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RESEARCH

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The Effects of Screen Time on Early Childhood Development: A Systematic Literature Review

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Abstract

The effects of screen time on young children warrant greater attention, particularly as screen use has increased during the COVID-19 pandemic. Excessive screen exposure in early childhood reduces opportunities for adequate stimulation and limits children's engagement with their physical and social environments. When children do not receive sufficient developmental stimulation during this critical period, optimal brain development may be affected, potentially leading to delays or disorders across various developmental domains. This review aimed to further examine the negative impact of screen time on early childhood development. Guided by the PRISMA guidelines, a comprehensive search was conducted across Google Scholar, PubMed, and Scopus using the keywords "screen time" and "child development" for articles published between 2021 and 2025. A total of 15 studies met the eligibility criteria. The findings consistently show that excessive screen time negatively affects several aspects of early childhood development, including motor, speech-language, cognitive, and social-emotional domains. The review also underscores the critical role of parents in regulating children's screen use to mitigate these risks. In conclusion, excessive screen media exposure diminishes developmental stimulation and increases the likelihood of developmental delays; therefore, active parental involvement in managing screen time is essential to promote healthy child development.

Keywords: Screen Time, Excessive Screen Exposure, Child Development.

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1. INTRODUCTION

The increasing trend of screen time use is a global phenomenon that has also grown rapidly in Indonesia. Screen media use is no longer limited to adults; it has become increasingly common among children. The digital environment today surrounds children with various screen-based devices such as televisions, smartphones, and tablets. The COVID-19 pandemic accelerated this trend, resulting in a surge of screen exposure among children worldwide (Hedderson et al., 2023). In Indonesia, this shift is evident with alarming statistics: 68.01% of early childhood children watch television, 33.44% of children aged 0–4 years use mobile phones, and 24.96% have accessed the internet (Badan Pusat Statistik, 2022). This excessive exposure to screen media is especially concerning for early childhood, a critical developmental period known as the "golden age" due to the rapid growth of brain neurons and sensitivity to external stimuli.

Developmentally, excessive screen time in early childhood has been associated with various delays and disturbances. Research has shown consistent negative impacts on motor skills, socio-emotional development, speech and language acquisition, and cognitive functions (Azlina & Surjadi, 2023; Kerai et al., 2022; Muppalla et al., 2023; Panjeti-Madan & Ranganathan, 2023; Webb, 2023). These effects are often attributed to reduced active play, limited parental interaction, and decreased environmental stimulation when screens dominate children's daily routines (Hutton et al., 2022). These issues extend beyond immediate developmental concerns and pose long-term societal risks, as early childhood serves as the foundation for lifelong learning and well-being.

Despite these known risks, screen use among young children in Indonesia remains excessive and insufficiently regulated. The Indonesian Child Protection Commission (KPAI, 2020) reported that 79% of children's screen time during the pandemic was unrelated to educational activities, and around 71.3% of children have their own gadgets. This figure stands in stark contrast to the World Health Organization's recommendation that children under 5 years should have no more than 1 hour of screen time per day, and none at all for those under 2 years (Sommer, Nußbaumer-Streit, & Gartlehner, 2021).

Previous research has consistently documented the negative effects of screen overuse on early childhood development. Conducted across diverse cultural and geographic contexts, these studies have employed various methodologies, including observational designs, longitudinal tracking, and parent-reported surveys. Their findings consistently show that high screen exposure is associated with poorer outcomes in language development, attention span, social interaction, and physical growth (Azlina & Surjadi, 2023; Hutton et al., 2022). However, the existing literature has several limitations. Many studies focus on Western populations, with far fewer examining the effects of screen time within Indonesian or broader Southeast Asian contexts. In addition, only a limited number of studies have systematically synthesized current findings to provide a comprehensive understanding of the impact of screen time, specifically during early childhood. This lack of contextual and integrative research leaves a critical gap in knowledge, particularly for local policymakers and educators who require evidence-based guidance to inform effective interventions.

