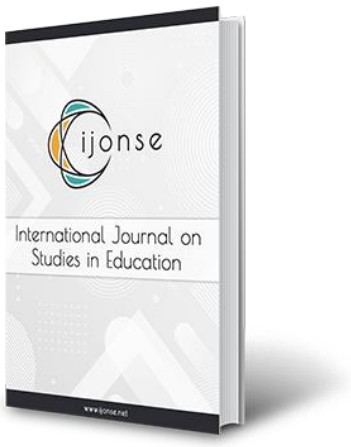

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Abstract

The digitalization era has fundamentally transformed the developmental landscape of preschool children, creating a new paradigm in the interaction between technology and language acquisition. This study aims to analyze the simultaneous influence of digital play intensity and social interaction on preschoolers' expressive language ability using a correlational quantitative design with a cross-sectional approach. The research sample involved 20 children aged 4–6 years enrolled in early childhood education centers (PAUD) in Tasikmalaya City, West Java, selected through purposive sampling based on strict inclusion and exclusion criteria. Research instruments included a modified Screen Time Questionnaire to measure digital play intensity, the Social Interaction Scale for Preschoolers to evaluate social interaction, and the Preschool Language Assessment Instrument to assess expressive language ability. Data were collected through structured observation over 4 weeks following standard protocols, and analyzed using SPSS 25.0 with multiple linear regression techniques. The findings revealed a significant negative effect of digital play intensity on expressive language ability, where each additional 1 hour of daily screen time was associated with a decrease of 4.183 points in expressive language scores. Conversely, social interaction showed a stronger positive, with every 1-point increase in social interaction scores correlating with a 0.672-point improvement in expressive language ability. This study provides significant empirical contributions to the development of evidence-based guidelines in early childhood education practice, highlighting the importance of achieving an optimal balance between educational digital technology and high-quality social interaction as a comprehensive strategy to optimize expressive language development during the critical preschool years.

Introduction

The era of digitalization has fundamentally changed the developmental landscape of children around the world, with digital screen technology becoming an integral part of their daily lives from an early age (Chu et al., 2024; Undheim, 2022). The use of digital devices among preschool children has experienced exponential growth, especially after the launch of touchscreen technology in 2010 which allowed children to interact with technology through touch and sound (Chu et al., 2024). This phenomenon raises fundamental questions about the impact of

digital play intensity on various aspects of child development, particularly expressive language ability which is the foundation of future communication and learning. Recent research shows that children aged 9–10 years spend an average of 3.99 hours per day on digital screen activities, with significant variation based on sociodemographic factors (Nagata et al., 2022). Even more concerning, data show that 70.3% of preschool children aged 0–5 years have experienced excessive digital screen exposure (Qu et al., 2023). The intensity of digital media use has been associated with various health and developmental consequences, including increased risk of obesity, mental disorders, unhealthy eating habits, as well as negative impacts on sleep, physical activity, and the musculoskeletal system (Priftis & Panagiotakos, 2023).

The most crucial aspect in the context of preschool child development is the impact of digital play on cognitive and language abilities. Meta-analytical studies reveal a consistent negative association between digital screen exposure and attention difficulties in preschool children, with five out of five cross-sectional studies reporting a significant positive relationship between high screen exposure and attention difficulties (Jourdren et al., 2023). Furthermore, longitudinal studies show that digital media use has a negative cross-lagged path effect on fine motor skills, which are a fundamental prerequisite for learning and cognition (Martzog & Suggate, 2022). However, the impact of digital play on expressive language ability shows complexity that requires deeper investigation. While some studies indicate potential benefits of digital technology in enhancing creativity, problem-solving, and even motor development (Güneş, 2020), concerns remain that the digitalization of play may reduce children's play processes to mere digital games, potentially undermining the evolutionary and genetic origins of play which predates humanity itself.

On the other hand, social interaction has long been recognized as a fundamental factor in children's language development. The interactionist theory of language acquisition emphasizes that greater social contact with peers positively influences language development (Hofmann & Müller, 2021). Research on children with intellectual disabilities shows that a greater amount of social contact in the early school years correlates with increased verbal and non-verbal language skills, although better language skills did not predict more social contact later on (Hofmann & Müller, 2021). The importance of social interaction in language development is also reflected in studies on children with hearing impairments, where communication skills, intelligibility, and lexical diversity showed significant differences between children with normal hearing and those with hearing impairments (Tabatabaei et al., 2021). These findings underscore the critical role of social interaction in facilitating optimal expressive language development.

