

ORIGINAL ARTICLE

Correlation Between Screen Time and Speech and Language Skills Among Preschool-Aged Children

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ABSTRACT

Introduction: The increasing prevalence of screen media usage among young children has raised concerns about its potential effects on various aspects of development, particularly speech and language development. Therefore, this study aims to examine the screen time of children aged 4 and 5 years old and its correlation with their speech and language scores. **Materials and Methods:** A total of 45 parents employed at a university took part in this cross-sectional study, which utilised an online self-administered Speech and Language Assessment Scale (SLAS) questionnaire to gather necessary data. Descriptive statistics were used to summarise sociodemographic characteristics and screen time patterns. The Spearman rank correlation was used to examine the correlation between screen time and speech and language scores. **Results:** On average, young children spent 1.96 hours per day engaged in screen time, with passive content being the most commonly watched, followed by interactive and educational content. Statistical analysis revealed a significant inverse correlation between total screen time and speech and language scores ($p=0.001$), suggesting that increased screen time is associated with lower speech and language skills. Notably, specific domains such as assertiveness, responsiveness, semantics, syntax, and articulation were adversely affected by higher levels of screen use. **Conclusion:** In conclusion, this study highlights the critical role of parental supervision in managing children's screen time and underscores the importance of promoting activities that foster face-to-face interaction and support speech and language development.

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INTRODUCTION

Screen time refers to the duration of time spent in front of any screen, including phones, tablets, televisions, video games, and other devices [1]. There are five types of screen time content, namely social screen time, passive screen time, interactive screen time, educational screen time, and other screen time [2]. Social screen time refers to activities that enable children to connect and interact with family members or friends, such as through social media, video calls, and similar platforms. Passive

screen time, on the other hand, involves sedentary use of screens where information is received without active engagement, for example, watching television, YouTube, or other streaming content [3]. Interactive screen time refers to activities in which children actively engage with others through digital platforms, such as playing video games or interactive games like Minecraft. Educational screen time involves the use of devices for learning purposes, including completing homework, watching educational videos on platforms like YouTube, and similar activities. Finally, the "other" screen time category encompasses all remaining digital content that does not fall within the four categories described above [2].

In the modern digital world, children are exposed to all

kinds of screens at a very young age [4]. Due to the easy accessibility of technological devices and the rapid pace of technological change, the number of children growing up with technology has increased, raising concerns about the potential adverse effects on their health and the risk of hindering their development and well-being [5].

In response to these concerns, the World Health Organisation [6] released guidelines in 2019 recommending that children aged two to five should be limited to one hour of screen time per day, while screen exposure is not encouraged for those under two years. Despite these recommendations, screen time among children continues to increase, which could negatively affect their language development [7]. Furthermore, the type of content viewed also plays a critical role, as it can either support or hinder language development [8]. Therefore, it is crucial for parents to be informed and educated about both screen time and its content to ensure that the children's speech and language can develop well.

Although global studies have explored on the association between screen time and language development [7,9-14], there remains a lack of research focused on the content of screen time rather than its duration. This gap is especially evident in the Malaysian context, where existing studies have primarily addressed the effects of screen use on sleep, behaviour, and physical activity rather than speech and language development. Moreover, there are no known local publications examining the types of content children engage with during screen time or their potential influence on language outcomes.

A local study by Joginder Singh et al. [15] revealed that 67% of Malaysian parents believed that screen time improved their children's language abilities, while only a small proportion recognised its possible drawbacks (8%). Additionally, 18% of parents were uncertain about the impact of screens on children's language development and 7% believed it had no effect at all. Apart from that, Malaysian children were also found to spend an average of 2.64 hours daily on screens [15], exceeding WHO recommendations. These findings suggest a general lack of awareness among parents regarding the possible adverse effects of excessive and inappropriate screen use on language development.

In light of these gaps, the present study seeks to investigate the correlation between screen time and speech and language development among children of staff at a selected university, with particular attention to the types of content viewed. This research is significant

not only in addressing a critical gap in Malaysian literature but also in providing practical insights for various stakeholders. By identifying how screen time and its content relate to children's language skills, this study aims to inform parents and empower them to make better decisions regarding their children's media consumption. Additionally, it offers valuable data to professionals in the field of speech-language pathology, supporting more effective guidance and interventions. Ultimately, this research hopes to contribute to more informed parenting practices and improved developmental outcomes for Malaysian children.

