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The Impact of Television and Mobile Device Screens on the Development of Children Aged 0 to 3 Years Students

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Abstract

In the digital era, infants and toddlers are frequently exposed to screen media. This article evaluates effects of screen exposure on children aged 0–3 years. A narrative integrative review synthesising empirical studies, meta-analyses, international and national guidelines, and recent reports, with focus on exposure measurement and contextual moderators (content quality, caregiver mediation, socioeconomic factors).

Excessive, unmediated screen exposure is associated with delayed expressive language, reduced contingent face-to-face interaction, poorer sleep quality and delayed sleep onset (notably with evening use), lower spontaneous physical activity, and challenges in behavioural self-regulation. Conditional benefits – such as video-calls and targeted educational or therapeutic apps – emerge mainly when media are age-appropriate and used with active caregiver engagement. Heterogeneity of measures and predominance of cross-sectional studies limit causal inference.

Recommend minimizing non-interactive screen time for under-3s, avoiding screens before bedtime, promoting caregiver-mediated uses and family media plans, and prioritizing longitudinal and intervention research.

Keywords: child development, digital media, television, smartphone, language development, emotional development

Introduction

Modern children grow up in a reality saturated with technology. From the earliest months of life, they are surrounded by screens–smartphones, tablets, computers, and televisions. In many families, these devices are an inseparable part of daily life. Infants and toddlers watch cartoons, listen to music, use educational apps, and engage in video calls. For many parents, screens have become a helpful tool in childcare – used to occupy, calm, or distract a child temporarily.

Meanwhile, children aged 0 to 3 go through a period of exceptionally intense biological and psychological development. During this time, brain structures responsible for speech, emotions, executive functioning, attention, and social relationships are forming rapidly (Shonkoff, Phillips, 2000). The environment–family, physical surroundings, and how time is spent–plays a critical role in shaping foundational competencies.

This article focuses on the impact of digital screens on the development of children in early childhood. It analyzes both direct consequences (e.g., speech delays, sleep disturbances) and indirect consequences (e.g., reduced social interaction, limited physical activity). Particular attention is paid to the recommendations of organizations such as the American Academy of Pediatrics (AAP), the World Health Organization (WHO), Zero to Three, and current research in developmental neuropsychology.

The goal of this article is to provide a comprehensive, evidence-based overview of how screen exposure affects children's early development and to offer practical strategies for parents, caregivers, and professionals to navigate media use responsibly in the first years of life.

Subject of research

The subject of this article is an analysis of the impact of exposure to screen-based images and content (television, smartphones, tablets, computers) on the multidimensional development of children from birth to 3 years of age. The study focuses on five key developmental areas: language acquisition and communication skills, socio-emotional development (including the quality of attachments and emotion regulation abilities), sleep quality and circadian rhythms, motor skills, and the potential use of technology as a supportive tool (e.g., educational apps, video calls, assistive technologies for children with disabilities). The article incorporates both empirical evidence from international literature and national data and reports relevant to Poland. The timeframe of the analysis covers contemporary research and the latest recommendations from international and national organizations, and the approach is synthetic and critical – the goal is to identify patterns of relationships between screen exposure and selected developmental indicators, and to formulate practical conclusions and recommendations.

Methodology

The article is of a review and integrative nature: a review of scientific literature, reports from international organizations (including the AAP and WHO), and available national studies and analyses (Polish reports and studies) was conducted, followed by a synthetic thematic analysis. The source selection criteria included: 1) empirical studies concerning the 0–3 age group; 2) review papers and meta-

analyses related to the impact of screen media on child development; 3) official guidelines and positions of pediatric and public health organizations; 4) national reports describing the scale of the phenomenon (descriptive and statistical data). The analysis was conducted multidimensionally – by identifying and comparing evidence pertaining to each developmental area: linguistic, socio-emotional, sleep and circadian rhythm, motor skills, and potential therapeutic/educational benefits.