Although there is empirical evidence on the individual impacts of digital play and social interaction on child development, there is a significant research gap in understanding the dynamic interaction between these two factors on preschoolers' expressive language ability. Most existing studies focus on a single variable or explore bivariate relationships without considering the multifactorial interaction complexity occurring in the context of children's language development. This research gap is further reinforced by limitations in existing screen time measurement methodologies. (Browne et al., 2021) identified significant variability in nomenclature surrounding problematic use and criteria for identifying clinical disorders, as well as a scarcity of measurement tools in key domains, including tools for young children, whole families, disadvantaged groups, and for specific patterns and

types of use. Byrne et al. (2021) further emphasized that most screen time measurement tools consist of one to three items and assess screen time duration on a typical day, with few tools assessing content or co-viewing, and only 11% of articles reporting psychometric properties.

A recent meta-analysis by (Bustamante et al., 2023) examining the relationship between screen time and executive function in children under 6 years found no statistically significant association between overall screen time and executive function, highlighting the need to consider other contextual and developmental factors in determining the effects of overall screen time use on children's executive function. The novelty of this study lies in its integrative approach exploring the simultaneous interaction between digital play intensity and social interaction on preschoolers' expressive language ability. Unlike previous studies that examined these factors separately, this research adopts a multidimensional perspective considering how both variables interact and contribute to complex language development outcomes.

This study also responds to the urgent need for early intervention in digital media use identified by (Qu et al., 2023), which shows that children with excessive screen time have a high likelihood of experiencing developmental and behavioral problems, particularly among preschool children and boys. This study contributes to a more nuanced understanding of how digital and social contexts interact in shaping children's language developmental trajectories. Consideration of screen time measurement complexity, as identified by previous studies (Shalani et al., 2021), is also a focus of this study design, adopting a more comprehensive, multi-method, multilevel, and multi-informant measurement approach as recommended by (Browne et al., 2021). This approach is important given that screen time in children and adolescents is associated with multiple factors at the intrapersonal, interpersonal, and socio-cultural levels, including child age, gender, and Body Mass Index, parental age and education, socioeconomic status, physical activity, environmental quality, parental screen time, rules, and the presence of digital devices in the child's/teenager's bedroom.

In the context of the complexity of language development in special populations, this study also accommodates the findings of (Méndez-Freije et al., 2024) which highlight the importance of considering language skills when designing individual interventions for populations with ADHD and DLD, both in comorbidity and in isolation. This demonstrates the relevance of this research not only for typical populations but also for children with special needs. The research problem is focused on the key question: "How do digital play intensity and social interaction simultaneously influence preschoolers' expressive language ability, and is there a specific interaction pattern between these two variables that can predict optimal language developmental outcomes?" This question integrates temporal, intensity, and quality dimensions of digital exposure with quantitative and qualitative dimensions of social interaction in the context of expressive language development.

The purpose of this research is to analyze the influence of digital play intensity and social interaction on preschoolers' expressive language ability using a robust and comprehensive methodological approach. Specifically, this research aims to: (1) identify the relationship patterns between digital play intensity and preschoolers' expressive language ability; (2) explore the role of social interaction as a moderator or mediator in the relationship between digital play and expressive language ability; (3) develop a predictive model that can

identify optimal conditions for expressive language development in an integrated digital-social environment; and (4) provide evidence-based recommendations for early childhood education practices and digital technology use policies that support optimal language development.

Expressive Language Ability of Preschool Children

Expressive language ability is a fundamental skill that enables children to convey ideas, feelings, and thoughts verbally. According to (Vinata et al., 2024), the aspect of children's expressive language development becomes a crucial means of communication between one party and another. This ability includes the use of vocabulary, sentence structure, and proper articulation to express thoughts and emotions effectively. Research by (Sunarti et al., 2024) shows that children with good expressive language ability will be more confident in conveying ideas, feelings, and thoughts. This ability involves not only the verbal aspect, but also pragmatic components that allow children to use language according to the context of social communication. (Astuti & Fitri, 2023) emphasize that pragmatics is the ability to use language appropriately within the context of social communication, which is an integral part of expressive language ability.

