences of screen time on the developing brain. Additionally, not all screen time is equal; the content and quality of the screen-based activities matter. Parents and caregivers should consider setting appropriate limits on screen time, ensuring that screen-based activities are educational and age-appropriate, and encouraging a balanced lifestyle that includes physical activity, social interactions, and other forms of learning and play. It's also advisable to consult with healthcare professionals for guidance on managing screen time for

children. In conclusion, increased screen-based media use among preschool-aged children, even within AAP-recommended limits, was linked to compromised white matter integrity in brain tracts essential for language, executive function, and literacy. These structural changes were associated with lower cognitive test scores, underscoring the need for further research to fully understand the implications of screen-based media exposure during early childhood brain development. Given the widespread use of screens in various settings, additional studies are essential to uncover the effects on developing brains during the early stages of childhood growth [12-23].

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