The methods included: systematic literature searches in scientific databases (primary works and reviews), critical appraisal of study quality (particularly regarding study design, control of confounding variables, and types of designs – cross-sectional vs. longitudinal), and a narrative synthesis of results highlighting areas with stronger and weaker empirical support. Significant limitations of the sources were also indicated – in particular, the predominance of correlational over experimental studies and the problem of heterogeneity in measuring screen exposure and developmental outcomes. Ethical aspects refer to data protection standards and participant consent in primary studies, and in the case of reports – to the transparency of data sources.

Development of Children Aged 0–3: Mechanisms and Needs

The period from birth to age three is marked by rapid maturation of brain structures and the emergence of core cognitive functions. The infant brain exhibits extraordinary neuroplasticity – hundreds of thousands of new synaptic connections are formed daily (Gopnik, 1999). The quality of a child's early experiences– sensory, emotional, social, and physical – plays a fundamental role in shaping the developing nervous system. Through interaction with caregivers and exploration of their surroundings, children learn how the world works and begin to form their self-concept.

During this time, several key developmental domains evolve:

- Language acquisition (babbling, first words, sentence formation),
- Emotional regulation (expressing needs, responding to others),
- Social bonding (trust, attachment, non-verbal communication),
- Motor development (crawling, walking, manipulating objects),
- Executive functioning (working memory, attention, problem-solving).

Disturbances in any of these domains may have long-term effects on overall development. Researchers are increasingly interested in the role of digital media in this process – specifically, how the quantity and quality of screen exposure may support or interfere with typical development (Christakis, 2014, pp. 399–400).

Face-to-face interaction with caregivers, physical activity, and real-world sensory experiences are not optional extras – they are prerequisites for healthy development during this critical stage.

The Scale of the Phenomenon – Data from Poland and Worldwide

Reports from American and European organizations show that up to 90% of children under the age of two are regularly exposed to screen media (Rideout, Robb, 2020). The 2020 *Common Sense Media* report revealed that the average American infant spends more than one hour daily consuming screen content (Zimmerman, Christakis, Meltzoff, 2007, pp. 473–479). In Poland, a study conducted by the Empowering Children Foundation (Fundacja Dajemy Dzieciom Siłę) found that 63% of children aged 6 to 36 months use screens daily, with average exposure exceeding 90 minutes per day (Fundacja Dajemy Dzieciom Siłę, 2023).

This phenomenon intensified during the COVID-19 pandemic, when the closure of childcare institutions and remote working conditions for parents increased reliance on screens as a form of childcare (Radesky, Zuckerman, 2019, pp. 1070–1071). Many parents admit to using screen devices to:

- Calm the child during tantrums or fatigue,
- Provide entertainment while they attend to household tasks or work,
- Introduce educational content or language stimulation.

However, what is often perceived as harmless or even beneficial may, in reality, displace critical developmental experiences—such as verbal exchanges, eye contact, touch, and physical movement. The increasing reliance on screens among infants and toddlers poses a significant public health concern and calls for widespread education and preventive strategies.

The Impact of Screens on Language and Speech Development

Language and speech development is one of the most important indicators of a child's cognitive and social progress. During the first three years of life, children acquire essential communication skills – not only vocabulary and grammar, but also the ability to understand, respond, interpret, and express emotions through language. This process is fundamentally dependent on social interaction, particularly face-to-face communication with caregivers.

Language learning in early childhood relies on the active engagement of neural networks responsible for speech perception, phoneme production, and auditory categorization. Neuroimaging studies show that by 6 months of age, infants activate brain regions associated with language processing, but only in real-life, socially interactive contexts (Kuhl, Tsao, Liu, 2003, pp. 9096–9101).

Simply listening to language, such as from television or an app, is insufficient. Infants acquire language through dialogue, intonation, gestures, facial expressions, and shared attention – elements that are missing in screen-based interactions.

Research shows that children who learn language solely from screens acquire significantly fewer new words than children who engage in real conversations with adults. For example, a study by Kuhl et al. (2003) found that infants who were exposed to a foreign language in person could distinguish phonemes of that

language, while infants exposed to the same material via video could not (Christakis, Zimmerman, DiGiuseppe, McCarty, 2004, pp. 708–713).