There is an urgent need to bridge the gap between established international recommendations and the current reality in Indonesia, where field practices indicate a high risk of screen overuse in early childhood. The mismatch between the WHO guidelines and the actual behavior of families, as documented by KPAI and BPS, underscores the risk of long-term developmental harm if the issue is not addressed. Although awareness campaigns exist, consolidated evidence that is locally relevant and easily accessible to parents, educators, and healthcare providers remains limited. In the midst of various assumptions that are still in doubt

within the community, this review is expected to be able to fill the gap in clarifying the negative impact of excessive use of screen time on early child development.

Given these conditions, a Systematic Literature Review (SLR) is necessary to critically examine and synthesize the available research on the impacts of screen time on early childhood development. An SLR will not only consolidate existing knowledge but also identify research gaps, guide future studies, and inform national policies and parental practices. Because parents play a crucial role in shaping children's screen use, this review can help raise parental awareness of the negative effects of excessive screen time during early childhood. By presenting clear, evidence-based insights, this review can serve as a foundation for awareness initiatives and practical interventions aimed at protecting and supporting early childhood development in Indonesia.

2. RESEARCH METHOD

This study employed a Systematic Literature Review (SLR) method guided by the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) framework. A systematic review was chosen over a narrative review to ensure a transparent, replicable, and comprehensive process for identifying, evaluating, and synthesizing existing research. The PRISMA approach outlines four key stages: identification, screening, eligibility, and inclusion. During the identification stage, relevant articles were retrieved through database searches. The eligibility stage involved reviewing the full texts of potentially relevant studies, and in the final inclusion stage, only studies that met all predetermined criteria were selected for detailed analysis.

The literature search was conducted using three electronic databases: Google Scholar, PubMed, and Scopus. To support the extraction and organization of search results, the authors utilized the Publish or Perish 8 (PoP) application. The search strategy employed the keyword combination “screen time” AND “child development”, with Boolean operators applied to refine and narrow the results. Filters were set to include only full-text, open-access articles published between January 2021 and April 2025 in either English or Bahasa Indonesia. The target population for the selected studies comprised children aged 0–7 years and parents of children within this age range.

The inclusion criteria for this review were as follows: studies published between 2021 and 2025; research subjects consisting of children aged 0–7 years or their parents; quantitative research designs such as cross-sectional, longitudinal, or experimental studies; full-text articles with open-access availability; and publications written in English or Bahasa Indonesia. Eligible studies also needed to directly examine the impact of screen time on aspects of child development, including cognitive, motor, language, or socio-emotional outcomes. Studies were excluded if they employed qualitative designs, were literature reviews, opinion pieces, or theoretical papers. Additional exclusion criteria included research involving participants older than 7 years, articles not available in full text, publications outside the 2021–2025 time frame, studies written in languages other than English or Bahasa Indonesia, or research that did not focus on relevant child development outcomes.

The initial search yielded 507 articles: 200 from Google Scholar, 190 from PubMed, and 117 from Scopus. After removing 7 duplicate records, 500 articles remained. During the title and abstract screening phase, 467 articles were excluded due to irrelevance. Of the 33 articles assessed for eligibility, 18 were excluded for reasons such as inappropriate study setting, non-English language, irrelevant outcomes, unsuitable study design, restricted access, or publication outside the 2021–2025 range. Ultimately, 15 studies met all inclusion criteria and were included in the final review (4 from Google Scholar, 7 from PubMed, and 4 from Scopus).

To minimize selection bias, two independent reviewers conducted the screening and eligibility assessments, with any discrepancies resolved through discussion and consensus. The quality of the included studies was evaluated using the Joanna Briggs Institute (JBI) Critical

Appraisal Checklist for Analytical Cross-Sectional Studies, which aided in assessing methodological rigor and validity. A narrative synthesis approach was applied to analyze the selected articles, and the findings were organized according to the developmental domains affected by screen time. These domains included cognitive development, motor development, language and speech development, and socio-emotional development. This classification facilitated clearer presentation of results and enabled the identification of patterns, gaps, and implications related to screen media use in early childhood.

