Screen Time vs. Speaking Time: A Qualitative Comparison of Speech Development in Toddlers with Different Gadget Use Patterns

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Abstract

Purpose – This study investigates how different gadget use patterns affect toddler speech development, addressing concerns about passive screen time limiting verbal interaction opportunities.

Design/methods/approach – A qualitative case study design was used to gain in-depth insights into children's behavior in their social context. Participants were selected purposively based on parental reports of gadget use. Inclusion criteria were toddlers aged 1 year 8 months to 4 years (M = 2.75 years) with typical development and no diagnosed disorders. Exclusion criteria included neurological conditions and prior speech-language therapy. The final sample consisted of 16 toddlers (7 girls, 9 boys), categorized into intensive users (frequent, prolonged exposure to non-interactive content) and limited users (gadgets used mainly for calls or video chats with relatives). Data collection included semi-structured parent interviews (30–45 minutes), naturalistic observation, and developmental screenings by a licensed child psychologist. Validity was ensured through triangulation and member checking. Data were analyzed using thematic analysis involving coding, categorization, and theme development.

Findings – Thematic analysis identified three key themes: rich verbal interaction fosters early speech, passive screen exposure hinders language acquisition, and early or unsupervised gadget use disrupts developmental timing. Children with limited gadget use developed age-appropriate speech, used spontaneous verbal expressions, and required no speech therapy. In contrast, toddlers with intensive gadget use showed limited vocabulary, reduced responsiveness, and in many cases required speech therapy. These developmental disparities were closely linked to differences in caregiver interaction, content type, and exposure duration.

Research implications/limitations – This study offers contextual insight from Indonesia using triangulated qualitative methods, though its small sample limits generalizability. Broader, mixed-method studies are recommended.

Practical implications – The findings emphasize limiting passive gadget use and encouraging active verbal interaction. Parenting programs and early education should promote language-rich environments and conscious media use. Digital tools should support interactive, not passive, use. Early intervention, including parental involvement and therapy, is essential.

Originality/value – This study adds to the discourse on early media exposure by offering practical insights for parents, educators, and policymakers to support toddlers' speech development.

Keywords Early childhood, Gadget use, Screen time, Speech development, Toddler

Paper type Research paper

1. Introduction

In the current digital era, the use of gadgets such as smartphones, tablets and other electronic devices has become an inseparable part of everyday life (Rashid Said Al Mushaiqri & Sulistio, 2024). This technology not only affects adults (Krisnana et al., 2022; Sarla, 2019), but is also increasingly used by children, even from an early age (Setiani, 2020; Wahyuningtyas et al., 2022). Many parents perceive gadgets as educational tools that support learning and development, encouraging early exposure. However, recent studies show that excessive use is linked to negative outcomes such as poor social interaction, reduced physical activity, and academic decline (Kuriakose et al., 2020). This is supported by the many applications and digital content which are claimed to be able to help children's cognitive development and motor skills (Vicky et al., 2023).

However, despite the various benefits offered, there is growing concern about the negative impact of excessive gadget use on children, especially in terms of speech and language development (Maulana, 2020). Direct interactions and verbal communication with parents or caregivers are often replaced by time spent in front of a screen. The lack of real verbal stimulation and social interactions that are important for language development can be marginalized due to children's too much engagement with digital devices (Brushe et al., 2024). This fact raises the question of whether early and passive screen exposure contributes to delays in expressive and receptive language development during the critical period of early childhood. Previous research has shown that children who spend too much time in front of screens tend to experience delays in their speech development (Nugraha et al., 2019; Pasaribu et al., 2023). With the increasingly widespread use of gadgets among children, it is important to understand in more depth how this technology can affect their language and speech development, so as to provide better guidance for parents and educators in regulating the use of gadgets for children.

Speech development in early childhood is a very important aspect of development. Speech is not only a means of communication (Weng & Qin, 2021), but also the foundation for children's cognitive and social development (Forrester, 2013; Heald & Nusbaum, 2014). Through the ability to speak, children can express their thoughts, needs and feelings, as well as interact with their surrounding environment. The ability to communicate effectively helps children understand and interpret the world around them, which in turn encourages the development of other cognitive skills, such as problem solving and critical thinking (Haslett & Samter, 2020).

In addition, good speech development is closely related to academic achievement later in life. Children who have well-developed speech skills tend to adapt more easily to formal learning environments, such as at school. They excel at understanding instructions, participating in class discussions, and mastering basic literacy skills, such as reading and writing. In other words, optimal speech development in early childhood can provide a strong foundation for academic success and lifelong learning (Cronin et al., 2020).

Furthermore, speech development also plays a central role in the development of social and emotional relationships. Children who have good speaking skills are better able to build and maintain relationships with peers and adults. They can communicate effectively, resolve conflicts, and express emotions in healthy ways (Rautakoski et al., 2021). In contrast, children with speech delays often face challenges in social interactions, which can impact their self-esteem and emotional health. Therefore, ensuring proper speech development from an early age is very important to support the child's overall development, both cognitively, academically and socially-emotionally (Irwin et al., 2002; Wren et al., 2023).

As the use of gadgets becomes more widespread among children, educators, psychologists and parents are starting to express concerns about the potential negative impacts they may have (Liza et al., 2023; Yohana & Mulyono, 2021). Gadgets, although offering a variety of educational benefits (Griffith et al., 2022; Wanti et al., 2023; Winarto et al., 2020), can also reduce important verbal interactions between children and parents or caregivers. The face-to-face interactions that play an important role in language learning and the development of communication skills (Neff & Martin, 2023) are often replaced by time spent in front of a screen (Stieger et al., 2023). Children who are more exposed to gadgets tend to spend less time talking and interacting with the people

around them, which can have a negative impact on the development of their speech skills (Maulana, 2020).

