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# THE IMPACT OF SCREEN USE ON COMPREHENSIVE DEVELOPMENT IN EARLY CHILDHOOD

## EL IMPACTO DEL USO DE PANTALLAS EN EL DESARROLLO INTEGRAL DURANTE LA PRIMERA INFANCIA

## O IMPACTO DO USO DE TELAS NO DESENVOLVIMENTO INTEGRAL DA CRIANÇA NA PRIMEIRA INFÂNCIA

Márcia Amaral Corrêa Ughini Villarroel[1]
Fabio Yoshimitsu Okuyama[2]

**Abstract**
The increasing use of electronic devices as the main learning reference in early childhood raises concerns about its impact on child development. This article analyzes, through a systematic literature review, the multidimensional effects of excessive screen use on the cognitive, social-emotional, and physical development of children aged 0 to 6 years. The research, qualitative and exploratory in nature, was conducted in the SciELO and BVS databases, focusing on Brazilian productions from the last five years. The theoretical framework articulates Jean Piaget's Genetic Epistemology, Martin Seligman's and Christopher Peterson's Positive Psychology, and António Damásio's neuroscience. The results indicate that prolonged screen exposure is associated with impairments in attention, language, and executive functions. In the social-emotional field, the replacement of face-to-face interactions with digital experiences can compromise the development of empathy, emotional regulation, and social skills. It is concluded that screen use must be mediated and balanced with concrete experiences and human interactions, which are fundamental for healthy and integral development in early childhood.

**Keywords:** Child Development Monitoring. Early Childhood. Cognitive Development. Emotional Development.

**Resumo**
O uso crescente de dispositivos eletrônicos como principal referencial de aprendizagem na primeira infância levanta preocupações sobre seus impactos no desenvolvimento infantil. Este artigo analisa, por meio de uma revisão sistemática da literatura, os efeitos multidimensionais do uso excessivo de telas no desenvolvimento cognitivo, socioemocional e

[1] Doctorate in Psychology and Education. Universidade de São Paulo. São Paulo. São Paulo. Brasil. E-mail: marcia.villarroel@sertao.ifrs.edu.br
[2] Doctorate in Computer Sciente. Universidade Federal do Rio Grande do Sul. Porto Alegre. Rio Grande do Sul. Brasil. E-mail: fabio.okuyama@poa.ifrs.edu.br

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físico de crianças de 0 a 6 anos. A pesquisa, de natureza qualitativa e exploratória, foi realizada nas bases de dados SciELO e BVS, com foco em produções brasileiras dos últimos cinco anos. O referencial teórico articula a Epistemologia Genética de Jean Piaget, a Psicologia Positiva de Martin Seligman e Christopher Peterson, e a neurociência de António Damásio. Os resultados indicam que a exposição prolongada a telas está associada a prejuízos na atenção, na linguagem e nas funções executivas. No campo socioemocional, a substituição de interações presenciais por experiências digitais pode comprometer o desenvolvimento da empatia, da regulação emocional e das habilidades sociais. Conclui-se que o uso de telas deve ser mediado e equilibrado com experiências concretas e interações humanas, fundamentais para um desenvolvimento saudável e integral na primeira infância.

**Palavras-chave:** Acompanhamento do Desenvolvimento Infantil. Criança da Primeira Infância. Desenvolvimento Cognitivo. Desenvolvimento Emocional.

**Resumen**
El uso creciente de dispositivos electrónicos como principal referente de aprendizaje en la primera infancia genera preocupaciones sobre sus impactos en el desarrollo infantil. Este artículo analiza, a través de una revisión sistemática de la literatura, los efectos multidimensionales del uso excesivo de pantallas en el desarrollo cognitivo, socioemocional y físico de niños y niñas de 0 a 6 años. La investigación, de carácter cualitativo y exploratorio, se realizó en las bases de datos SciELO y BVS, con enfoque en producciones brasileñas de los últimos cinco años. El marco teórico articula la Epistemología Genética de Jean Piaget, la Psicología Positiva de Martin Seligman y Christopher Peterson, y la neurociencia de António Damásio. Los resultados indican que la exposición prolongada a pantallas se asocia con perjuicios en la atención, el lenguaje y las funciones ejecutivas. En el ámbito socioemocional, la sustitución de interacciones presenciales por experiencias digitales puede comprometer el desarrollo de la empatía, la autorregulación emocional y las habilidades sociales. Se concluye que el uso de pantallas debe ser mediado y equilibrado con experiencias concretas e interacciones humanas, fundamentales para un desarrollo saludable e integral en la primera infancia.