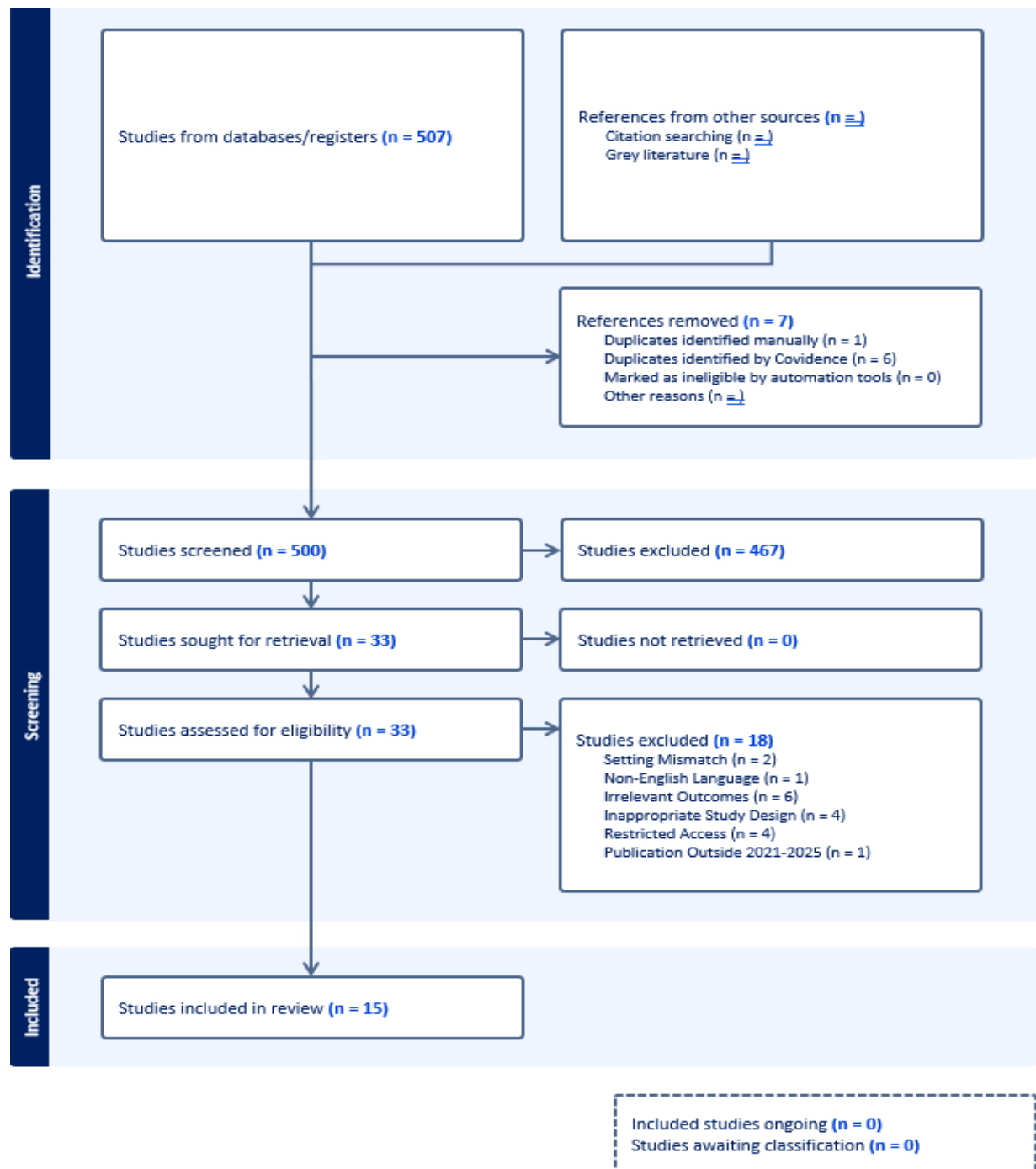


Figure 1. PRISMA Flow Chart.