In addition, child psychologists have noted an increase in the number of cases of speech delays associated with excessive use of gadgets. Children who spend too much time in front of screens often have difficulty developing a broad vocabulary and the ability to form complex sentences. The content offered by gadgets, although perhaps educational, often does not provide the verbal stimulation necessary for optimal language development. The lack of dynamic two-way interaction, which usually occurs in face-to-face conversations, can limit children's opportunities to practice and improve their speaking skills (Putri & Eliza, 2021).

This concern is also reinforced by a number of studies showing a correlation between excessive use of gadgets and delayed language development. These studies found that children who were exposed to a lot of gadgets tended to show lower speech abilities compared to those who engaged in more social and verbal interactions (Pasaribu et al., 2023). These concerns are increasingly pushing educators and parents to reconsider the role of gadgets in children's daily lives, and to look for ways to balance technology use with the face-to-face interactions that are essential for healthy speech development (Neff & Martin, 2023). Thus, understanding and managing the impact of gadget use is becoming increasingly important to ensure children's optimal development.

While prior studies have examined the relationship between screen time and language development, many have relied on quantitative, correlational approaches that primarily measure screen duration and general developmental outcomes (Nurhafani et al., 2023; Tan et al., 2018). These studies often identify associations between excessive screen use and delays in speech or attention, but they seldom explore the underlying mechanisms behind these outcomes. More recent work by Azzahara et al. (2023) highlights concerns regarding reduced verbal interaction and environmental stimulation; however, such findings remain fragmented and are rarely examined through in-depth, contextual analysis. To date, few qualitative or mixed-methods studies have systematically investigated how patterns of gadget use, particularly passive exposure without caregiver mediation, disrupt opportunities for verbal exchange, which are essential during the early stages of language acquisition. Thus, a deeper exploration of these factors is needed to provide educators, psychologists, and parents with more nuanced, evidence-based strategies for managing technology use in support of children's speech development.

In East and Central Java, anecdotal reports and local practitioner observations suggest that many families encounter challenges in regulating toddlers' gadget use, particularly in low- to middle-income communities. At the same time, access to early intervention services such as speech therapy remains limited, especially outside urban centers (Suparto & Mawardah, 2016). These contextual issues raise concerns about potential delays in speech development linked to early and passive screen exposure. The choice of this setting reflects its socio-cultural diversity and the widespread presence of digital devices in daily family life, making it a meaningful location to explore how screen exposure intersects with early language development. Moreover, the limited availability of speech-language support in the region highlights the urgency of context-sensitive, in-depth research (Putri AS et al., 2025). This study adopts a qualitative case study approach to illuminate the nuanced dynamics of parent, child interactions and media use patterns in the home environment, an area that remains underexplored, especially within the Indonesian context and in contrast to prior studies that rely on quantitative or large-scale data.

Although a number of studies have established correlations between screen time duration and speech delays, most have relied on quantitative methods and have not examined the socio-cultural nuances of device use and its impact on verbal interactions in depth. Few qualitative studies have explored how patterns of gadget use, beyond just duration, affect the speech development of toddlers within Indonesian family settings. To address this gap, this study adopts a case study approach grounded in Vygotsky's socio-interactionist theory and media displacement theory, which emphasize the importance of social interaction in early language development and how media use may displace such interaction. Accordingly, this study asks how do different patterns of gadget use (intensive vs. limited), as shaped by caregiver interaction and media

exposure, relate to toddlers' speech development in the Indonesian home context. The findings are expected to provide contextually relevant and practical insights for parents, educators, and policymakers in supporting healthy speech development during the early years.

2. Methods

2.1. Research Design

This study employed a qualitative approach using a case study method to explore how different patterns of gadget use influence toddlers' speech development. A qualitative design was selected because it facilitates an in-depth understanding of speech development as a socially and contextually situated process, particularly within everyday caregiver-child interactions. The case study method was chosen over other qualitative designs (e.g., ethnography or grounded theory) because the research focused on a bounded system, toddlers aged 2–4 with distinct gadget use patterns (intensive vs. limited), and aimed to understand this phenomenon in its real-life, family-based context. Ethnography was deemed less appropriate as the goal was not cultural immersion, and grounded theory was not pursued because the aim was not to generate theory, but to explore and compare real-world cases in depth.

The unit of analysis in this study is the caregiver–child dyad, with particular attention to how interactions surrounding gadget use shape language input and expression. This inquiry is rooted in an interpretivist epistemology, assuming that children's speech development is co-constructed through interaction and mediated by contextual factors, including digital environments. While quantitative measures of speech development exist, they often fail to capture the nuanced, relational, and experiential aspects of language emergence in everyday settings. Thus, a qualitative case study approach was considered more suitable than a mixed-method design to address the study's focus on how and why certain developmental patterns occur under different media exposure conditions (Priya, 2021; Rashid et al., 2019).

2.2. Research Subjects

Participants in this study were selected using purposive sampling to capture meaningful variation in gadget use patterns relevant to early childhood speech development. The sample consisted of sixteen toddlers (7 females, 9 males), aged between 1 year 8 months and 4 years (M = 2.75 years), who were reported by their caregivers to have typical developmental histories and no prior diagnoses of neurological or developmental disorders.

Inclusion criteria required that children be within the target age range, demonstrate age-appropriate developmental milestones (as confirmed through parental screening interviews and observational checklists), and have no prior formal diagnoses of speech-language or cognitive delays. Children with known neurological conditions (e.g., epilepsy, cerebral palsy), formal diagnoses such as autism spectrum disorder, or prior enrollment in speech therapy programs were excluded.

Participants were then divided into two groups based on composite data derived from multiple sources, including semi-structured parental interviews, home observations, and daily activity logs completed over a three-day period: a)Intensive Use Group (n = 8): Children who were exposed to digital devices for more than 3 hours per day, primarily consuming non-interactive, entertainment-based content (e.g., YouTube videos, mobile games); b)Limited Use Group (n = 8): Children whose daily screen time did not exceed 30 minutes and who primarily used devices in interactive contexts (e.g., video calls with family) under direct parental supervision.