**Palabras clave:** Seguimiento del desarrollo infantil. Primera infancia. Desarrollo cognitivo. Desarrollo emocional.

## Introduction

Early childhood, understood as the period from birth to six years of age, is a critically important phase for human development. It is during this interval that the foundations for cognitive, social-emotional, and physical development are established, shaping the individual's entire life trajectory. However, the contemporary context presents an unprecedented challenge: the increasingly early immersion of children in the digital universe. Recent data indicate that 93% of young people in Brazil are internet users and that one third of children up to five years of age use screens for more than two hours per day—exceeding the time recommended by

health organizations (CETIC.br, 2023). This scenario gives rise to the following research problem: how does the growing use of electronic devices as the main reference for learning affect the cognitive, social-emotional, and physical development of children in early childhood?

The omnipresence of smartphones, tablets, and other technological devices has transformed the way children interact with the world, learn, and socialize, making screens a predominant learning reference in many households. This paradigmatic shift—from concrete interaction to digital mediation—demands a thorough analysis of its consequences.

The general objective of this study is therefore to analyze the multidimensional impacts of excessive screen use as a predominant learning reference on the integral development of children aged 0 to 6 years, through a systematic literature review. The specific objectives are: (i) to identify the cognitive effects of prolonged screen use on children's attention, memory, and language development; and (ii) to examine the social-emotional consequences of replacing face-to-face interactions with digital experiences. The relevance of this study lies in the urgency of understanding the effects of a widespread social phenomenon and in providing evidence-based guidance for parents, educators, and health professionals. The proliferation of screens in children's daily lives is not merely an entertainment issue, but a factor that may be reshaping the very structures of human development. A critical analysis of recent studies on this topic within the Brazilian context is essential for reflecting on guidelines and pedagogical practices that promote healthy development in the digital age.

## 1 Theoretical Framework

Child development is a complex and multifaceted process that has been examined by different theoretical traditions. To analyze the impacts of screen use in early childhood, this article draws on three complementary theoretical pillars: Jean Piaget's Genetic Epistemology (1975), which underpins the cognitive dimension; the Positive Psychology of Martin Seligman and Christopher Peterson (2001), which

provides a framework for understanding social-emotional development; and the neuroscientific studies of António Damásio (1996), which deepen the understanding of the relationship between emotion, cognition, and the biological substrate of the developing brain.

### 1.1 Knowledge construction from a Piagetian perspective

Jean Piaget (1975) revolutionized the study of cognitive development by proposing that children are not mere recipients of information, but active constructors of their own knowledge. Through interaction with the environment, children assimilate and accommodate new information into their mental structures, engaging in a continuous process of equilibration. In early childhood, the sensorimotor (0–2 years) and preoperational (2–6 years) stages are particularly crucial.

In the sensorimotor stage, intelligence is practical, and children learn through sensory exploration and motor action. This is the phase of discovering the body, objects, and physical causality. In the preoperational stage, symbolic function, language, and egocentric thinking emerge. Children become capable of mentally representing the world, although their reasoning remains intuitive and centered on their own perspective.

Piagetian theory emphasizes, throughout child development, the irreplaceable importance of concrete experience and object manipulation for the construction of cognitive structures. For Piaget, knowledge is inseparable from action. In this sense, the use of screens as the main learning tool may represent an obstacle to this process, as it replaces three-dimensional, multisensory exploration of the world with a bidimensional and predominantly visual experience. Interaction with a screen, however interactive it may be, does not replicate the richness of manipulating real objects, which allows children to discover physical properties such as weight, texture, and volume—fundamental elements for constructing notions of space, time, and causality.