3. RESULTS AND DISCUSSION

The findings of this systematic review provide clear evidence that excessive screen time during early childhood can negatively impact multiple areas of development, including motor, cognitive, language, and socio-emotional skills (Azlina & Surjadi, 2023; Kerai et al., 2022; Muppalla et al., 2023). These developmental issues are largely linked to the displacement of important real-world experiences needed for growth. A key mechanism is the reduction in caregiver-child interaction, as screen use often replaces opportunities for two-way communication that supports language acquisition and emotional bonding (Panjeti-Madan & Ranganathan, 2023; Webb, 2023). Instead of engaging in responsive dialogue, children are often passively consuming content that lacks the social cues necessary for developmental learning.

Another significant mechanism is the limitation of sensory and motor stimulation. Excessive screen exposure promotes sedentary behavior, limiting the time children spend engaging in physical activities that support coordination and motor skill development. Hutton et al. (2022) emphasize that increased screen use reduces opportunities for children to physically explore their surroundings an essential component of both motor and cognitive. Moreover, the type of media content also plays a role in developmental outcomes. Fast-paced or overstimulating media may negatively impact attention and behavioral regulation, while content that is interactive and age-appropriate may offer modest cognitive benefits if used in moderation and alongside adult interaction (Muppalla et al., 2023).

Variations in outcomes were noted across the included studies. Several studies reported a strong and consistent association between screen time and delayed language development, particularly among children under three years old (Azlina & Surjadi, 2023; Kerai et al., 2022). In contrast, findings related to cognitive development, such as attention span and executive function, were less consistent. While some studies showed significant negative effects, others reported weaker associations, possibly due to differences in screen content, exposure duration, or measurement methods (Panjeti-Madan & Ranganathan, 2023; Webb, 2023). The impact on socio-emotional development was generally more consistent, especially in studies that considered co-factors such as parental involvement and the context of media use (Hedderson et al., 2023).

Despite the clear patterns, this review has some limitations. Most of the included studies used cross-sectional designs, which restrict the ability to establish causal relationships between screen use and developmental outcomes. Many also relied on self-reported data from parents, which could be influenced by social desirability or recall bias (Azlina & Surjadi, 2023). Furthermore, the majority of studies were conducted in high-income countries, with limited representation from low- and middle-income settings such as Indonesia, making it challenging to generalize the findings across diverse populations (Badan Pusat Statistik, 2022; KPAL, 2020). Additionally, this review excluded qualitative studies, which may have provided valuable insights into family routines, parenting styles, and socio-cultural influences on screen use.

Table 1. Results of the search on the impact of screen time on child development.

No	Title and Author	Methodology	Key Impacts	Result
1	Does Screen Time Do More Damage in Boys Than Girls? (Chakhunashvili et al., 2024)	Cross-sectional	Language development	a. Early screen time exposure increased a child's risk of delayed expressive language development. b. Children aged 12-30 months is a very

				vulnerable group to expressive language delays and boys are more affected.
2	The Impact of Physical Activity and Screen Time on Motor Creativity in Kindergarteners (Ghanamah, 2025)	Cross-sectional	Motor development and cognitive development	a. Physically active children tend to show better short-term memory, motor creativity, and show lower screen time use. b. Excessive screen can reduce child's physical activity and creative expression.
3	Emotional Reactivity and Behavioral Problems in Preschoolers: The Interplay of Parental Stress, Media-Related Coping, and Child Screen Time (Jusiené et al., 2025)	Cross-sectional	Socio-emotional development	a. Child behavior problems showed positive correlation with screen time.
4	Screen time and social-emotional skills in preschoolers with developmental, behavioural or emotional issues in Singapore (Kiing et al., 2024)	Cross-sectional	Socio-emotional Development	a. Children with DBE problems were exposed to excessive screen time on early age starting before 1 year old, especially at mealtimes. b. Earlier and higher screen time is correlated with lower social-emotional skills and greater behavioral problems.
5	Association between screen time and physical activity on mental health among preschoolers: a cross-sectional study from Southwest China (Liang et al., 2024)	Cross-sectional	Socio-emotional developments	a. Excessive screen time and low physical activity are risk factors for mental health problems in preschool.