Similarly, Christakis and Zimmerman (2007) demonstrated that each additional hour of television per day in children aged 8 to 16 months was associated with a 6–8% reduction in vocabulary size (Chonchaiya, Pruksananonda, 2008, pp. 977–982).

Globally, speech and language delays are increasingly diagnosed in children under age three. One of the contributing factors is excessive screen time, which replaces direct interaction with caregivers. A study by the Canadian Pediatric Society found that 18-month-old children who were exposed to screens for more than 1 hour per day were twice as likely to exhibit delayed expressive speech (Madigan, Browne, Racine, Mori, Tough, 2019, pp. 244–250).

Additional symptoms observed by speech-language pathologists include:

- Echolalia (repetitive speech),
- Flat intonation,
- Poor pragmatic language use (e.g., not asking questions or commenting),
- Impaired narrative skills and symbolic communication.

In many homes, children now spend more time interacting with screens than with adults. This shift results in screens acting as the "language source" – with cartoons serving as narrators and apps replacing dialogue. Although technology can be a developmental tool for older children, it cannot replicate the richness of real-time, emotionally responsive human communication during early childhood.

A study by Hirsh-Pasek, Zosh, and Golinkoff, (2015, pp. 3–34) showed that preschool-aged children learned better from educational apps only when an adult was present to interpret and discuss the content. Children left to interact with the screen alone showed minimal language transfer from the digital environment to the real world.

Emotional and Social Development and Digital Media

Emotional and social development in the first three years of life is rooted in the quality of early relationships, especially with primary caregivers. This is the time when children begin to form emotional security, trust, empathy, and the ability to self-regulate. Excessive screen exposure, especially when it dominates the child's daily experiences, can significantly disrupt these developmental processes. This section explores how digital media affect attachment, social engagement, and emotional growth in early childhood.

Bowlby's (1969) attachment theory emphasizes that a child's emotional development is built on predictable, responsive, and emotionally attuned interactions with a primary caregiver. From the first months of life, infants begin regulating their emotions through the facial expressions, voice, and physical presence of their

caregivers. These early exchanges help children understand emotional cues and develop trust.

When screens replace human interaction, the development of social synchrony – eye contact, turn-taking, shared attention – is compromised (Tronick, Cohn, Shea, 1986, pp. 349–371). A child who spends more time looking at a screen than at a caregiver's face misses critical moments of emotional learning.

Children exposed to high levels of screen time during early development often demonstrate:

- Poor facial expression recognition,
- Limited facial mimicry,
- Reduced social initiative,
- Avoidance of eye contact.

Heffler and Sienko (2020, pp. 420–426) found that toddlers aged 12–36 months who were exposed to screens for more than 2 hours per day showed a significantly higher incidence of autism-like behaviors, even if they did not meet formal diagnostic criteria. These behaviors are not necessarily signs of autism but may indicate a lack of social-emotional stimulation in early environments.

Empathy and emotional literacy are not innate – they develop through daily modeling by caregivers. A child learns to understand joy, anger, fear, and sadness by observing and participating in emotionally rich interactions. When screen content replaces this process, the child may struggle to recognize and regulate emotions in real-life social contexts.

A study by Nilsen, Zamani, and Lesaux (2019, pp. 781–789) showed that children with frequent screen exposure were less likely to initiate interactions with peers, had difficulty resolving conflicts, and showed delayed emotional self-regulation compared to their peers with lower screen time.

The term digital relational deprivation refers to the erosion of emotional connection caused by excessive digital media use in families. Even when a parent is physically present, if they are absorbed in their phone rather than engaging with the child, the child may experience a lack of being seen, heard, and emotionally validated (Radesky et al., 2014, pp. 843–849).

Tronick's "still-face" experiments demonstrated that infants as young as 3 months become visibly distressed when caregivers become unresponsive – even for a few seconds (Tronick, Als, Adamson, Wise, Brazelton, 1978, pp. 1–13). Similar reactions occur when the caregiver's attention is consistently directed at a device rather than at the child.