### 1.2 Social-emotional development and Positive Psychology

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While Piaget focused on cognition, Positive Psychology — particularly through the work of Martin Seligman and Christopher Peterson (2004) — shifted its attention to human well-being and flourishing. Seligman (2011) proposes that well-being is composed of five elements (the PERMA model): positive emotions, engagement, positive relationships, meaning, and accomplishment. Positive Education, derived from this approach, argues that schools and families should be concerned not only with academic development, but also with the cultivation of character strengths and social-emotional competencies.

In early childhood, social-emotional development is as vital as cognitive development. It is during this period that children learn to recognize and regulate their emotions, develop empathy, establish secure affective bonds, and interact socially. These competencies form the foundation for mental health and success in interpersonal relationships throughout life. Face-to-face interaction with caregivers and peers is the primary vehicle for this learning. Through eye contact, touch, tone of voice, and the emotional responses of others, children learn about the social world.

The replacement of human interactions with digital experiences may deprive children of these essential exchanges. Communication mediated by screens, even through video calls, lacks the richness of nonverbal cues present in in-person interaction. Children may struggle to learn how to "read" facial expressions and body language —skills that are fundamental to empathy and social intelligence. Furthermore, solitary use of electronic devices may lead to isolation and reduced practice of social skills involving actions such as sharing, negotiating, and resolving conflicts.

### 1.3 The neuroscience of emotions and mind–body integration

António Damásio (1996), in his work Descartes' Error, made a decisive contribution to the educational field by demonstrating the inseparability of emotion and reason. Challenging the Western philosophical tradition that opposed mind and

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body, Damásio showed, based on neurobiological evidence, that emotions are crucial for decision-making and for the act of thinking itself. His studies with patients who had lesions in the ventromedial prefrontal cortex revealed that, although their logical reasoning abilities remained intact, the absence of emotions rendered them incapable of making appropriate life decisions.

Damásio (1996) further proposed the hypothesis of "somatic markers," according to which emotional experiences create "marks" in the brain that guide future decisions, functioning as an alarm or incentive system that helps individuals navigate the world. Learning, therefore, is not a purely cognitive process; it is deeply influenced by the learner's emotional state. A safe and affectively positive learning environment facilitates attention, memory, and knowledge consolidation.

From this perspective, early childhood is understood as a period of intense brain plasticity, during which children's experiences shape the architecture of their brains. Interactions with the environment—especially social interactions—strengthen or weaken synaptic connections, defining the neural circuits that will support cognitive and emotional functions throughout life. In this context, excessive exposure to screens has the potential to negatively interfere with this process in several ways. The rapid and intense stimulation characteristic of digital content may lead to a state of hyperexcitability and attentional difficulties. Additionally, the blue light emitted by screens may disrupt circadian rhythms and melatonin production, affecting sleep quality, which is fundamental for memory consolidation and brain health (Cajochen et al., 2011).

In summary, the articulation of the theoretical constructs proposed by Piaget, Seligman, and Damásio offers a coherent and appropriate framework for reflecting on the risks associated with excessive screen use in early childhood. If cognitive development depends on concrete action, social-emotional development on human interactions, and neurobiological development on a rich and balanced environment, then replacing these fundamental experiences with excessive interaction with screens represents a threat to children's integral development.

## 2 Methodological Aspects

The present study is characterized as qualitative research with an exploratory purpose, organized through a systematic literature review. This method was chosen because it allows for the synthesis and analysis of multiple studies, providing a comprehensive and in-depth view of the research problem (Galvão & Pereira, 2014). To this end, a survey of scientific articles published on the topic was conducted, as detailed below.