6	Screen Time and Developmental and Behavioral Outcomes for Preschool Children (McArthur et al., 2022)	Cross-sectional	Socio-emotional and language development	a. Preschool-aged children with screen media use above 1 hour/day have a higher risk of behavioral problems, delayed developmental, and lower language acquisition.
7	Displacement of peer play by screen time: associations with toddler development (Putnick et al., 2023)	Cohort	Socio-emotional developments, motoric developments	a. Children with higher screen time have reduced playtime with peers. b. Screen media use indirectly increases the risk of developmental delays through reduced playtime with peers.
8	Screen time and early childhood development in Ceará, Brazil: a population-based study (Rocha et al., 2021)	Cross-sectional	Language development, socio-emotional development	a. Around 69% of children have excessive screen media use; this percentage increases with age, reaching 85% in children aged 49-60 months. b. More screen media use is correlated with poorer communication, problem-solving, and social skills.
9	The Dark Side of Multimedia Devices: Negative Consequences for Socioemotional Development in Early Childhood (Rocha et al., 2023)	Cross-sectional	Socio-emotional development	a. Children's average daily screen time is increased by age. b. Higher screen media use is correlated with increased psychosocial problems.
10	Screen Time, Nature, and Development: Baseline of the Randomized Controlled Study 'Screen-free till 3' (Schwarz et al., 2024)	Randomized Controlled Study	Motor, language, and social-emotional development.	a. The time spent of nature exploration showed positive correlation with child's development b. High screen time use among parents is correlated with higher screen time use among children and also

				negatively impact child's development
11	Associations of media use and early childhood development: cross-sectional findings from the LIFE Child study (Schwarzer et al., 2022)	Cross-sectional	Motoric, cognitive, language, and social-emotional developments.	a. Higher screen time in children showed correlation with lower levels of cognition, language, and social-emotional skills. b. Higher intensity of parent-child interaction is correlated with better child development in motor, cognition, language, and social-emotional aspects.
12	A longitudinal study of the relationship between children's exposure to screen media and vocabulary development (Sundqvist et al., 2024)	Cohort	Language development	a. There is negative association between language development and screen time use at all age time points. b. Screen time use at the age of 2 years can predict language skills at the age of 2 and 5.
13	Prevalence of excessive screen time and its association with developmental delay in children aged <5 years: A population-based cross-sectional study in India (Varadarajan et al., 2021)	Cross-sectional	Language development	a. Higher screen time in children is significantly correlated with the delay development in language acquisition and communication.
14	Association between screen time and hyperactive behaviors in children under 3 years in China (Wu et al., 2022)	Cross-sectional	Socio-emotional development	a. Screen time increases with age b. Higher screen media usage correlated with higher rates of hyperactive behavior in children under 3 years of age.

15	Associations between screen time and cognitive development in preschoolers (Zhang et al., 2022)	Quasi-experimental	Cognitive development	a. Preschool children with higher screen media usage show a tendency to have poorer working memory.
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Motoric Developmental Delay

The negative impact of excessive screen time on children's motor skills can be effectively understood through established child development theories. Piaget's theory of cognitive development emphasizes the critical role of active learning through direct physical interaction with the environment. During early childhood, children acquire knowledge and develop motor skills by manipulating objects and engaging in sensorimotor activities. These hands-on experiences stimulate both gross and fine motor development, which are essential for everyday functions such as walking, drawing, and self-care. When screen time becomes excessive, however, these active and exploratory behaviors are often replaced with passive observation. This reduces the sensory and motor experiences needed for healthy development (Youvan, 2024). As a result, children who spend long periods in front of screens miss valuable opportunities to move, explore, and strengthen their motor abilities.

In parallel, Vygotsky's socio-cultural theory highlights the importance of social interaction and guided participation in learning processes. Vygotsky argues that cognitive and motor development are scaffolded through meaningful engagement with caregivers and peers (Yusof, 2021). Screen time can disrupt these social opportunities by reducing children's time spent playing with peers or interacting closely with parents. Such social facilitation is crucial for motor skill acquisition, as children often learn new movements and refine motor abilities through imitation, feedback, and encouragement during social play (Putnick et al., 2023; Schwarzer et al., 2022). When screen time replaces these interactions, it creates a dual impact both reducing physical activity and diminishing the social learning environment necessary for motor development.