Digital content – especially apps and cartoons – is often hyperstimulating, with fast-paced visuals, bright colors, and loud sounds. These features can interfere with the development of self-soothing and attention regulation. Instead of learning to cope with boredom, frustration, or delay, children expect immediate gratification from screen-based entertainment.

Radesky et al. (2016) found that children who were frequently given screens to calm down were less likely to develop internal self-regulation skills and more likely to display impulsivity and tantrums in unfamiliar settings (Radesky, Schumacher, Zuckerman, 2015, s. 1–3).

Sleep, Circadian Rhythm, and Screen Use Before Bedtime

Sleep during the first three years of life plays a critical role in neurological, physical, and emotional development. It supports concentration, memory consolidation, emotional regulation, immune function, and overall mood. At the same time, infants and toddlers often experience irregular sleep patterns and require stable routines. Increasingly, researchers express concern about the negative effects of screen exposure on young children's sleep quality and rhythms.

Newborns and infants typically sleep 14–17 hours per day, though not in consolidated blocks. Around 6 months of age, the circadian rhythm begins to stabilize under the influence of melatonin – a hormone produced in response to darkness (Mindell, Owens, 2015). Establishing a consistent daily routine, dim lighting, and a calm environment is essential for healthy sleep development.

However, blue light emitted from screens (in the 460–480 nm range) inhibits melatonin production, delaying sleep onset and disrupting the sleep-wake cycle.

Electronic screens emit short-wavelength light that stimulates the suprachiasmatic nucleus of the hypothalamus – the brain's internal clock – leading to circadian rhythm disturbances. Hale and Guan (2015) found that children and adolescents who used screens in the evening experienced:

- Shorter total sleep time,
- Increased nighttime awakenings,
- Lower sleep quality (LeBourgeois, Hale, Chang, Akacem, 2017, pp. 92–96).

These effects are also observed in children under age 3, particularly when TVs or tablets are used during pre-sleep routines.

Sleep deprivation in toddlers does not always present as sleepiness. Instead, overtired children often become:

- Irritable,
- Hyperactive,
- Impulsive,
- Emotionally dysregulated.

A study by Cheung et al. (2017) showed that toddlers who slept fewer than 10 hours per night exhibited more frequent behavioral issues, including aggression and attention problems (Hale, Guan, 2015, s. 50–58). These children also struggled with social interaction and were less responsive to caregivers.

In many households, screens are incorporated into bedtime routines – "just one cartoon," a lullaby video, or a game on a tablet. Parents may believe these

tools help calm the child, but in reality, the sensory stimulation can lead to overarousal, delaying sleep and lowering sleep quality (Cheung et al., 2017).

Additionally, children may become dependent on screens to fall asleep, developing sleep associations that can interfere with self-soothing abilities.

Experts advise that children:

– Under 18 months should avoid screens altogether,
– Ages 2–3 should be limited to no more than 1 hour per day, with co-viewing (Nathanson, Alade, 2016, pp. 579–593).
– Avoid all screens at least 1 hour before bedtime.

Instead of screens, families can implement soothing bedtime rituals:

– Reading together,
– Gentle massage,
– Soft music or lullabies,
– Storytelling,
– Prayer or mindfulness for children.

These activities support melatonin production, emotional bonding, and relaxation, enhancing both the quantity and quality of sleep.

Motor and Sensory Development and Screen Devices

Motor and sensory development during infancy and early childhood lays the foundation for physical health, learning, and emotional regulation. Movement and sensory exploration help children develop body awareness, balance, coordination, and cognitive skills. Excessive screen exposure can interfere with these processes by reducing opportunities for active movement and multisensory experiences that are critical for sensory integration and neuromotor development.

Even before walking, infants engage in essential motor activities – kicking, rolling, reaching, crawling. These actions stimulate muscle development, bilateral coordination, and brain maturation. As the child grows, gross motor milestones like crawling and walking coincide with fine motor development such as grasping and manipulating objects (Zelazo et al., 2013, pp. 16–33).

These experiences not only build physical capacity but also contribute to executive functioning, spatial awareness, and emotional self-regulation. Children who are physically active are better able to focus, process stimuli, and manage emotions.