To address the potential for reporting bias—especially the influence of social desirability regarding screen time—triangulation was employed. Reports from parents were cross-checked with observational notes taken during two home visits and time-use diaries maintained by caregivers. The classification was only finalized after consistency across these sources was confirmed.

2.3. Data Collection Methods and Instrument Development

Data collection took place between December 2024 and February 2025 across two provinces in Indonesia: East Java and Central Java. The settings included children's homes and, in several cases, speech therapy centers, to allow for observation of real-life interactions and developmental contexts. Consistent with qualitative research standards, the researchers functioned as the primary instruments, actively engaging in data collection, contextual interpretation, and reflexive analysis.

Semi-structured interviews with parents or primary caregivers, lasting approximately 30–45 minutes, conducted either face-to-face or via secure video calls. The interview guide was developed based on prior research and frameworks related to media use in early childhood (e.g., AAP, WHO). To enhance credibility, the guide was pilot-tested on three parents outside the final sample. Feedback from this pilot was used to refine the wording, sequencing, and clarity of the questions. Naturalistic observations of toddlers in their daily routines, with a focus on verbal behavior and parent–child interactions, conducted in home environments to maintain ecological validity. Observations were non-intrusive and spanned typical play, mealtime, and media use sessions. Developmental screenings administered by a licensed child psychologist using standardized tools to ensure participants met the inclusion criteria and to complement parent-reported developmental information.

The interview instrument used semi-structured interview guide. The semi-structured interview guide was developed to capture three main domains: patterns of gadget use (e.g., "What types of digital devices does your child use, and how often?"); verbal stimulation at home (e.g., "How often do you engage in storytelling, singing, or conversations with your child?"), parental attitudes and practices (e.g., "Do you notice any changes in your child's speech when gadget use increases?"). Interview questions were designed to be open-ended, flexible, and culturally sensitive, allowing parents to elaborate on their experiences and provide contextual explanations.

Naturalistic observations were carried out during routine activities such as playtime, mealtime, or gadget use sessions. The observational protocol included indicators such as the frequency and type of verbal expressions (e.g., use of single words, two-word phrases, sentence formation), quality of child–caregiver interaction (e.g., turn-taking in conversation, joint attention), and gadget-related behavior (e.g., response to digital prompts, passive vs. active engagement). Field notes were systematically recorded to document behavior patterns, environmental cues, and researcher reflections. To enhance trustworthiness, inter-rater reliability was established through dual coding by two independent observers on 25% of the cases, with agreement rates exceeding 85%. Discrepancies were discussed and resolved through consensus.

In addition, all children underwent developmental screening using the Bayley Scales of Infant and Toddler Development, Third Edition (Bayley-III), administered by a licensed psychologist. The screening results were used not only to ensure inclusion criteria (i.e., typical development), but also to provide supportive clinical context in interpreting speech behaviors observed in natural settings. Screening data were triangulated with observation and interview findings during thematic analysis.

2.4. Data Analysis

Data were analyzed using a thematic analysis approach, following Braun and Clarke's (Braun & Clarke, 2006) six-step framework: (1) familiarization with data, (2) initial coding, (3) searching for themes, (4) reviewing themes, (5) defining and naming themes, and (6) producing the report. Interview transcripts and naturalistic observation notes were imported into NVivo 12 Pro, enabling systematic and iterative coding. Codes were then grouped into broader conceptual categories relating to speech behaviors, caregiver–child interactions, and patterns of gadget use.

Themes were generated inductively, but guided by conceptual frameworks from socio-interactionist theory and media displacement theory. To ensure analytical rigor, two independent coders were involved in the early coding phase, and inter-coder agreement was reached through discussion and codebook refinement. Themes were then refined through reflective analysis to

identify meaningful contrasts between the two participant groups. To increase transparency, Table 1 presents the thematic coding matrix illustrating key themes, sub-themes (codes), and representative data excerpts:

Table 1. Emergent Themes, Sub-Themes, and Illustrative Quotes from Thematic Analysis

Theme	Sub-theme / Code	Quotes
Speech Development in Limited Gadget Use Group	Age-appropriate milestones	"Each child in this group was able to combine two or more words into simple sentences before the age of two."
	Spontaneous verbal interaction	"Child B-02 was observed initiating play by saying, 'Mom, let's play ball.'"
Parental Mediation in Limited Use	Supervised, educational content	"Screen time was limited to a maximum of 30 minutes per day and always involved supervision."
	High verbal stimulation	"Parents maintained high levels of interaction through storytelling and reading."
Speech Delay in Intensive Gadget Use Group	Delayed expressive language	"Most children used only single-word utterances... "
	Minimal sentence use	"Child A-03 remained unable to form simple sentences even after two months of therapy."
Parental Involvement in Intensive Use	Low engagement during screen time	"When he is at home, he is busy watching YouTube all the time. When I talk to him, he is silent."
Social Withdrawal and Passive Behavior	Preference for screen over human interaction	"Child A-06 failed to respond to verbal prompts but remained intensely focused on the TV throughout the observation."

This matrix highlights how the interaction patterns, parental mediation, and screen content correspond to observed differences in verbal development. The themes directly support the comparative analysis between the two groups, making visible how passive, unsupervised gadget use appears consistently associated with reduced verbal interaction and language delay symptoms.

To enhance the credibility and trustworthiness of the findings, this study employed source triangulation by integrating data from three sources: naturalistic observations, semi-structured interviews, and developmental documentation (e.g., psychologist screening notes). These sources were cross-checked to identify consistencies and contradictions in children's verbal behavior and parental narratives. Member checking was conducted with five participating parents, who were invited to review summary interpretations of their interview and observation data. In two cases, parents provided clarifications that led to important refinements. For example, one parent initially described her child's gadget use as "limited," but upon reviewing observation data, she acknowledged more frequent unsupervised use. This prompted a reclassification of the participant's group from limited to intensive use. In another case, a parent elaborated on the role of bilingual exposure as a contributing factor to perceived speech delay, which was noted in the final interpretation to avoid over-attribution to gadget use. In addition, the researcher maintained a reflexive journal to document assumptions, reactions, and decisions made throughout the study, contributing to auditability of the research trail. This reflexivity helped manage bias and supported a more nuanced interpretation of emerging themes, especially when distinguishing between screen-related delay and other contextual factors such as parenting style or stimulation quality.