Empirical evidence supports these theoretical perspectives. Studies have shown that children with higher screen time are more sedentary and engage less frequently in physical play activities that promote motor growth (Youvan, 2024; Yuan et al., 2024). Such play activities are essential because they foster both gross motor skills, such as running and jumping, and fine motor skills, including grasping and manipulating objects (Widiarti & Anggita, 2022). Moreover, children's natural curiosity to touch and explore their surroundings plays a crucial role in fine motor development. Interactions with nature and physical environment have been linked to improved cognitive and motor outcomes, further underscoring how excessive screen time limits these critical experiences (Summers et al., 2019).

This review strengthens previous findings by highlighting the dual pathways through which excessive screen time impairs motor development: reduced physical activity and diminished social interaction. A novel contribution of this review is the emphasis on parental screen habits, which have been shown to correlate with children's screen use and their motor developmental outcomes (Schwarz et al., 2024). The intensity of parent-child interaction, which Vygotsky suggests is vital for development, is often compromised when parents themselves have high screen time, limiting children's opportunities for guided motor skill learning (Schwarzer et al., 2022). Understanding these interconnected influences suggests that effective interventions should not only focus on limiting children's screen exposure but also on encouraging parents to reduce their screen time and increase quality interactive play. This comprehensive perspective fills an important gap in the literature by integrating behavioral and social factors influencing motor development in the context of screen time.

Speech and Language Developmental Delay

The negative impact of excessive screen time on children's speech and language development can be explained through established developmental theories, particularly the interactionist perspective, which highlights the important role of social interaction in language acquisition. Excessive screen time replaces these interactive opportunities with passive consumption of media, which diminishes children's exposure to rich linguistic input and limits the social exchanges necessary for language growth. Empirical studies support this theoretical understanding, demonstrating a consistent negative correlation between screen time duration and language development, where increased screen exposure predicts lower language and speech proficiency (Rocha et al., 2023; Sundqvist et al., 2024).

Furthermore, children who exceed the WHO recommendations of no more than one hour of screen time per day show significantly lower language development, emphasizing the risks of excessive use (Al Hosani et al., 2023; Madigan et al., 2020). Early and frequent screen exposure also increases the risk of expressive language delays, which can have cascading effects on other communication skills (Chakhunashvili et al., 2024). This review adds depth to prior research by emphasizing that the negative effects of screen time stem not only from its duration but also from the reduction in essential shared reading and face-to-face interactions that support language learning (Gath et al., 2023). Shared reading and interactive storytelling expose children to varied vocabulary, sentence structures, and emotional expression, all of which are crucial for holistic language development (Youvan, 2024).

Moreover, the interrelatedness of language domains means that delays in expressive language can hinder a child's ability to communicate feelings and understand others, thereby impacting social communication broadly (Amanda & Najmah, 2024). This review fills gaps by emphasizing the qualitative nature of language exposure lost due to screen time, not just the quantitative aspect, and highlights the need for parents and caregivers to actively engage in language interactions rather than rely on screens as a substitute. Such insights call for targeted interventions promoting reduced screen time alongside enhanced interactive communication to support optimal speech and language development in early childhood.

Lower Socio-Emotional Development

The adverse effects of excessive screen time on children's socio-emotional development can be interpreted through Bronfenbrenner's ecological systems theory, which emphasizes the importance of interactive social environments in shaping emotional and behavioral growth (Guy-Evans, 2024). According to this framework, children develop socio-emotional skills through active engagement with peers, caregivers, and their surroundings, where they learn to recognize, express, and regulate emotions within social contexts. Excessive screen use disrupts these vital social interactions by reducing the time children spend in cooperative play and face-to-face communication, which are foundational for emotional self-regulation and social competence (Putnick et al., 2023; Rocha et al., 2023). This review highlights how screen time diminishes children's play opportunities, narrowing their social learning environments and potentially leading to reduced initiative, increased behavioral problems, and emotional dysregulation (Kiing et al., 2024).