The development of expressive language in preschool children undergoes structured stages. (Arianti et al., 2024) identified several stages of first language acquisition, namely the prelinguistic stage (babbling period), the one-word stage, two-word stage, and many-word stage. Each of these stages requires appropriate stimulation to achieve optimal development. (Alia et al., 2024) found that through proper intervention, children's expressive language ability can increase significantly from 49.69% in the pre-cycle to 91.72% in the final intervention stage.

Digital Play Intensity and Its Impact on Language Development

The digital era has transformed preschool children's play and learning patterns. (Agustina et al., 2024) conducted research on 100 children aged 5–6 years and found that smartphone use had a positive effect of 19.2% on children's expressive language ability. The most frequently accessed content was watching videos via the YouTube application, which indirectly could sharpen children's language ability through exposure to diverse vocabulary and language structures.

However, the intensity of digital play also raises concerns in the academic community. (Massaroni et al., 2024) in their systematic review identified that prolonged screen exposure in the first two years of life can negatively affect language development and communication skills, particularly in terms of comprehension and vocabulary range. This study emphasizes that television is the most detrimental medium to children's ability because it is used passively and often features language and content that do not match children's processing modes.

(Bhutani et al., 2024) in their comprehensive review of 16 studies found mixed results, where nine studies reported negative effects of screen time on language development, five studies found no significant effects, and two studies reported positive effects. These findings suggest that factors such as viewing duration, video characteristics, content, and co-viewing with adults play an important role in determining the impact of digital play on language

development. (Taylor et al., 2022) analyzed touchscreen applications for preschool children and found that applications with learning objectives had higher educational potential, more opportunities for feedback, and age-appropriate language to support learning and language development. This shows that the quality of digital content is just as important as the intensity of its use.

The Role of Social Interaction in Expressive Language Development

Social interaction is a major catalyst in the development of preschool children's expressive language ability. (Wieczorek et al., 2025) conducted a meta-analysis of 130 studies involving 62,120 children and found a moderately significant correlation between social competence and expressive language ability ($r = 0.20$). This finding indicates that social skills and expressive language ability develop synergistically.

Family interaction patterns have a substantial impact on children's language development. (Astuti & Fitri, 2023) found a very strong correlation ($r = 0.880$) between family interaction patterns and the pragmatic development of preschool children. Harmonious interaction patterns create a conducive environment for children's language and social ability development. (Ansar et al., 2021) compared social interaction patterns in families of children with expressive language delay and children with normal development, finding significant differences ($p = 0.01$) in the patterns used by parents.

Turn-taking ability is an important aspect of social interaction that is closely related to expressive language development. (Weldiani et al., 2022) studied 30 preschool children and found a significant relationship (Sig. 0.007) with a correlation coefficient of 0.480 between social interaction and turn-taking ability. This turn-taking skill continues to develop through frequent and structured social interactions with people around the child.

Digital Learning Methods in Developing Expressive Language

Technological innovations have created various effective learning methods to develop expressive language ability. (Barakat, 2023) implemented digital drama-based instruction on 60 kindergarten children and demonstrated its effectiveness in developing receptive and expressive language. This method uses dramatic representations where movements and actions are performed by children according to their developmental stages.

Digital storytelling has been proven as an effective technique in improving expressive language ability. (Vinata et al., 2024) used Classroom Action Research methodology and found a significant improvement in children's expressive language ability from 15.38% in the pre-action to 76.92% in the second cycle. Children's success in retelling stories as heard became an indicator of the improvement in expressive language ability.

The read-aloud method has also shown effectiveness in developing expressive language ability. (Putri et al., 2024) applied this method to children aged 4–6 years at PAUD Al-Hassanah Samarinda and found an increase in expressive language ability from an average of 69% before the intervention to 86% in the first cycle. These findings indicate that interactive digital learning methods can be an effective alternative in developing expressive

language.

Balance between Digital Technology and Social Interaction

Achieving an optimal balance between the use of digital technology and direct social interaction is the key to optimizing preschool children's expressive language development. (Sakr & Oscar, 2022) identified four conceptualizations of time adopted by practitioners regarding digital play: balance, restriction, self-regulation, and open exploration. These conceptualizations are influenced by the perception of applications as tools or activities, pedagogical emphasis on objectives versus play, and the adoption of popular concern discourses. Alia et al. (2024) emphasized the importance of parental support and supervision as well as content that can help children access a variety of learning materials and entertainment. However, (Ansar et al., 2021) found that excessive screen time (mean 4.0200 for children with expressive language delay compared to 1.9600 for normal children) can negatively impact expressive language development. (Arianti et al., 2024) confirmed that social interaction has both positive and negative impacts, so the role of parents or educators is highly necessary in providing appropriate stimuli. The right combination of educational digital technology and quality social interaction can create an optimal learning environment for the development of preschool children's expressive language ability.