This research was carried out by paying attention to the ethical principles of qualitative research, such as respecting privacy, confidentiality, and the rights of participants. All parents of children provide voluntary written consent before the data collection process begins. The identity of the participant is disguised by using a code or initials to maintain confidentiality.

3. Result

This study revealed a striking difference in speech development between children who use gadgets intensively and those who use them restricted. From the 16 children of the participants, eight were in the limited-use group, and eight were in the intensive-use group. A more detailed view can be seen in table 2.

Table 2. Comparison of Speech Development between Two Groups of Children

Variable	Group of Limited Gadget Use	Group of Intensive Gadget Use
Number of Children	8	8
Avg. Screen Time (per day)	30 minutes (max)	3–6 hours
Parental Involvement during screen use	High	Low
Speech delay incidence	None	6/8
Average utterance complexity	3–5 word sentences	1–2 word utterances
Response to adult interaction	High engagement	Low to no engagement
Referral to speech therapy	None	6 children; 2 children need family support)

3.1. Groups of Children with Limited Use of Gadgets

In the group of children with limited gadget use, all participants demonstrated speech development consistent with age-appropriate milestones. Each child in this group was able to combine two or more words into simple sentences before the age of two. Their vocabulary showed notable growth and dynamism, as evidenced by frequent use of new words and spontaneous initiation of verbal interactions in daily activities. These verbal expressions were not only responsive but also proactive, indicating healthy development of both expressive and receptive language skills.

Observational data supported these findings. Children in this group actively engaged in verbal exchanges with adults and peers, asked questions, and responded promptly to conversational cues. For example, child B-02 was observed initiating play by saying, "Mom, let's play ball," while his mother sat in the living room. This utterance, made without prompting, reflected the child's ability to use language spontaneously in a socially meaningful context. Parental interviews reinforced these behavioral observations. One parent (Mother of B-03) shared:

> "I do set limits on screen time—just half an hour, and even then, I always accompany them. The rest of the time, we usually play guessing games or I read them a story every night."

Another parent (Father of B-05) noted:

> "If they want to watch YouTube, I choose content that teaches letters or children's songs. But afterward, we always talk about what they just watched."

These narratives revealed that screen time was limited to a maximum of 30 minutes per day and was always supervised. Digital content was carefully curated, primarily consisting of educational videos. More importantly, parents maintained high levels of direct verbal interaction through storytelling, reading, and interactive play—activities known to foster language acquisition.

None of the children in this group required referral for speech therapy. Documentation from child psychologists confirmed that all six children displayed adequate development in both expressive and receptive language domains. For instance, child B-05 could correctly name basic colors, identify family members, and respond accurately to two-step questions, indicating an advanced level of verbal comprehension and expression for their developmental stage.

3.2. Groups of Children with Intensive Gadget Use

In contrast to the previous group, children in the intensive gadget use group generally displayed notable delays in speech development. Several had undergone formal assessments, while others showed early signs of expressive language difficulty. Instead of using percentages—which can mislead in small samples—we focus here on patterns observed across participants.

One child (A-03), aged three, had been in speech therapy for two months but remained unable to form simple sentences. His mother explained:

"I've already taken them to speech therapy, but up until now they still can't say 'want to eat' or form two-word sentences. They usually just say 'mama' or point at things."

This child was observed to be largely non-responsive during interactions. When his father tried to engage him by saying, "Let's play with toy cars." the child did not respond verbally or make eye contact, instead continuing to stare at the smartphone screen.

Most children in this group demonstrated limited expressive vocabulary, typically restricted to 1–2 words. For example, child A-05 primarily used sounds like "eh" or gestures rather than words. His caregiver noted:

"When I ask what they want, they usually just point. They rarely say anything."

Home observations revealed extended unsupervised screen exposure, often lasting several hours per day. Parents reported that this screen use typically involved non-educational content. A mother stated:

"When I'm working or cooking, I give them my phone. They watch YouTube all day, from morning until evening."

This form of passive media engagement left minimal room for verbal interaction. Child A-06 was another illustrative case. During a home visit, the child remained fixated on the television despite repeated verbal prompts from the researcher. He did not respond when called by name and avoided eye contact. A neighbor, who often interacted with the family, commented:

"The child rarely speaks. Even when called, they don't always turn around, let alone respond."

The lack of developmental progress in these cases cannot be attributed solely to gadget use, but the consistent pattern of reduced responsiveness, low verbal output, and passive screen engagement suggests a concerning link. The children's limited language abilities were often reported as emerging after extended daily exposure to gadgets, typically in environments with little adult supervision or dialogue.

Notably, parental awareness of the problem varied. Some expressed concern, while others were unaware of the potential developmental implications. One parent candidly admitted:

"I thought it was normal for a child not to talk much—after all, they're still little. But it's true that they spend more time on the phone than having conversations in daily life."

Observational data during home visits further highlighted the children's low responsiveness to human interaction. Several children showed a strong preference for screens over social stimuli, displaying limited eye contact and ignoring verbal prompts. For instance, child A-06 failed to respond when spoken to by the researcher but maintained intense focus on the television screen throughout the observation. While not all children in this group had been

formally diagnosed with severe delays, the overall pattern indicated a concerning trend of reduced verbal engagement likely influenced by excessive and unsupervised gadget use.

These findings suggest that the combination of excessive screen time and lack of verbal engagement may contribute to the stagnation or delay of early language development. However, individual developmental histories and family dynamics remain important mediating factors.

3.3. Qualitative Themes Explaining Speech Development Differences

The comparative analysis between the two groups revealed several recurring themes that shed light on the underlying mechanisms linking screen time patterns to early speech development. To conclude te result section, the flowchart diagram illustrating the key findings of the research is presented in figure 1.