MATERIAL AND METHODS

Study design, target population and sample size

This cross-sectional study was conducted at a designated public university located on the East Coast of Malaysia. The population for this study consisted of parents who are staff members currently working there. Utilising purposive sampling method, the subjects were selected based on the inclusion criteria include able to read and understand the English language, have children aged four or five years old who engaged with screen media. Parents of children diagnosed with conditions that are associated with language delay including autism spectrum disorder, genetic disorders, hearing impairment, neurological disorders were excluded from this study. Ethical approval was obtained from the Human Research Ethics Committee USM (HREC) prior to data collection (USM/JEPeM/KK/24010009).

The sample size for this study was determined using a sample size calculator provided by Raosoft.Inc (<http://www.raosoft.com/samplesize.html>). The sample size was calculated using a 10% margin of error, a 95% confidence interval, and a 50% response distribution with a population size of 5382. Therefore, the minimum recommended number of subjects for this study is 95 participants. When including a 20% dropout, the number of participants suggested for this study is 114 participants. Nevertheless, only 45 parents were successfully recruited for the study.

Survey Questionnaire

This study used a set of self-administered questionnaires conducted via Google Forms. The questionnaires comprised three sections: section A collected sociodemographic information of parents and children including age and educational level, as well as children's sociodemographic data (age, gender, and schooling status); section B focused on children's screen time; and section C gathered about children's speech and language skills.

Three questions were asked in section B. The first question gathered data on the average screen time of children during weekdays and weekends. The following formula was employed to calculate the average screen time:

$$\frac{[(\text{Screen time weekday} \times 5) + (\text{Screen time weekend} \times 2)]}{7} \quad (1)$$

The second question collected information regarding the types of screen time content watched by the children. It provides a comprehensive overview of all the different types of content that children interact with during screen time. Parents were required to choose one or more options that best describe the content their children typically watched. The last question, a single-response question, focused on identifying the most common types of screen time content watched by children. In contrast to the second question, it is more focused and narrowed down to the content that children most commonly engage with among all the accessible sorts.

This study used the Speech and Language Assessment Scale (SLAS) developed and validated by Hadley and Rice [16], to evaluate children's speech and language skills. The SLAS is a brief questionnaire designed to gather parental assessments of a child's articulation, overall intelligibility, vocabulary, sentence structure, and conversational skills [16]. Thirteen items were classified into five categories: assertiveness, responsiveness, semantics, syntax, and articulation. The construct validity of the five SLAS scales was assessed, demonstrating moderate to moderately high correlations across all scales. Each item was rated using a seven-point Likert scale, with 1 representing "very low", 4 indicating "normal" and 7 denoting "very high". The mean rating

Table I The Distribution of Items in the Composite Scale of SLAS

Scale	Number of Items	Item No.
Assertiveness	3	1, 8, 9
Responsiveness	2	2, 10
Semantics	3	4, 5, 7
Syntax	2	11, 12
Articulation	3	3, 6, 13

for each of the five composite SLAS scales was derived from the evaluations of the individual SLAS components (Table I). The composite scale scores are calculated by aggregating the ratings for each SLAS item and dividing by the total number of items [16].

Data Collection

Posters were disseminated and affixed throughout the university campus at areas with high crowd to advertise the subjects recruitment. Additionally, to further promote

the study, the posters were disseminated through WhatsApp groups for staff members. The questionnaire was accessible via a quick-response (QR) code for the convenience of the interested subjects to respond. The surveys included informed consent, comprising an overview of the research, its objectives, the anticipated duration for completing the questionnaire, potential risks and benefits and assurances of confidentiality throughout the study. Interested and eligible participants were directed to scan the QR code on the poster, complete the questionnaire, and submit their responses. The participants required approximately 10 minutes to complete the questionnaire. The recruitment of the participant lasted for around two weeks only due to the time constraint to complete the study. Thus, resulted to a fairly low response rate with only 45 participants.

Data Analysis

The analysis of data in this study was performed using IBM Statistical Package for the Social Science (SPSS) version 27. A descriptive analysis was conducted to describe the sociodemographic information of the parents and their children, the average duration of children's screen time of and the type of screen time content watched. The Shapiro-Wilk test was used to check the normality of the data. The Shapiro-Wilk test indicated that all the variables were not normally distributed therefore, Spearman rank correlation was conducted to investigate the correlation between the reported screen time and the children's speech and language scores.

RESULTS

Sociodemographic characteristics

The sociodemographic data of parents and their children are shown in Table II. The data show that 46.7% of the children are 4 years old and 53.3% of them are 5 years old. In terms of gender, 48.9% of the children are male, while 51.1% are female. The comparable percentages across both gender and age indicate their adequate representation in this investigation.

Based on the responses, 12 parents (26.7%) were aged 26 to 30 years, 12 parents (26.7%) were aged 36 to 40 years, 11 parents (24.4%) were aged 31 to 35 years, and 10 parents (22.2%) were aged 41 to 45 years.