Screen-based activities typically involve static posture – sitting or lying down while watching videos or using a tablet. These prolonged periods of inactivity displace time that should be spent crawling, climbing, or playing. Even when children interact with touchscreens, the movement is limited to repetitive fine motor gestures, such as tapping or swiping.

Tremblay et al. (2017, p. 874) recommend that children aged 1–3 years engage in at least 180 minutes of physical activity daily, spread throughout the day, and that screen time be minimized or avoided. However, many parents unintentionally substitute screens for physical play, particularly in small indoor spaces or during bad weather.

Sensory integration is the brain's ability to organize information from various sensory systems (touch, sight, hearing, balance, proprioception) to produce appropriate behavioral and motor responses. This capacity is developed through diverse real-world sensory experiences – running, jumping, rolling, handling materials of different textures.

When children lack these opportunities due to prolonged screen use, symptoms may include:

- Delayed reflex integration,
- Poor hand-eye coordination,
- Increased sensitivity to touch or noise,
- Avoidance of physical activity,
- Balance and posture issues (Ayres, 2005).

Screens overstimulate visual and auditory pathways, while under-stimulating vestibular and tactile systems, leading to an imbalanced sensory profile.

Frequent use of screens in poor posture (e.g., “smartphone neck”) is linked to muscle imbalances, curvature of the spine, and reduced core strength. Studies in Poland have shown that even preschool children display early signs of postural deviation, which correlates with screen time and lack of physical activity (Czaprowska, Nowotny, Pięta, 2018, pp. 108–114).

The child's developing musculoskeletal system is particularly vulnerable to habits such as slouching, prolonged sitting, and asymmetrical movements. These habits can persist into school age, affecting health, confidence, and classroom performance.

Young children need active, full-body movement that includes climbing, crawling, dancing, pushing, pulling, and jumping. These activities support:

- Motor planning,
- Bilateral integration,
- Proprioceptive awareness,
- Behavioral regulation.
- The World Health Organization recommends:
- No screen time under age 2,
- No more than 1 hour per day for ages 2–4, and only if balanced by 3 hours of daily physical activity (WHO, 2019a).

Encouraging outdoor play, exploration, and physical games is one of the most effective strategies to counteract the sedentary effects of screens and foster holistic development.

Potential Benefits of Digital Media (When Used Appropriately)

Despite the many risks associated with excessive and unregulated screen exposure, it is important not to overlook the developmental potential of digital media, provided they are used appropriately. When high-quality content is chosen, time is limited, and a caregiver is actively engaged, screen-based experiences can offer educational, emotional, and relational benefits – especially in specific contexts or for children with special needs.

One of the most clearly beneficial uses of digital media for young children is video calling with distant family members. Maintaining relationships with grandparents, siblings, or other relatives via video platforms helps foster emotional bonds, even across physical distances. Unlike passive video watching, video calls are interactive and socially responsive, which makes them more developmentally appropriate (McClure, Chentsova-Dutton, Barr, Heller, 2018, pp. 12–22).

A study by McClure, Chentsova-Dutton, Barr, and Heller (2018) showed that children aged 15–24 months responded with more engagement, facial expression, and verbal responses during live video calls than when watching pre-recorded videos (Myers, 2016).

Educational apps can support cognitive development when used in specific, controlled conditions:

- Content is age-appropriate and simple,
- Apps avoid overstimulation (e.g., no flashing lights or loud noises),
- The child uses the app with an adult, who interprets and expands on the experience,
- The app encourages active thinking, not passive consumption.

Hirsh-Pasek et al. (2015, pp. 3–34) demonstrated that children achieved better language comprehension and retention when an adult engaged with them during app use. In contrast, solo use led to minimal learning and poor transfer of knowledge to real-life contexts.

Some animated shows and educational video programs are created with input from child development experts and can serve as tools for learning empathy, emotional expression, or social problem-solving. However, these benefits are only realized when an adult co-watches and guides the experience.

Shared viewing enables:

- Talking about characters' emotions,
- Connecting the story to the child's real-life experiences,
- Expanding vocabulary and narrative skills.