The comparison highlights clear contrasts between toddlers with limited versus intensive gadget use in terms of speech development, verbal interaction, and parental involvement. Children with limited, supervised screen time and enriched verbal environments showed age-appropriate language skills, while those exposed to prolonged, unsupervised gadget use exhibited signs of speech delay, minimal interaction, and often required therapy. While the flowchart effectively summarizes these findings, the reviewer noted that it lacks theoretical grounding. Incorporating a conceptual or causal framework, such as the role of parental mediation, home literacy environment, or socio-cognitive development, would enhance the analytical depth and better contextualize the observed patterns.

The quality of verbal interaction emerged as a crucial factor. Children in the limited gadget use group (Group B) were routinely engaged in rich, reciprocal communication. Their daily routines were filled with activities such as storytelling, interactive play, and direct conversations with caregivers, all of which stimulated expressive and receptive language development. On the contrary, children in the intensive gadget use group (Group A) primarily received passive input through screens, with minimal social context or linguistic exchange. This lack of meaningful verbal interaction appeared to be a key factor contributing to the limited language acquisition observed in the group.

The nature of screen content and the degree of parental supervision played a significant role. In Group B, screen time was both limited and deliberately used as a tool for co-learning, with parents actively engaging children in discussion during and after viewing. Content was educational and age-appropriate, and screen exposure was structured around family routines. In contrast, children in Group A consumed mostly entertainment-based content without parental mediation. The absence of co-viewing and dialogic interaction significantly reduced opportunities for language stimulation, leading to poorer verbal engagement and responsiveness.

The timing and duration of screen exposure appeared to have long-term developmental implications. In Group A, most children were introduced to gadgets before the age of two, and daily usage often extended beyond three hours. This early and excessive screen exposure coincided with critical windows of language development. The data suggest that such patterns may interfere with the child's capacity to develop foundational language skills, particularly when screen time displaces verbal play, storytelling, and real-time communication with caregivers.

These results suggest a strong association between the intensity of gadget use and variations in speech development outcomes. Children exposed to high screen time often showed signs of delayed verbal expression, while those with limited use typically demonstrated more advanced speech patterns. The findings also highlight the moderating role of parental involvement—particularly in setting screen time boundaries and providing verbal stimulation—as a key factor influencing children's language development.
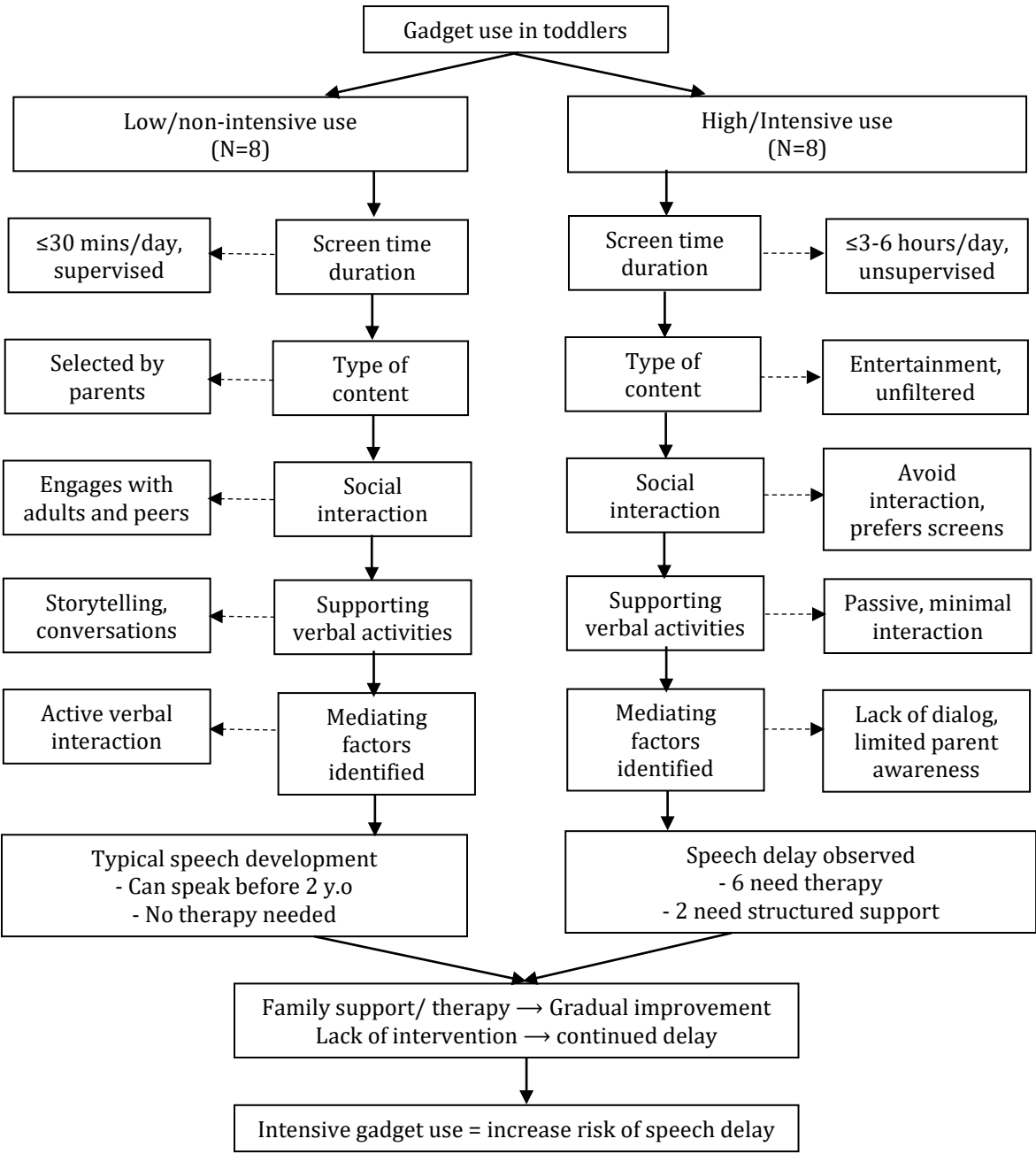
Figure 1. Comparative flowchart of speech development in toddlers with different gadget use patterns