Conceptual Framework

In Figure 1, the conceptual framework illustrates the relationship between digital play intensity (X1) and social interaction (X2) as independent variables on expressive language ability (Y) as the dependent variable. Moderator factors such as child's age, quality of digital content, parental supervision, learning methods, and social environment may influence the strength of the relationships among the variables.

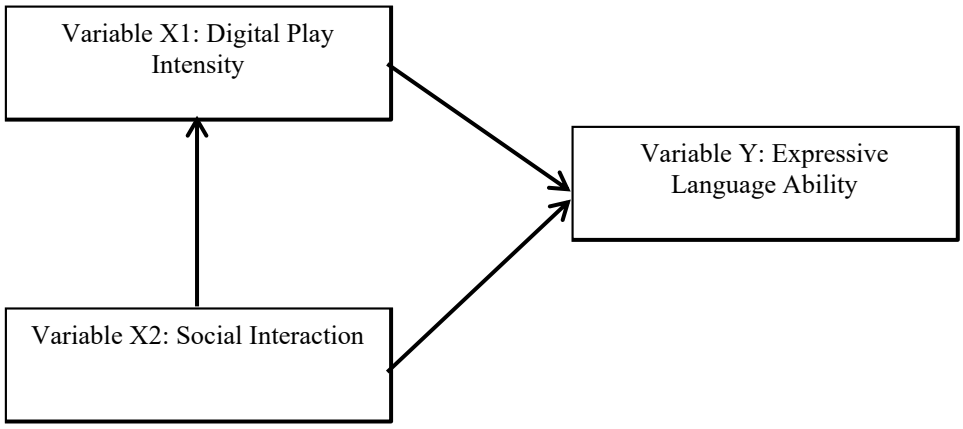

Figure 1. Conceptual Framework

Method

This study used a correlational quantitative design with a cross-sectional approach to analyze the influence of

digital play intensity and social interaction on preschoolers' expressive language skills (Abduh et al., 2023). The research population consists of children aged 4-6 years who are registered in early childhood education institutions in the Tasikmalaya area, West Java. The sample selection was carried out by purposive sampling with inclusion criteria: children aged 4-6 years, have normal development without hearing or cognitive impairment, have been exposed to digital technology for at least 6 months, and parents are willing to participate. Exclusion criteria included children with a diagnosed history of language delay and absences of more than 20% during the data collection period. The number of samples was set as 20 children based on the Slovin formula with a 95% confidence level.

The digital play intensity variable (X1) was measured using a modified Screen Time Questionnaire that quantified the daily duration of use of digital devices, frequency of access to educational applications, and the type of content accessed. This instrument has a reliability of Cronbach's Alpha of 0.85 based on a pilot study. The social interaction variable (X2) was operationalized through the Social Interaction Scale for Preschoolers (SISP) which evaluated the quality of communication with peers, responsiveness to social stimuli, and involvement in group activities. The validity of the instrument's content has been confirmed through expert judgment with a Content Validity Index of 0.92.

Expressive language skills (Y) were assessed using the Preschool Language Assessment Instrument (PLAI) which measures children's syntactic complexity, lexical diversity, and narrative abilities. This instrument has been validated with a construct validity coefficient of 0.88 and a test-retest reliability of 0.91. Data collection was carried out through structured observation for 4 weeks with an interval of 2 times a week. Each observation session lasted 45 minutes with a standard protocol involving guided play activities and natural interactions.

Data analysis used Statistical Package for Social Sciences (SPSS) version 25.0 with the stages of the Kolmogorov-Smirnov normality test, linearity test, and multicollinearity test as prerequisites for parametric analysis. Inferential analysis uses multiple linear regression to test the simultaneous influence of independent variables on dependent variables, with a significance level of $\alpha = 0.05$. The regression model used: $Y = a + b1X1 + b2X2 + e$, where Y is expressive language ability, X1 is the intensity of digital play, X2 is social interaction, and e is the error term. Additional analyses include Pearson correlation tests to identify the strength of relationships between variables and moderation analysis to explore the effect of X1 and X2 interactions on Y.