Table II Sociodemographic Information of Parents and Children

Variables	Frequency, N (%)
Parent's age	
21 - 25 years old	-
26 - 30 years old	12 (26.7)
31 - 35 years old	11 (24.4)
36 - 40 years old	12 (26.7)
41 - 45 years old	10 (22.2)
46 - 50 years old	-
51 years old and above	-

continue

Table II Sociodemographic Information of Parents and Children (Cont.)

Variables	Frequency, N (%)
Child's age	
4 years old	21 (46.7)
5 years old	24 (53.3)
Child's gender	
Male	22 (48.9)
Female	23 (51.1)
Child's schooling status	
Attending preschool	36 (80.0)
Not attending preschool	9 (20.0)

The educational level of the parents predominantly comprises Sijil Pelajaran Malaysia (similar to O-Levels) at 44.4%, followed by Bachelor's degrees at 31.1%, Vocational and Technical Certificates at 8.9%, Doctor of Philosophy (PhD) at 8.9%, and finally Master's degrees at 6.7%.

The Average Amount of Screen Time of Children

This study obtained data on average screen time for weekdays and weekends. A descriptive analysis was conducted to analyse the average amount of screen time (Table III). Based on the findings, the participants spent an average of 1.73 ± 1.11 hours of screen time on weekdays and an average of 2.54 ± 1.40 hours of

Table III The Average Amount of Screen Time of Children

Variable	Minimum	Maximum	Mean	SD
Average Screen Time (Weekdays)	0.25	5.00	1.73	1.11
Average Screen Time (Weekends)	0.50	6.00	2.54	1.40
Average Screen Time	0.32	5.29	1.96	1.15

screen time on the weekends. The average amount of screen time (hours/day) was calculated using the previous formula (1). The data indicate that children spent an average of 1.96 ± 1.15 hours of screen time a day, in which the minimum and maximum amount of screen time reported were 0.32 and 5.29 hours a day, respectively.

The Types of Screen Time Content Watched by Children

A multiple-response question was asked to determine the types of screen time content watched by the children. This enabled parents to choose all types of content their children engage with, providing a comprehensive view of their screen time habits. A descriptive analysis was then conducted to summarise the data, with the findings displayed in Table IV. The table indicates that nearly all children (42, 93.3%) engaged in passive screen time, while more than half (29, 64.4%) engaged in interactive

Table IV The Types of Screen Time Content Watched by Children

Types of Screen Time Content	Frequency, N	Percent of cases (%)
Social Screen Time	2	4.4
Passive Screen Time	42	93.3
Interactive Screen Time	29	64.4
Educational Screen Time	16	35.6
Other Screen Time	2	4.4
Total	91	202.1

screen time. Less than half of the children (16, 35.6%) engaged in instructional screen time, and only 2 children (4.4%) engaged in social screen time or other forms of screen time. In this study, parents were not required to identify the various forms of screen time their children participated in.

The Predominant Types of Screen Time Content Watched by Children

A descriptive analysis was conducted to identify the predominant types of screen time content watched by the children. This analysis provided insights into the specific content categories that children engaged with most frequently (Table V). Thirty children (66.7%) predominantly engaged in passive screen time, 9 (20.0%) watched interactive screen time, 5 (11.1%) saw educational screen time, and only 1 participant (2.2%) focused on social screen time.

Table V The Most Common Types of Screen Time Content Watched

Types of Screen Time Content	Frequency, N (%)
Social Screen Time	1 (2.2)
Passive Screen Time	30 (66.7)
Interactive Screen Time	9 (20.0)
Educational Screen Time	5 (11.1)

The Correlation between Screen Time and Speech and Language Score

A Spearman rank correlation was conducted to investigate the correlation between reported screen time and the speech and language scores of the children of staff working in the selected university (Table VI). A significant, negative correlation exists between screen time and the overall speech and language score, suggesting that less screen time correlates with an elevated speech and language score. A significant, strong, and inverse correlation exists between screen time and assertiveness ($p < 0.05$, $r = -0.629$), responsiveness ($p < 0.05$, $r = -0.562$), semantics ($p < 0.05$, $r = -0.591$), syntax ($p < 0.05$, $r = -0.625$), and articulation ($p < 0.05$, $r = -0.597$). This suggests that reduced screen time correlates with elevated scores across all domains of the SLAS.