Linebarger and Walker (2005) found that children who watched educational programming with a caregiver had significantly better language outcomes than those who watched random content alone (Linebarger, 2005, pp. 624–645).

In therapeutic contexts, digital tools can be especially helpful for children with developmental delays or disabilities. Examples include:

– Augmentative and alternative communication (AAC) apps for non-verbal children,

– Emotion recognition software for children with autism spectrum disorder (ASD),

– Interactive apps supporting fine motor skills or visual tracking.

Research by Ganz et al. (2012, pp. 60–74) supports the use of customized digital tools as part of a comprehensive intervention plan for children with autism and language impairments.

To ensure that digital media contributes positively to development, families should follow a set of evidence-based principles:

Table 1. Summary of Key Screen Time Guidelines for Young Children

Guideline	Description
Adult presence	The caregiver should talk, ask questions, and explain.
Time limits	No more than 1 hour/day for 2–3-year-olds (WHO, 2019b).
Quality content	Choose educational, age-appropriate, and non-violent content.
Balance	Screen time should never replace human interaction, movement, or outdoor play.
No screens before bedtime	At least 1 hour of screen-free time before sleep.

By using screens mindfully and sparingly, families can mitigate risks and harness digital tools for meaningful developmental support.

Recommendations for Parents and Professionals

In light of the growing concerns surrounding screen exposure in early childhood, leading medical and developmental organizations – alongside psychologists, speech therapists, and pediatricians – have formulated evidence-based guidelines. These recommendations are intended to minimize developmental risks and support families in creating healthy, screen-balanced environments during the formative years of life.

In its 2016 policy statement, the AAP outlined the following screen time recommendations for young children (American Academy of Pediatrics, 2016):

1. Children under 18 months: Avoid screen use entirely, except for video chatting.
2. Children 18–24 months: May be introduced to high-quality content, but only with an adult actively present and engaged.
3. Children 2–5 years: Limit to 1 hour per day, with co-viewing and discussion.
4. Avoid screens during meals, before bed, and in the child's bedroom.
5. Families are encouraged to create a media use plan and model healthy digital behavior.

In 2019, the WHO published strict recommendations focused on screen use, physical activity, and sleep for children under 5 (WHO, 2019c):

1. Under age 1: No screen time.
2. Ages 1–2: Screen time should still be avoided completely.
3. Ages 2–4: Screen time should not exceed 1 hour per day.
4. All children in this age group should engage in at least 180 minutes of physical activity daily, including moderate to vigorous play.
5. Children should receive 11–14 hours of quality sleep per day, including naps.

Many parents use digital media with the best of intentions, but lack awareness of the developmental consequences of early screen exposure. Therefore, professionals must take an active role in educating families:

1. In nurseries and preschools – through workshops, printed materials, and parent meetings.
2. In pediatric and psychological practices – by discussing screen habits during check-ups.
3. In media and public campaigns – using relatable messages like "Your face is the best screen for your baby."

Child development specialists (e.g., psychologists, speech therapists, pediatricians, occupational therapists) should incorporate screening for screen use into standard practice and offer guidance for alternatives to screens.

Everyday digital hygiene practices include:

1. Turning off screens during meals.
2. Putting away smartphones when the child seeks attention.
3. Setting limits on screen time (when, where, how long).
4. Having screen-free zones (e.g., bedrooms, dining rooms).
5. Avoiding screen use as a calming strategy during emotional outbursts.

Suggested alternatives to screen time:

1. Sensory play (e.g., playdough, water play, finger painting),
2. Reading books aloud, even to infants,
3. Physical activities like crawling, rolling, jumping, dancing,
4. Music and singing, to build rhythm and motor coordination,
5. Social play with other children or family members.

Organizations like AAP and UNICEF encourage families to create a Family Media Plan that outlines:

1. Who can use screens, and when?
2. Where are screens allowed or restricted?
3. Which apps, programs, or games are appropriate?
4. How is screen use balanced with sleep, meals, outdoor play, and social time?