Results

Characteristics of Research Samples

This study involved 20 preschool children with an age range of 4-6 years who were registered in early childhood education institutions in the Tasikmalaya area, West Java. The demographic characteristics of the sample show a representative distribution with 11 boys (55%) and 9 girls (45%). The average age of the study subjects was 5.2 years (SD = 0.8), with a distribution of 4 years of age as many as 5 children (25%), 5 years of age as many as 8 children (40%), and 6 years of age as many as 7 children (35%).

Table 1. Demographic Characteristics of the Study Sample

Variable	Category	Frequency (n)	Percentage (%)
Gender	Man	11	55.0
	Woman	9	45.0
Age	4 years	5	25.0
	5 years	8	40.0
	6 years	7	35.0
Digital Display Length	< 1 year	3	15.0
	1-2 years	12	60.0
	> 2 years	5	25.0
Socioeconomic Status	Mid-to-Lower	8	40.0
	Intermediate	9	45.0
	Intermediate to upper	3	15.0

Descriptive Analysis of Research Variables

Based on the results of data collection during 4 weeks of observation, a score distribution was obtained for each research variable. Digital play intensity showed an average of 3.85 hours per day (SD = 1.42), with a range of 1.5-6.8 hours. The social interaction score had a mean of 76.45 (SD = 12.38) out of a maximum scale of 100. Expressive language ability showed an average of 68.25 (SD = 14.67) with a distribution that was close to normal.

Table 2. Descriptive Statistics of Research Variables

Variable	Mean	Std. Deviation	Minimum	Maximum	Skewness	Kurtosis
Digital Play Intensity (hours/day)	3.85	1.42	1.5	6.8	0.324	-0.512
Social Interaction (score)	76.45	12.38	52	95	-0.218	-0.743
Expressive Language Skills (score)	68.25	14.67	45	89	-0.156	-0.892

The normality test using the Kolmogorov-Smirnov showed a normal distribution for all variables ($p > 0.05$). The linearity test confirmed the linear relationship between independent and dependent variables ($F = 12.47$; $p = 0.003$). The multicollinearity test showed no collinearity between independent variables (VIF < 10; Tolerance > 0.1).

Correlation Analysis Between Variables

Pearson's correlation analysis revealed a significant pattern of relationships between the study variables. Digital play intensity showed a moderate negative correlation with expressive language ability ($r = -0.542$; $p = 0.013$), indicating that an increase in the duration of digital play is related to a decrease in expressive language skills. In contrast, social interaction had a strong positive correlation with expressive language skills ($r = 0.681$; $p = 0.001$).

Table 3. Intervariable Correlation Matrix

Variable	1	2	3
1. Digital Play Intensity	1	-0.395*	-0.542*
2. Social Interaction	-0.395*	1	0.681**
3. Expressive Language Skills	-0.542*	0.681**	1

Note: *p < 0.05; **p < 0.01

Interesting findings were found on a negative correlation between the intensity of digital play and social interaction (r = -0.395; p = 0.043), suggesting that children with high digital screen time tend to have lower levels of social interaction.

Multiple Linear Regression Analysis

Multiple linear regression models show that the intensity of digital play and social interaction simultaneously affects preschoolers' expressive language skills (F = 18.42; p < 0.001). A coefficient of determination (R^2) of 0.684 indicates that 68.4% variation in expressive language ability can be explained by both independent variables.

Table 4. Multiple Linear Regression Analysis Results

Variable	B	Std. Error	Beta	t	Sig.	VIVID
Constant	45.267	8.924	-	5.072	0.000	-
Digital Play Intensity	-4.183	1.847	-0.405	-2.265	0.037	1.185
Social Interaction	0.672	0.212	0.567	3.169	0.006	1.185

Model Summary: R = 0.827; R^2 = 0.684; Adjusted R^2 = 0.647; F = 18.42; p < 0.001

The regression equation formed: $Y = 45.267 - 4.183X_1 + 0.672X_2$

Where Y is expressive language ability, X_1 is the intensity of digital play, and X_2 is social interaction.