4. Discussion

4.1. The Effect of Gadget Use on Children's Speech Development

This research found that intensive use of gadgets in early childhood is related to delays in speech development. Of the eight research subjects in group of intensive gadget use, they showed the symtoms of speech delays and six of them required speech therapy. In the context of this study, technology use, particularly when passive and unsupervised, was consistently associated with reduced verbal engagement, highlighting the role of interactional quality in early language development. According to Vygotsky's theory, children's language development is strongly influenced by rich social interactions with other people, especially through repeated verbal communication in a social environment (Maflah Alharbi, 2023; Smolucha & Smolucha, 2021). When children interact more with gadgets than with their social environment, they miss out on

opportunities to engage in conversations that are important for language learning (Janius et al., 2024). Interaction with a screen does not provide the same context for dynamic and stimulating two-way communication that is typically obtained from direct human interaction (Brushe et al., 2024).

The findings of this study align with Bruner's theory of language development, particularly the concept of scaffolding, in which adults provide structured support to help children gradually develop more complex language skills (Bruner, 2021). In the limited-use group, parents actively engaged children in reciprocal verbal interactions such as storytelling, question–answer exchanges, and play-based dialogue, forms of support that functioned as verbal scaffolds. For instance, child B-05 was observed responding to two-step questions and identifying objects based on verbal prompts, indicating how adult mediation facilitated expressive and receptive growth. In contrast, children in the intensive-use group received significantly less verbal stimulation. Most interactions observed were either one-directional (e.g., parents giving instructions) or replaced entirely by passive screen use. This lack of adult-guided scaffolding appeared to contribute to the children's limited vocabulary, reduced sentence complexity, and minimal verbal initiation, as seen in children such as A-03, who exhibited non-responsiveness even during play.

The type of content that children often access via gadgets also contributes to speech delays. Content that is not educational or lacks rich verbal stimulation, such as entertainment videos or simple games, does not provide an environment that stimulates language development. According to Piaget, children learn through active exploration and interaction with the world around them (Veraksa et al., 2022; Waite-Stupiansky, 2022). The type of digital content consumed by children plays a critical role in shaping their language development. Observations and parental interviews revealed that children in the intensive gadget group were primarily exposed to entertainment-based content, such as YouTube cartoons and mobile game videos, which offered minimal verbal stimulation and rarely required active participation. This passive engagement limited opportunities for children to acquire new vocabulary or engage in meaningful dialogue. For example, child A-06 was observed repeatedly watching the same cartoon episodes, with no adult scaffolding or conversation around the content. In contrast, children in the limited-use group were occasionally exposed to interactive or semi-educational content, such as video calls with family or guided educational videos that parents discussed afterward. These contexts fostered more two-way communication, encouraging children to respond, ask questions, and practice word use. Thus, the quality and interactivity of content, not just screen duration, appear to significantly influence children's expressive and receptive language growth.

The finding that research subjects in group of intensive gadget use experienced the symtoms of speech delays that required therapeutic intervention shows the importance of monitoring gadget use in early childhood. According to Bronfenbrenner, child development is influenced by various interacting environmental systems, including family, school, and media (Feriver et al., 2022; Hayes et al., 2022). The findings from this study underscore the crucial role of caregivers in shaping children's language environments. In families with limited gadget use, caregivers were consistently observed initiating conversations, narrating daily activities, and engaging in shared storytelling or play—practices that created rich opportunities for verbal scaffolding. In contrast, in households where children were frequently left alone with screens, such verbal interactions were sparse or absent, and caregivers often reported using gadgets to occupy the child while they attended to other tasks. These contrasting caregiving patterns highlight that the quantity and quality of caregiver–child verbal exchanges, not simply screen time duration, are critical for fostering language development (Anderson & Hanson, 2017; Hassinger-Das et al., 2020). Therefore, interventions should prioritize supporting caregivers in integrating responsive communication practices into everyday routines, rather than solely focusing on screen-time limitations.

4.2. Speech Development of Children Who Use Gadgets Intensively

Children in the intensive gadget use group consistently demonstrated limited vocabulary and difficulty forming meaningful sentences, as reflected in both observational and interview data. For

instance, child A-03, aged three, could only utter single words like "mom" and "eat," and did not respond to prompts for more complex speech during both play and mealtime observations. One parent reported, "They understand YouTube ads better than talking to people. When asked something, they usually respond with just one word — sometimes they don't say anything at all." Such examples illustrate how passive gadget exposure may replace rich linguistic input and output opportunities, thereby narrowing children's expressive language experiences. This is related to their lack of opportunities to engage in conversations that are rich in new words and complex sentence structures. Vygotsky's theory of cognitive development emphasizes that language is the main tool for children to develop thinking and the ability to understand the world around them (Smolucha & Smolucha, 2021). When interactions with gadgets replace direct verbal interactions with adults or peers, children lose the linguistic stimulus that is important for their vocabulary development. They are less exposed to the variety of words and sentences used in everyday conversation, which causes limitations in their vocabulary and their ability to form meaningful sentences. In addition, research also shows that interactions with screens tend to provide more passive and simple language, which is not enough to support optimal language development.