Further supporting this perspective, socio-emotional development is critically dependent on secure attachments formed through quality caregiver-child interactions, which are often compromised when caregivers substitute screens for engagement (Youvan, 2024). Lack of these interactions may contribute to anxiety and future difficulties in social relationships. Additionally, excessive screen time indirectly exacerbates socio-emotional challenges by decreasing physical activity, which has been linked to increased mental health risks in preschoolers (Liang et al., 2024). Parents' frequent use of screens to calm children can lead to

media dependence and tantrums when access is restricted, creating a cycle of emotional reactivity and behavioral issues (Coyne et al., 2021; Jusienė et al., 2025).

Moreover, this review consolidates emerging evidence on the association between early and high screen exposure and hyperactive behaviors in children, highlighting a dose-response relationship that elevates risk with earlier and more frequent use (Wu et al., 2022). By integrating these findings with ecological and developmental theories, this review strengthens the understanding of how excessive screen time undermines the socio-emotional developmental processes through both direct and indirect pathways. It also underscores the critical role of parents in managing screen time and fostering emotionally rich, interactive experiences to mitigate these negative outcomes.

Lower Cognitive Development

The negative impact of excessive screen time on cognitive development in early childhood can be explained through Piaget's theory of cognitive development, which emphasizes that children learn best through active exploration and interaction with their environment rather than passive observation. Early cognitive growth depends on reciprocal social interactions that stimulate thinking, reasoning, and language skills processes that screen-based activities typically fail to provide (Schwarzer et al., 2022). The crucial "golden age" of cognitive development requires engagement in diverse, hands-on experiences that electronic devices often displace (Youvan, 2024).

Moreover, screen time reduces opportunities for physical activity, which research has linked to improvements in short-term memory and motor creativity (Ghanamah, 2025). Physical play promotes brain development by enhancing neural connectivity, whereas prolonged screen exposure characterized by rapidly changing lights and sounds can impair both short-term and long-term memory, as well as other cognitive functions (Liang et al., 2024). This review consolidates evidence showing that increased screen time is correlated with diminished problem-solving abilities, reduced working memory capacity, and delays in achieving key developmental milestones, including school readiness (Kerai et al., 2022; Rocha et al., 2023; Wu et al., 2022).

Importantly, the content of screen media also plays a critical role: exposure to age-inappropriate or overstimulating content further compromises cognitive development, indicating that not all screen time is equal in its effects (Supanitayanon et al., 2020). By integrating these findings with developmental theory, this review strengthens the argument that excessive screen time disrupts essential cognitive learning processes through both the reduction of active, social, and physical experiences and the quality of media consumed. It highlights the need for parents and caregivers to carefully regulate not only the quantity but also the quality of children's screen exposure to protect and promote cognitive development during this critical period.

4. CONCLUSION

Excessive screen use in early childhood is concerning, as this "golden period" is crucial for brain development. Excessive screen time reduces children's opportunities for play, exploration, and social interaction, thereby hindering motor, language, cognitive, and socio-emotional development. Parents, educators, and policymakers must limit screen time and encourage active, social, and stimulating activities to protect children's development and future well-being.

Reducing excessive screen time in early childhood requires a broader approach beyond parents alone. Parents should be supported with strategies such as setting screen-free times, co-viewing media, and promoting physical play and exploration. Positive parent-child interactions greatly enhance motor, language, cognitive, and socio-emotional development. Governments should set clear screen time guidelines, promote awareness through public health campaigns,

and support community programs. Schools can teach media literacy and offer engaging, device-free activities. Healthcare providers also play a vital role by monitoring screen habits during routine visits, counselling families, and recommending targeted interventions for children at risk of developmental delays.

Further research is needed to create effective, culturally appropriate interventions for managing screen time and promoting healthy alternatives. Collaborative efforts among parents, educators, healthcare providers, and policymakers are crucial to support children's motor, language, cognitive, and socio-emotional development while reducing screen-related risks.

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