The results of the study revealed significant findings that supported the research hypothesis. Digital play intensity had a significant negative effect on expressive language ability (β = -0.405; p = 0.037), suggesting that every 1 hour increase in digital screen time per day was associated with a decrease in expressive language ability scores of 4.183 points. These findings are consistent with research (Massaroni et al., 2024) which identify the negative impact of prolonged screen exposure on language development and communication. Social interaction showed a stronger positive influence on expressive language skills (β = 0.567; p = 0.006), where every 1-point increase in social interaction score was associated with an increase in expressive language skills by 0.672 points. These results support an interactive theory of language acquisition that emphasizes the importance of social contact in children's language development.

Further analysis showed that children with a combination of low screen time (< 3 hours/day) and high social interaction (score > 80) had the best expressive language skills (mean = 82.4; SD = 6.7). In contrast, children with high screen time (> 5 hours/day) and low social interaction (score < 65) showed the lowest expressive language

skills (mean = 51.2; SD = 8.3). The findings of this study provide empirical evidence that the balance between digital technology and social interaction is a key factor in optimizing the development of expressive language in preschoolers. The resulting model can be used as a predictor to identify children at risk of expressive language delays and design targeted interventions.

Discussion

Negative Impact of Digital Play Intensity on Expressive Language Skills

The findings of this study confirm the significant negative influence of digital play intensity on preschoolers' expressive language skills ($\beta = -0.405$; $p = 0.037$). These results are in line with research (De Carvalho et al., 2023)which suggests that children with low motor development experience delays in language acquisition, indicating that sedentary digital activities can inhibit neuromotor development that is essential for expressive language skills. A moderately negative correlation ($r = -0.542$) between digital screen time and expressive language ability suggests that any increase in digital playtime duration is associated with a decrease in the child's ability to express ideas and ideas verbally.

The neurobiological mechanisms underlying these negative impacts can be explained through the perspective of cognitive development. (Coughlan et al., 2023) In a longitudinal pathway analysis they found that cognitive ability at 9 months of age became a key mediator in expressive language development at 3 years of age. Excessive digital exposure in preschoolers can interfere with the formation of neural pathways necessary for sensorimotor and cognitive integration, further impacting expressive language abilities. These findings are reinforced by research data showing that children with high screen time (> 5 hours/day) have the lowest expressive language ability scores (mean = 51.2; SD = 8.3).

The Fundamental Role of Social Interaction in the Development of Expressive Language

Social interactions showed a strong positive influence on expressive language skills ($\beta = 0.567$; $p = 0.006$), with a substantial positive correlation ($r = 0.681$; $p = 0.001$). These findings are consistent with the results of the study (Jurkic et al., 2023) who used structural equation modeling on 167 single language learning children and 76 dual language learning children, found that social competence was positively correlated with expressive language skills, especially in the context of community language learning. Their research emphasizes that language skills and the promotion of those skills have important implications for positive social behavior in early childhood.

(Hardman et al., 2022) A retrospective cohort study of 75 children with cochlear implants provided additional insights into the importance of pre-linguistic social communication skills. They found that in the early implantation group (< 18 months), pre-linguistic social communication skills became the strongest correlation of language outcomes four years post-implantation. These findings indicate that a strong foundation of social interaction at a critical period of development has a long-term impact on expressive language skills.

The mechanisms underlying the positive influence of social interaction can be explained through the theory of

social scaffolding in language acquisition. (Ahla et al., 2022) in their study in Banjarmasin found a strong correlation (r = 0.634) between family support and expressive language skills of preschoolers, with a significance value of p = 0.000. Family support that includes verbal stimulation, responsiveness, and emotional involvement creates an optimal environment for the development of expressive language skills.

Dynamic Interaction between Digital and Social Variables

Correlation analysis revealed a significant negative relationship between the intensity of digital play and social interaction (r = -0.395; p = 0.043), suggesting that an increase in digital screen time is related to a decrease in the quality of social interactions. These findings are in line with research (Maseri et al., 2021) which evaluates software applications to improve verbal communication in children with autism spectrum disorder. While digital technology can be effective in interventions, they emphasize that such applications should not replace qualified therapists, and that application-based interventions should be complemented by focused, systematic home-based treatments.

(Muès et al., 2024) In a systematic review they identified 56 factors related to receptive and expressive language skills in autistic children and high-risk siblings. They group these factors into three main categories: biological factors, psychosocial and environmental factors, and age- and developmental-related factors. Joint attention, nonverbal cognitive ability, and frontal EEG strength were the most studied and proven factors related to language skills in both groups of children.