### 2.1 Data sources and search strategy

The search for articles was carried out in the Scientific Electronic Library Online (SciELO) and the Virtual Health Library (BVS) databases, due to their relevance and broad coverage of scientific publications in the fields of health and human sciences within the Brazilian and Latin American context. The search strategy employed the following Health Sciences Descriptors (DeCS) and their combinations in Portuguese, along with their corresponding terms in English: ("tempo de tela" OR "screen time"); ("desenvolvimento infantil" OR "child development"); ("primeira infância" OR "early childhood"); ("desenvolvimento cognitivo" OR "cognitive development"); ("desenvolvimento socioemocional" OR "social-emotional development"). The searches were combined using the Boolean operators AND and OR, with the following main structure: ("tempo de tela" OR "screen time") AND ("desenvolvimento infantil" OR "child development") AND ("primeira infância" OR "early childhood"). For study selection, inclusion and exclusion criteria were defined in order to ensure the relevance and quality of the analyzed sample.

#### *2.1.1 Inclusion criteria*

a) **Type of study:** Original articles, review articles (systematic, integrative, or narrative), and essays;
b) **Language:** Publications in Portuguese, English, or Spanish;

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c) **Publication period:** Articles published within the last five years, covering the period from January 2020 to October 2025, in order to ensure the timeliness of the discussion, especially considering changes in habits during and after the COVID-19 pandemic;

d) **Population:** Studies focusing on children within the early childhood age range (0 to 6 years);

e) **Theme:** Studies that directly addressed the relationship between the use of electronic devices (screens) and at least one dimension of child development (cognitive, social-emotional, or physical);

f) **Studies conducted in Brazil:** To align with the research problem guiding this study.

*2.1.2 Exclusion criteria*

a) **Type of publication**: Theses, dissertations, books, book chapters, editorials, letters to the editor, and conference proceedings abstracts;

b) **Population**: Studies focused exclusively on older children, adolescents, or adults;

c) **Theme**: Articles that addressed the use of technology in education without focusing on its impacts on development, or that dealt with other types of non-interactive media;

d) **Duplicates**: Duplicate articles identified in more than one database were considered only once;

e) **Access**: Articles whose full text was not available for analysis.

## 3 Data Collection and Analysis

The selection of articles followed the recommendations of the PRISMA protocol (Preferred Reporting Items for Systematic Reviews and Meta-Analyses). The process was conducted in three stages, as described below:

1 Title and Abstract Screening: Reading of the titles and abstracts of all articles identified in the initial search in order to verify their relevance to the research topic;
2 Full-Text Reading: Full reading of the preselected articles to allow for the detailed application of the inclusion and exclusion criteria;
3 Final Selection: Definition of the final sample of studies to be included in the review.

After the selection process, data from the articles were extracted and listed in Section 3.1.1 for analysis, including the following information: authors and year of publication, title, journal, type of study, objectives, methodology, main results, and conclusions. Data analysis was conducted in a descriptive and qualitative manner, seeking to identify the main cognitive and social-emotional effects of screen use as reported in the literature. The results were grouped into thematic categories aligned with the specific objectives of the study and discussed in light of the theoretical framework adopted (Piaget, 1975; Seligman & Peterson, 2001; Damásio, 1996).

## 3.1 Selected Articles

After applying the inclusion and exclusion criteria, seven studies were selected to compose the final sample of this systematic review. Below, the characterization of these studies is presented, including authors, year of publication, type of study, sample, objectives, and main results.

### *3.1.1 Characterization of the studies selected in the systematic review*

**a) ARTICLE 1**

Authors/Year: Rocha et al. (2021)
Type of Study: Population-based cross-sectional study
Sample/Population: 3,155 children aged 0–60 months in Ceará, Brazil

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Objectives: To investigate the association between screen time and early childhood development in Brazilian children

Main Results: Sixty-nine percent of children were exposed to excessive screen time. Each additional hour of screen exposure was associated with impairments in communication (SMD −0.03), problem solving (SMD −0.03), and the personal–social domain (SMD −0.04). Screen exposure increased with age, reaching 85.2% among children aged 49–60 months.