Such plans help families stay consistent and empower children to develop healthy lifelong media habits.

Final conclusions

The first three years of a child's life are a critical window for neurological, emotional, linguistic, and physical development. It is during this time that the foundations of learning, self-regulation, communication, and social bonding are established. In this context, digital screens – television, smartphones, tablets – can be either supportive tools or developmental disruptors, depending on how they are used.

This review of current research and international guidelines clearly shows that excessive and unregulated screen exposure poses a significant risk to early development. Documented consequences include:

- Delays in speech and language development,
- Reduced emotional engagement and empathy,
- Disrupted sleep and circadian rhythm,
- Lower levels of physical activity and sensory input.

At the same time, well-curated, age-appropriate content – when used with adult participation – can provide educational value, support family connection, and assist children with specific developmental needs.

The most essential factor remains face-to-face interaction. Real human contact cannot be replaced by screen-based content. Caregivers, educators, and healthcare professionals should work together to promote media literacy, support digital balance, and reinforce the idea that the caregiver's face is the most powerful screen a child will ever need.

References

American Academy of Pediatrics (2016). Media and Young Minds. *Pediatrics*, *138*(5), e20162591.

Ayres, A.J. (2005). *Sensory Integration and the Child*. Los Angeles: Western Psychological Services.

Bowlby, J. (1969). *Attachment and Loss*. Vol. 1: *Attachment. Attachment and Loss*. New York: Basic Books.

Cheung, C.H.M., Bedford, R., Saez, D., Urabain, I.R., Karmiloff-Smith, A., Smith, T.J. (2017). Daily touchscreen use in infants and toddlers is associated with reduced sleep and delayed sleep onset. *Sci Rep*, *7*, 46104.

Chonchaiya, W., Pruksananonda, C. (2008). Television viewing associates with delayed language development. *Acta Paediatr*, *97*(7), 977–982.

Christakis, D.A. (2014). Interactive media use at younger than the age of 2 years: Time to rethink the American Academy of Pediatrics guideline? *JAMA Pediatr*, *168*(5), 399–400.

Christakis, D.A., Zimmerman, F.J., DiGiuseppe, D.L., McCarty, C.A. (2004). Early television exposure and subsequent attentional problems in children. *Pediatrics*, *113*(4), 708–713.

Czaprowska, K., Nowotny, J., Pięta, M. (2018). Postawy ciała dzieci w wieku przedszkolnym – zależność od aktywności fizycznej i siedzącego trybu życia. *Med Og Nauk Zdr.*, *24*(2), 108–114.

Fundacja Dajemy Dzieciom Siłę (2023). *Dzieci i media cyfrowe – raport 2023*. Warszawa.

Ganz, J.B., Earles-Vollrath, T.L., Heath, A.K., Parker, R.I., Rispoli, M.J., Duran, J.B. (2012). A meta-analysis of single-case research on aided augmentative and alternative communication systems with individuals with autism spectrum disorders. *J Autism Dev Disord*, *42*(1), 60–74.

Gopnik, A. (1999). *The Scientist in the Crib*. New York: HarperCollins.

Hale, L., Guan, S. (2015). Screen time and sleep among school-aged children and adolescents: A systematic literature review. *Sleep Med Rev*, *21*, 50–58.

Heffler, K.F., Sienko, D.M. (2020). Media exposure and early language and social development. *J Dev Behav Pediatr*, *41*(6), 420–426.

Hirsh-Pasek, K., Zosh, J.M., Golinkoff, R.M. (2015). Putting education in "educational" apps: Lessons from the science of learning. *Psychol Sci Public Interest*, *16*(1), 3–34.

Hirsh-Pasek, K., Zosh, J.M., Golinkoff, R.M., Gray, J.H., Robb, M.B., Kaufman, J. (2015). Putting education in "educational" apps: Lessons from the science of learning. *Psychol Sci Public Interest*, *16*(1), 3–34.

Kuhl, P.K., Tsao, F.M., Liu, H.M. (2003). Foreign-language experience in infancy: Effects of short-term exposure and social interaction on phonetic learning. *PNAS*, *100*(15), 9096–9101.