Implications for Populations with Special Needs

The findings of this study have special relevance for children with special needs. (Su et al., 2024) their longitudinal study of 77 children aged 2-6 years with autism spectrum disorder exposed to Chinese found that both subgroups (high verbal and low verbal) showed steeper improvements in structural language (lexicon and grammar) compared to flatter growth in decontextualized language. Early language skills predicted language outcomes one year later in both groups, underscoring the importance of early interventions focused on quality social interactions. (Liu et al., 2025) in their retrospective study of 41 children with mixed receptive-expressive language disorder showed that 12-week language and speech therapy was beneficial for children with MLD across different age ranges. Significant improvement occurred in all language domains after therapy (all $p < 0.01$, $\eta^2 > 0.14$), with comparable improvement between the age groups of ≤3 years and >3 years.

Validation of Predictive Models and Clinical Applications

The resulting regression model ($Y = 45.267 – 4.183X_1 + 0.672X_2$) with $R^2 = 0.684$ indicates substantial predictive ability in identifying children who are at risk of expressive language delay. (Deniz et al., 2024) In their systematic review and meta-analysis of 26 studies of parent-mediated play-based interventions for preschoolers with autism, they found that the interventions were effective for social communication skills (d = 0.63) and language skills (d = 0.40) as well as autistic characteristics (d = -0.19).

The findings of this study confirm that the optimal balance between educational digital technology and high-quality social interaction is key in optimizing the development of expressive language in preschoolers. Children with a combination of low screen time (< 3 hours/day) and high social interaction (> score of 80) showed the best expressive language skills (mean = 82.4; SD = 6.7), while the opposite condition produces suboptimal outcomes. The results of this study provide strong empirical evidence for the development of evidence-based guidelines in early childhood education practices, emphasizing the importance of digital screen time limitation and improving the quality of social interaction as a comprehensive strategy for optimizing preschoolers' expressive language development.

Conclusion

An empirical investigation of 20 preschoolers in the Tasikmalaya region, West Java, revealed the complex dynamics between the intensity of digital play and social interaction in shaping expressive language skills. Significant findings showed that the intensity of digital play contributed substantially negatively to expressive language development ($\beta = -0.405$; $p = 0.037$), where each increase in the duration of exposure to digital screens for one hour per day correlated with a decrease in expressive language ability scores of 4.183 points. This phenomenon indicates that passive and sedentary digital activities can inhibit neuromotor processes that are essential for language acquisition, particularly in the formation of neural pathways necessary for sensorimotor and cognitive integration. In contrast, social interaction demonstrated a more dominant positive influence ($\beta = 0.567$; $p = 0.006$), with each one-point increase in social interaction scores resulting in an increase in expressive language skills of 0.672 points, confirming the fundamental role of social scaffolding in the language acquisition process.

A predictive model generated through multiple linear regression analysis ($R^2 = 0.684$) proves that the optimal combination of digital screen time restriction and improving the quality of social interaction is the most effective strategy in optimizing preschoolers' expressive language development. Children with minimal screen time (< 3 hours/day) and high-quality social interaction (> score of 80) showed superior expressive language performance (mean = 82.4), while contrasting conditions with excessive digital exposure (> 5 hours/day) and limited social interaction (< score of 65) resulted in suboptimal expressive language skills (mean = 51.2). These findings provide a strong empirical foundation for the development of evidence-based guidelines in early childhood education practices, emphasizing the urgency of implementing policies that integrate digital screen time constraints with the stimulation of structured social interaction as a holistic approach in facilitating optimal expressive language development in a critical period of preschool child development.

Recommendations

Please use 10-point font size. Please margin the text to the justified. Manuscripts should be 1.5 times spaced. Footnotes and endnotes are not accepted. All relevant information should be included in main text. Do not indent paragraphs; leave a space of one line between consecutive paragraphs. Do not underline words for emphasis. Use italics instead. Both numbered lists and bulleted lists can be used if necessary. Before submitting your manuscript,

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Subdivide text into unnumbered sections, using short, meaningful sub-headings. Please do not use numbered headings. Please limit heading use to three levels. Please use 12-point bold for first-level headings, 10-point bold for second-level headings, and 10-point italics for third -level headings with an initial capital letter for any proper nouns. Leave one blank line (1.5 times spaced) before and after each heading. (Exception: no blank line between consecutive headings.) Please margin all headings to the left.

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