**b) ARTICLE 2**

Authors/Year: Nobre et al. (2021)

Type of Study: Cross-sectional, descriptive, and exploratory study

Sample/Population: 180 children aged 24–42 months enrolled in public and private daycare centers.

Objectives: To analyze the determinants of screen time among children in early childhood.

Main Results: Sixty-three percent of children exhibited screen time greater than two hours per day. Television remained the main source of exposure. Screen time was positively associated with family resources, socioeconomic level, and language development. The main explanatory factors for longer screen time were socioeconomic level and language development.

**c) ARTICLE 3**

Authors/Year: Araújo et al. (2024).

Type of Study: Narrative literature review.

Sample/Population: Studies addressing the effects of screen exposure on children (2020–2024)

Objectives: To analyze the impact of screen exposure on children's cognitive, emotional, and behavioral development.

Main Results: Excessive screen use among children under five years of age was associated with language delays due to reduced verbal interactions. Children exposed to more than two hours of daily screen time showed a higher prevalence of attention deficits. Sleep disturbances were frequent, including reduced duration and quality of

sleep. Difficulties in social interaction were observed, especially in contexts involving non-educational content and lack of parental supervision.

**d) ARTICLE 4**

Authors/Year: Brito et al. (2023).

Type of Study: Qualitative study based on Bronfenbrenner's Bioecological Theory.

Sample/Population: Nine mothers of children under three years of age and six education professionals, Paraíba, Brazil.

Objectives: To identify the repercussions of the COVID-19 pandemic on digital screen use in very early childhood (0–3 years).

Main Results: The restrictions imposed by the pandemic made screens the only available resource for educational activities, interaction, leisure, and distraction, leading to an exponential increase in exposure time. Prior to the pandemic, electronic devices were used to a lesser extent and with greater supervision. During the pandemic, increased remote work among parents and the use of screens for educational purposes resulted in fewer restrictions.

**e) ARTICLE 5**

Authors/Year: Gondim et al. (2022).

Type of Study: Integrative literature review.

Sample/Population: 26 scientific articles addressing digital screen use in early childhood (2010–2020).

Objectives: To identify scientific knowledge regarding the influence of digital screen use on social development in early childhood.

Main Results: Routine screen use was associated with behavioral changes. The importance of establishing rules regarding schedules and content, as well as caregiver supervision, was highlighted. Concerns related to socialization and risks associated with early screen use were identified. The integrative synthesis pointed to both vulnerabilities and potentialities, emphasizing the need for shared moments and the reconfiguration of social interactions in early childhood.

**f) ARTICLE 6**

Authors/Year: Becker and Donelli (2024).

Type of Study: Qualitative study with in-depth interviews.

Sample/Population: Parents of infants aged 10–17 months from the metropolitan region of Porto Alegre, Brazil.

Objectives: To understand the reasons why parents provide digital media to infants.

Main Results: A discrepancy was identified between the dissemination of pediatric guidelines and parental access to such information. Parents, due to lack of knowledge and practical needs, provide various types of digital media to infants. Screens were perceived as positive and facilitative in caregiving, functioning as a "technological babysitter." Parents reported introducing digital media within the first six months of life, believing that early access would enhance cognitive skills and promote family interaction. However, concerns were also expressed regarding screen use at the expense of other forms of play.

**g) ARTICLE 7**

Authors/Year: Vita and Jorge (2023)

Type of Study: Quantitative cross-sectional study.

Sample/Population: 139 family members of children aged 1–5 years, São Paulo, Brazil.

Objectives: To examine the effects of deprivation of the physical school environment on child development during the pandemic, focusing on cognitive-linguistic, social-emotional, and motor aspects.

Main Results: All children (100%) were exposed to screens, with the majority using them for four hours or more per day. The social-emotional domain was the most negatively affected, followed by the cognitive-linguistic domain. Older children showed a stronger association with greater social-emotional impairment ($p = 0.0011$), while younger children exhibited fewer positive effects in the cognitive-linguistic domain ($p = 0.0137$). The absence of the school environment and the overall effects of the pandemic negatively influenced development, with negative effects outweighing positive ones.