Moreover, it is not only limitations in vocabulary, children who frequently use gadgets also show difficulty in constructing more complex sentences. According to Bruner's theory of scaffolding, children develop language skills through guided interactions with more competent speakers who provide support appropriate to the child's developmental level (Fleer, 1990). In the intensive gadget use group, such scaffolding was frequently absent. Observational data showed that several children engaged with screens for extended periods without verbal interaction from caregivers. For example, during a home visit, child A-06 watched cartoons for over an hour while the caregiver remained silent and occupied with chores. When the researcher prompted the child with a simple question "what do you want to watch?", the child did not respond, and the caregiver did not intervene or support the interaction. This illustrates how missed opportunities for adult-mediated scaffolding may contribute to delays in the development of sentence construction and conversational turn-taking. Interactive verbal interaction allows children to hear, imitate, and ultimately internalize more complex sentence structures. However, excessive gadget use often replaces these interactions with more passive, one-way forms of communication, such as watching videos or playing games, which do not provide the context for effective sentence construction practices. As a result, children may have difficulty constructing sentences that are correct and appropriate to the context, because they do not get enough examples and feedback from real verbal interactions.

Furthermore, children who frequently use gadgets also tend to be less responsive to verbal stimuli from the environment around them. They focus more on the screen and are less sensitive to conversations or verbal directions from parents or caregivers. This was evident in several observed cases. For instance, during an observation at home, child A-04 was called multiple times by his mother to come eat dinner "Let's get the dinner", but the child remained fixated on the tablet screen and did not respond or make eye contact. Only after the gadget was physically removed did the child show minimal verbal reaction. Such instances illustrate the reduced verbal responsiveness and attentional disengagement associated with prolonged screen use. According to Bandura's social learning theory, children learn a lot through direct observation and interaction with other people (Aryal, 2022; Rumjaun & Narod, 2020). When their attention is too focused on the screen, they miss the opportunity to observe and learn from the verbal interactions in their surroundings. This leads to a lack of response to verbal stimuli, which can affect their ability to understand and respond well to conversations. Observations also show that these children tend to exhibit behavior that is less sensitive to verbal directions or instructions from adults, which can interfere with their social and emotional development in addition to language development.

This phenomenon shows the importance of supervision in children's use of gadgets to ensure that they still receive sufficient verbal stimulation and have the opportunity to engage in active verbal interactions. Parents and caregivers need to be more aware of the negative impacts of excessive gadget use and encourage children to engage in direct conversations rich in words

and complex sentence structures. In this way, it is hoped that children can develop a wider vocabulary and better ability to construct sentences, as well as become more responsive to verbal stimuli from the environment around them, thus supporting healthier language and communication development.

4.3. Parental Supervision and Balanced Digital Exposure in Supporting Speech Development

The results of this study highlight the importance of parental supervision in regulating gadget use in young children to support optimal speech development. Effective supervision is not just about limiting screen time, but also includes monitoring the type of content children access and engaging with them during screen use. In the limited screen-use group, several parents were observed co-viewing videos with their children and providing verbal explanations during viewing. For example, the parent of child B-03 used a short educational video on animals and paused frequently to ask, "What sound does the lion make?" or "Can you say elephant?"—facilitating dialogic interaction. Such practices helped reinforce vocabulary learning and maintained verbal engagement even during media exposure. According to the American Academy of Pediatrics, children under the age of two are not recommended to use gadgets, and older children are recommended to use gadgets for a very limited duration and always under parental supervision (Ayu et al., 2020). This close supervision is important to ensure that children are not exposed to inappropriate content and to encourage them to engage in more active verbal interactions with parents or caregivers. These verbal interactions can enrich children's vocabulary and help them form more complex sentences, which is important for positive language development (Donnelly & Kidd, 2021).

Parental supervision should also include encouragement of activities that support direct interaction and verbal communication. According to Vygotsky's theory of language development, social interaction is the main key in children's language development, because through this interaction children learn to understand and use language in a meaningful social context (Smolucha & Smolucha, 2021). By reducing the time children spend in front of screens and increasing the time for interactive play and talking with others, parents can create an environment rich in verbal stimulation that supports children's speech development. It also allows children to receive useful feedback about their language use, which is an important component of language learning.

This research provides empirical insights into how parental supervision, particularly the balance between limiting screen time and maintaining high-quality verbal interactions, is closely related to children's speech outcomes. In families where screen exposure was limited and parents actively engaged in conversations, storytelling, or co-viewing activities, children demonstrated stronger expressive and receptive language abilities. For instance, during interviews, parents in the limited-use group reported routines such as "reading bedtime stories every night" or "talking about what happened at school," which were echoed in observational data showing children initiating and sustaining conversations. In contrast, minimal parental supervision and lack of structured verbal interaction in the intensive-use group were often accompanied by delayed speech milestones. Excessive use of technology at an early age can disrupt a child's language development and communication skills, because it reduces the time that should be spent on important social interactions. According to Bandura's social learning theory, children learn a lot through observation and interaction with others, and excessive use of gadgets can reduce their opportunities to learn through these interactions (Rumjaun & Narod, 2020).

A balanced approach means that technology should be used in a way that supports a child's development, not hinders it. For example, using technology for activities that involve two-way interaction, such as video calls with family members, can provide greater benefits than just watching passive entertainment videos. Technology can be used as a tool to enrich children's learning experiences if used wisely and under proper supervision (Vartiainen et al., 2020; Yang, 2022). Therefore, it is essential for parents and educators to select digital content that encourages active participation and verbal engagement. In this study, children in the limited-use group typically accessed educational content such as alphabet songs, story videos, or video calls with

relatives, which were often accompanied by adult explanations or follow-up discussions. In contrast, children in the intensive-use group were frequently exposed to fast-paced entertainment content, such as cartoons and mobile games, with minimal verbal interaction. These patterns suggest that the nature of digital content and the presence of adult mediation play a significant role in shaping language development.

In addition, the findings of this research also emphasize the need for policies that support healthy and balanced use of technology at home and at school. Furthermore, structured environments such as early childhood education settings can support not only language development but also cognitive aspects such as attention and focus, which are often disrupted in children with excessive screen exposure (Al Baqi & Puspitasari, 2024). These findings suggest that school-based interventions can serve as a protective factor, especially for children from high-screen households. This policy should include guidance on the appropriate duration of gadget use for different ages, the type of content recommended, and the importance of adult supervision in children's use of technology (Gupta et al., 2022). With supportive policies, it is hoped that children can enjoy the benefits of technology without having to face the risk of delayed language development or other developmental problems associated with uncontrolled use of gadgets.