LeBourgeois, M.K., Hale, L., Chang, A.M., Akacem, L.D. (2017). Montgomery-Downs HE, Buxton OM. Digital media and sleep in childhood and adolescence. *Pediatrics*, *140*(Suppl 2), S92–S96.

Linebarger, D.L., Walker, D. (2005). Infants' and toddlers' television viewing and language outcomes. *Am Behav Sci, 48*(5), 624–645.

Madigan, S., Browne, D., Racine, N., Mori, C., Tough, S. (2019). Association between screen time and children's performance on a developmental screening test. *JAMA Pediatr*, *173*(3), 244–250.

McClure, E.R., Chentsova-Dutton, Y., Barr, R.F., Heller, J. (2018). "FaceTime doesn't count": Preschoolers and video chat. *J Appl Dev Psychol*, *59*, 12–22.

Mindell, J.A., Owens, J.A. (2015). *A Clinical Guide to Pediatric Sleep: Diagnosis and Management of Sleep Problems*. Lippincott: Williams & Wilkins.

Myers, L.J., LeWitt, R.B., Gallo, R.E., Maselli, N.M. (2016). Baby FaceTime: Can toddlers learn from interactive video chat? *Dev Sci*, *20*(4), e12390.

Nathanson, A.I., Alade, F. (2016). The bedtime story: How screen media may influence young children's sleep. *Infant Child Dev*, *25*(6), 579–593.

Nilsen, E.S., Zamani, M., Lesaux, N.K. (2019). The impact of screen media use on children's social development. *J Child Psychol Psychiatry*, *60*(7), 781–789.

Radesky, J., Kistin, C., Zuckerman, B., Nitzberg, K., Gross, J., Kaplan-Sanoff, M., Augustyn, M., Silverstein, M. (2014). Patterns of mobile device use by caregivers and children during meals in fast food restaurants. *Pediatrics*, *133*(4), e843–e849.

Radesky, J.S., Schumacher, J., Zuckerman, B. (2015). Mobile and interactive media use by young children: The good, the bad, and the unknown. *Pediatrics*, *135*(1), 1–3.

Radesky, J.S., Zuckerman, B. (2019). Electronic media and young children's health. *JAMA*, *321*(11), 1070–1071.

Rideout, V., Robb, M.B. (2020). *The Common Sense Census: Media Use by Kids Age Zero to Eight*. San Francisco: Common Sense Media.

Shonkoff, J.P., Phillips, D.A. (2000). *From Neurons to Neighborhoods: The Science of Early Childhood Development.* Washington: National Academy Press.

Tremblay, M.S. et al. (2017). Canadian 24-Hour Movement Guidelines for the Early Years (0–4 years): An integration of physical activity, sedentary behaviour, and sleep. *BMC Public Health*, *17*(Suppl 5), 874.

Tronick, E., Als, H., Adamson, L., Wise, S., Brazelton, T.B. (1978). The infant's response to entrapment between contradictory messages in face-to-face interaction. *J Am Acad Child Psychiatry*, *17*(1), 1–13.

Tronick, E., Cohn, J., Shea, E. (1986). The interactive structure of face-to-face communication in the infant. *Emot Dev*, 349–371.

World Health Organization (2019a). *Guidelines on physical activity, sedentary behaviour and sleep for children under 5 years of age*. Geneva.

World Health Organization (2019b). *To grow up healthy, children need to sit less and play more*. WHO: News Release.

World Health Organization (2019c). *Guidelines on physical activity, sedentary behaviour and sleep for children under 5 years of age*. Geneva.

Zelazo, P.R., Anderson, J.E., Richler, J., Wallner-Allen, K., Beaumont, J.L., Weintraub, S. (2013). NIH Toolbox cognition battery (CB): Measuring executive function and attention. *Monogr Soc Res Child Dev*, *78*(4), 16–33.

Zimmerman, F.J., Christakis, D.A., Meltzoff, A.N. (2007). Television and DVD/video viewing in children younger than 2 years. *Arch Pediatr Adolesc Med.*, *161*(5), 473–479.