The review described above highlights the methodological diversity of the selected studies, which include three quantitative population-based and cross-sectional investigations, two qualitative studies, and two literature reviews (narrative and integrative). The total sample comprised more than 3,400 Brazilian

children in early childhood, distributed across different regions of the country (Ceará, Paraíba, São Paulo, and Rio Grande do Sul), in addition to the qualitative perspectives of mothers, fathers, and education professionals, as well as the synthesis of multiple national and international studies. The seven studies converge in pointing to negative associations between excessive screen time and different dimensions of child development, particularly in the cognitive, social-emotional, and motor domains. Notably, the most recent studies (2023–2024) emphasize the impact of the COVID-19 pandemic on the exponential increase in screen exposure time, with 100% of the children exposed and the majority exceeding four hours per day—well above the recommendations of the Brazilian Society of Pediatrics.

## 3.2 Results and Discussion

The systematic literature review conducted in the SciELO and BVS databases, focusing on Brazilian studies published over the last five years, made it possible to identify an incipient yet thought-provoking body of evidence regarding the impacts of screen use on child development. The seven selected studies encompass different regions of Brazil (Ceará, Paraíba, São Paulo, and Rio Grande do Sul), with a total sample exceeding 3,400 children aged 0 to 6 years, in addition to qualitative perspectives from parents and education professionals. Data analysis revealed a scenario in which excessive screen exposure is a generalized reality, with percentages ranging from 63% to 100% of the children studied, frequently exceeding the time recommendations established by the Brazilian Society of Pediatrics. The results were organized into three major areas, aligned with the specific objectives of this study: cognitive effects, social-emotional consequences, and parental perceptions of the phenomenon.

### *3.2.1 Cognitive effects: attention, language, and executive functions*

The analyzed studies converge in indicating that excessive screen exposure in early childhood is associated with impairments in fundamental cognitive domains.

One of the most prominent effects concerns **attention**. The nature of digital content —characterized by rapid stimuli, abrupt transitions, and intermittent rewards — appears to shape a pattern of more superficial and less sustained attention. Araújo et al. (2024), in their narrative review covering studies published between 2020 and 2024, highlight that children exposed to more than two hours of daily screen time show a higher prevalence of attention deficits, as well as sleep disturbances marked by reduced duration and quality.

This finding corroborates Damásio's (1996) neuroscientific perspective, according to which the developing brain, in its period of greatest plasticity, adapts to the stimuli it receives, shaping neural circuits that privilege rapid responses at the expense of sustained reflection. A brain accustomed to the high speed and fragmentation of digital stimuli may struggle to engage in tasks that require prolonged concentration, such as reading or complex problem solving, which are foundational to school learning. Vita and Jorge (2023), in their study involving 139 families from São Paulo, found that 100% of the children were exposed to screens during the pandemic, with the majority exceeding four hours per day, and that the cognitive-linguistic domain was significantly impaired, especially among younger children.

Language development is another domain particularly sensitive to the effects of screen time. Several studies, including the large population-based investigation by Rocha et al. (2021) involving 3,155 children aged 0 to 60 months in Ceará, identified a statistically significant negative association between screen time and communication development. The authors demonstrated that each additional hour of screen exposure was associated with impairments in communication, problem solving, and the personal–social domain. Even more concerning is the finding that 69% of the children observed were exposed to excessive screen time, a proportion that increased to 85.2% among children aged 49 to 60 months.

Araújo et al. (2024) complement these findings by noting that excessive screen use among children under five years of age is associated with language delays due to reduced verbal interactions. The explanation for this phenomenon is multifactorial. First, the time children spend in front of screens often replaces

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opportunities for verbal interaction with caregivers. Language acquisition is a fundamentally social process, dependent on turn-taking, observation of facial expressions, and responsiveness to others—elements that are absent or impoverished in interactions with digital devices. Second, even so-called "educational" content rarely adapts to the child's individual pace and needs in the same way a human interlocutor does. From Piaget's (1975) perspective, language develops through action and the need to communicate within real interactions—conditions that passive or semi-passive screen experiences fail to adequately provide.