The results of this study suggest that excessive gadget use during early childhood may be linked to reduced verbal interaction and observable delays in expressive language skills. These findings highlight the importance of parental supervision in regulating children's screen time and encouraging more direct verbal interactions to support optimal speech development. This research also provides empirical evidence that supports the need for a more careful and balanced approach to technology use in children to ensure that their development is not disrupted by external factors such as excessive gadget use. The results of this study underline the importance of monitoring the use of gadgets in early childhood. Parents and caregivers are advised to limit the use of gadgets and involve children more in direct verbal interactions to support optimal speech development (Andika Sari et al., 2024). Apart from that, this research also shows the importance of early intervention and family support for children who show signs of speech delays due to excessive use of gadgets. The results of this study can inform parenting practices and early childhood policies by emphasizing the need for supervised, interactive screen use and active verbal engagement at home. These findings may support the development of parenting education programs and digital media guidelines tailored for families with young children.

4.4. Research Contribution

This study contributes to the existing body of literature on early childhood language development in the digital era by reinforcing socio-interactionist theories, such as those of Vygotsky and Bruner, which emphasize the foundational role of adult‑child verbal interaction. Rather than proposing a new theoretical framework, the study provides contextual empirical support by illustrating how variations in screen exposure correspond with different speech development outcomes in toddlers.

Methodologically, the study offers context-specific insights by employing a qualitative case study design that integrates triangulated data sources—parental interviews, naturalistic home observations, and developmental screenings using the ASQ-3. This combination allowed for a holistic understanding of how caregiver behaviors, media habits, and family communication patterns shape children's early speech development, particularly in an Indonesian socio-cultural context where digital parenting practices are rapidly evolving.

Practically, the study highlights the importance of structured screen supervision, suggesting actionable steps such as encouraging co-viewing with children and using digital content as conversation starters; promoting daily verbal interaction routines like storytelling and shared reading; implementing early speech monitoring protocols in pediatric or educational settings using caregiver checklists or guided observation; designing workshops or community-based parent education focused on healthy digital habits and verbal stimulation at home.

By linking observed parenting behaviors with children's speech outcomes, the study informs practical guidelines for parents, educators, and early intervention practitioners, while supporting policy initiatives that advocate for media use education in early childhood programs.

4.5. Limitations

This study has several limitations that should be acknowledged to contextualize the interpretation of the findings. *First*, the qualitative case study design involved a purposive sample of only 16 children, which limits the generalizability of the results to broader populations. Moreover, the sample selection was based in part on parent-reported screen time behaviors, which introduces the potential for selection bias or recall inaccuracy.

Second, the study relied heavily on subjective data sources such as parental interviews, naturalistic observations, and documentation from child psychologists. While subjectivity is inherent in qualitative research, this limitation was addressed through data triangulation, cross-referencing observations, interviews, and developmental assessments, to ensure consistency and accuracy. Member checking with selected participants was also conducted to confirm that the researchers' interpretations aligned with participants' actual experiences.

4.6. Suggestions

Building on the findings of this study, several recommendations are proposed for future research and practical application. *First*, the observed contrast between parental behaviors in high and low screen-time groups—particularly in terms of verbal responsiveness, co-viewing habits, and supervision of content—highlights the need for further investigation. Future studies should explore in greater depth how specific parenting strategies, such as dialogic interaction during screen use or content selection, can mitigate the negative effects of excessive gadget exposure on toddlers' speech development. *Second*, while this study indicated a general association between non-educational content and delayed language outcomes, more targeted research is needed to compare the developmental impacts of different content types—e.g., fast-paced entertainment, passive videos, and interactive educational applications. This could inform guidelines on recommended content for early childhood. *Third*, to expand on this study's context, future research should include more varied populations from different cultural and linguistic settings, using mixed-methods or longitudinal approaches to assess how speech development evolves in relation to family dynamics, media habits, and environmental factors.

5. Conclusion

This study aimed to examine the impact of gadget use patterns on toddlers' speech development through a qualitative case study approach. The findings suggest a strong association between excessive, unsupervised screen exposure and observable delays in speech development. Children in the high-exposure group demonstrated limited vocabulary and reduced sentence complexity, often requiring speech therapy referrals based on Bayley-III assessments and behavioral observations. In contrast, children with limited and supervised gadget use, especially those engaged in frequent verbal interactions with caregivers, tended to exhibit age-appropriate or even advanced speech skills. These results contribute to the academic field by offering context-specific, in-depth insights into how caregiver behavior and screen content interact to shape speech outcomes in early childhood, particularly in an under-researched socio-cultural setting.

While the findings offer important implications, the study is limited by its small, purposively selected sample and reliance on parent-reported data, which may introduce bias. Nonetheless, the triangulated design and inclusion of developmental assessments enhance the credibility of the conclusions. Practically, the results underscore the importance of early parental engagement in moderating screen use and fostering real-life verbal interactions at home. Educators, clinicians, and policymakers are encouraged to develop targeted interventions, such as parent workshops, media co-use guidelines, and early screening protocols to support healthy speech development. Future research should build on these findings by involving more diverse populations, examining

different types of digital content, and employing longitudinal or mixed-method designs to better understand long-term developmental trajectories related to gadget use.

Declarations

Author contribution statement

Safiruddin Al Baqi conceptualized the study, developed the methodology, performed the systematic literature review, and contributed to data analysis and interpretation of the findings. Nur Afiah participated in assisted in data analysis, and contributed to drafting and revising the manuscript. All authors engaged in discussions regarding the findings and made contributions to the final manuscript..

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Data availability statement

The dataset generated and analyzed during the research is available from the corresponding author upon reasonable request.

Declaration of interests statement

All authors declare that they have no financial or personal interests that could influence the work presented in this manuscript.

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