Becker and Donelli (2024), in their qualitative study with parents of infants aged 10 to 17 months in Porto Alegre, revealed that many parents introduce digital media within the first six months of life, mistakenly believing that such exposure enhances cognitive skills, when in fact it may compromise language development. Executive functions—which include skills such as planning, working memory, inhibitory control, and cognitive flexibility—are also affected. These functions, which develop intensively in early childhood and are crucial for self-regulation and learning, depend on the maturation of the prefrontal cortex. Excessive screen exposure may interfere with this process by limiting children's opportunities to practice these skills in real-life contexts.

Free play, rule-based games, and interaction with the physical environment naturally require planning, negotiation, and impulse control. Nobre et al. (2021), in a study involving 180 children aged 24 to 42 months, found that 63% exceeded two hours of daily screen time, with television remaining the main source of exposure. Paradoxically, screen time was positively associated with socioeconomic level, suggesting that families with greater resources have increased access to devices, but not necessarily more conscious use. By replacing these developmentally rich activities with digital content consumption, there is a risk of delaying the development of these essential competencies.

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*3.2.2 Social-emotional consequences: empathy, emotional regulation, and social skills*

In the social-emotional domain, the consequences of replacing face-to-face interactions with digital experiences are equally concerning and, in some studies, even more pronounced than cognitive impacts. Vita and Jorge (2023) demonstrated that the social-emotional domain was the most negatively affected during the pandemic, followed by the cognitive-linguistic domain, with older children showing a significant association with greater social-emotional impairment. This finding is particularly relevant when analyzed through the lens of the Positive Psychology framework proposed by Seligman and Peterson (2004), which emphasizes the importance of character strengths and virtues developed in childhood for well-being throughout life.

The development of **empathy** — the ability to take another person's perspective and understand their feelings — is a cornerstone of social competence. This learning occurs primarily through observation and interaction with other people. Gondim et al. (2022), in their integrative review of 26 articles on social development in early childhood, identified consistent concerns regarding socialization and the risks associated with early screen use, emphasizing the need for shared moments and the reconfiguration of social interactions. Screen-mediated interaction, as previously noted, is limited in its capacity to convey the complexity of human emotions. The absence of direct eye contact, body language, and other nonverbal communication cues may hinder the development of neural circuits associated with empathy and social cognition, as highlighted by Damásio (1996).

**Emotional regulation** — the ability to manage and express emotions appropriately — is another competency potentially compromised in this context. It is common for parents and caregivers to use electronic devices as a means of "calming" children or distracting them from negative emotions. Although effective in the short term, this strategy may be harmful in the long run. Instead of learning to cope with boredom, frustration, or sadness, children learn that there is an immediate and effortless escape from these feelings. This may undermine the development of internal self-regulation strategies and emotional resilience, concepts central to Positive Psychology. Children who do not learn to tolerate discomfort may become

adults with low frustration tolerance and greater difficulty coping with life's challenges.

Finally, **social skills** as a whole are affected. Rocha et al. (2021) found a negative association between screen time and the personal–social domain. Early childhood is the prime period for learning foundational skills such as sharing, turn-taking, negotiation, conflict resolution, and cooperation. These skills are intensively practiced during peer play, and the social isolation resulting from excessive screen use limits opportunities for such learning, potentially leading to difficulties in social interaction and a reduced repertoire of prosocial behaviors.

### *3.2.3 Parental perceptions and the impact of the COVID-19 pandemic*

A key aspect revealed by qualitative studies is the discrepancy between pediatric guidelines and families' everyday practices. Becker and Donelli (2024) identified a significant gap between the dissemination of pediatric recommendations discouraging screen exposure for children under two years of age and parents' actual access to and understanding of this information. The authors report that parents, due to lack of knowledge and practical demands, provide various forms of digital media to infants, often perceiving screens as positive and facilitative in caregiving, functioning as a "technological baby-sitter". Many parents argue that early exposure is important for enhancing cognitive skills and fostering family interaction, revealing a misguided perception of the benefits of screen use. At the same time, these parents express concern about screen use at the expense of other forms of play, highlighting an ambivalence that characterizes contemporary family–technology relationships.

The COVID-19 pandemic dramatically intensified this situation. Brito et al. (2023), in a qualitative study involving nine mothers of children under three years of age and six education professionals in Paraíba, found that pandemic-related restrictions made screens the only available resource for educational activities, interaction, leisure, and distraction, leading to an exponential increase in exposure time. Prior to the pandemic, electronic devices were used to a lesser extent and under greater supervision. During the pandemic, increased parental remote work and

the use of screens for educational purposes resulted in fewer restrictions. These findings are corroborated by Vita and Jorge (2023), who observed that 100% of children were exposed to screens during the pandemic, with the majority exceeding four hours per day, and that negative effects far outweighed positive ones. It is important to emphasize that the studies also highlight the role of mediating factors, such as content type and parental mediation. Educational content and shared screen use (co-viewing), in which parents actively engage with children by discussing what they are watching, may mitigate some negative effects. Gondim et al. (2022) stress the importance of establishing rules regarding schedules and content, as well as caregiver supervision. Nobre et al. (2021) likewise point out that screen time was positively associated with family resources and language development, suggesting that, in specific contexts and with appropriate mediation, screen use may be less harmful. Nevertheless, the evidence indicates that, in most cases, screen use is passive, solitary, and characterized by low-quality content, thereby amplifying the risks discussed in this section.

## 4 Final Considerations

The present systematic literature review, analyzed in light of the theoretical contributions of Piaget, Seligman, and Damásio, demonstrates that the excessive use of electronic devices as the primary learning reference in early childhood entails multidimensional and predominantly negative impacts on children's integral development. The findings indicate that early and prolonged immersion in the digital environment represents a significant challenge to children's cognitive, social-emotional, and neurobiological development.

At the cognitive level, in line with Piagetian theory, the replacement of active and concrete exploration of the environment with bidimensional interactions mediated by screens compromises the development of fundamental skills. The literature points to impairments in sustained attention, delays in language development, and negative effects on executive functions, which constitute the foundation for formal learning and self-regulation throughout life. With regard to the social-emotional dimension, analysis grounded in Positive Psychology reveals that the

reduction of face-to-face interactions in favor of screen time may undermine the development of competencies essential to well-being and social coexistence. Difficulties in developing empathy, the weakening of emotional regulation mechanisms, and the impoverishment of social skills emerge as concerning consequences, with the potential to affect mental health and the quality of future interpersonal relationships.

From a neurobiological perspective, the studies corroborate Damásio's view regarding the integration of emotion and cognition, as well as the importance of lived experiences in shaping brain architecture. Screen exposure may not only alter patterns of neural connectivity but also interfere with basic physiological processes, such as sleep, which are vital for memory consolidation and healthy brain development.

In light of these considerations, it is concluded that although technology is a present and important tool in the contemporary world, its use in early childhood must be carefully mediated and limited. The aim is not to demonize technology, but rather to recognize that, during this crucial stage of development, nothing replaces the richness of human interaction and exploration of the physical world. Recommendations for reduced screen time, high-quality content, and preferably active parental mediation are not mere formalities, but fundamental conditions to ensure that children can fully develop their cognitive, social-emotional, and physical potential.

By synthesizing the scientific evidence available in the Brazilian context over the last five years, this study reinforces the need for public policies and awareness campaigns to guide parents, educators, and health professionals regarding the risks associated with indiscriminate screen use. The future of a generation growing up immersed in digital technologies depends on our ability to balance the promises of technology with the enduring needs of human development.

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