Table VI The Correlation between Screen Time and each domain of the Speech and Language Assessment Scale (SLAS)

Variables		r	p
Screen Time	Speech and Language Score	-0.611	0.001*
	Domain of the SLAS		
	Assertiveness	-0.629	0.001*
Screen Time	Responsiveness	-0.562	0.001*
	Semantics	-0.591	0.001*
	Syntax	-0.625	0.001*
	Articulation	-0.597	0.001*

Note: *p < 0.05, Statistical test – Spearman Correlation

DISCUSSION

The Amount of Screen Time of Children

This study revealed that the children spend an average of 1.96 hours of screen time per day, exceeding the daily limit recommended by both the World Health Organisation (WHO) and the American Academy of Pediatrics (AAP), which advise no more than one hour of screen exposure for children aged two to five [17]. Although this figure surpasses recommended guidelines, it remains lower than findings from several other studies conducted both in Malaysia and abroad. For instance, Joginder Singh et al. [15] reported that Malaysian children aged three to five spent an average of 2.64 hours per day on screens, while Raj et al. [18] and Lee et al. [19] found averages closer to three hours daily. International comparisons reveal even higher usage, with American preschoolers averaging 4.1 hours daily [20] and Brazilian children aged three to five spending about 3.7 hours per day in front of screens [21].

One possible explanation for the relatively lower screen time in this study is the parental background. Many of the parents were employed in government healthcare institutions. According to Algethami et al. [22], parents with government jobs often demonstrate greater awareness of screen time guidelines, possibly due to higher education levels and better access to health education resources. These factors may contribute to more regulated screen use at home.

This study also highlighted a clear difference in screen time between weekdays and weekends. Children spent an average of 1.73 hours of screen time on the weekdays and an average of 2.54 hours of screen time on the weekends. This weekend increase mirrors findings from various international studies. For example, in the Czech Republic, Sigmundov6 et al. [23] found higher weekend screen use among preschoolers; in Turkey, 3elik, Uizer, and Uizer [24] observed the same among kindergarteners; and in Canada, Carson et al. [25] reported increased weekend screen use among children aged four to five. The consistency of these

results across different countries suggests a common pattern: children tend to have increased screen exposure during weekends, likely due to less structured routines. In the present study, this trend may be attributed to the fact that most children (80%) attended preschool, which offers a structured, screen-limited environment during weekdays. As noted by Goncalves et al. [26], such structured settings reduce screen access, whereas weekends, being more flexible and home-based, often lead to greater sedentary behaviour and higher screen usage.

The Type of Screen Time Content Watched by Children

The findings of this study revealed that more than half of the children engaged in passive screen time and interactive screen time, with only 35.6% of them engaged in educational screen time. These results align with previous findings, where Australian children aged two years and eleven months to five years and eleven months predominantly engaged in entertainment content, averaging two hours daily, compared to just one hour on educational material [27]. Similarly, Suleman et al. [28] reported preschoolers spent most of their screen time watching entertainment programs and playing games rather than using it for preschool-related purposes on both weekdays and weekends.

Children's inclination towards passive screen time can largely be attributed to the highly reinforcing nature of the content available, which is deliberately designed to capture and retain young viewers' attention [3]. Additionally, the low rate of educational screen use may reflect a shift post-COVID-19. This is also applied to preschool children who increasingly use screen media, especially for educational purposes as they engage in remote learning activities through digital platforms to continue their education. While screen time for learning surged during school closures, its necessity declined once physical classes resumed [29]. Only two children were reported engaged in social screen time, with one primarily using screens for communication. This low engagement could be attributed to 80% of participants attending preschool, providing regular face-to-face interaction and reducing the need for digital socialisation [30].

The Correlation between Screen Time and the Speech and Language Scores of Children

This study found a significant, strong, inverse relationship between screen time and total speech and language scores, including domains such as assertiveness, responsiveness, semantics, syntax, and articulation. Lower screen time was associated with higher scores in all areas. These results are consistent with previous studies. Mustonen, Torppa, and Stolt [31] reported moderate but significant negative correlations between screen time and language skills among Finnish

preschoolers. Similar trends were reported in New Zealand [32] and Saudi Arabia [7], found that increased screen time predicted poorer language comprehension, production, and overall development.

One potential explanation for this relationship is that screen use often displaces enriching activities such as shared reading and direct parent and child interaction, both of which are crucial for language acquisition [32,33]. Shared reading facilitates language development through behaviours such as elaboration and questioning [34, 35]. Its replacement with screen time may reduce these opportunities and negatively impact language growth. Both shared reading and social interactions are crucial for children's language development [36,37]. Mustonen et al. [31] emphasised that early childhood is a critical period for language acquisition, which depends heavily on social interaction. Excessive screen use may reduce both the frequency and quality of these interactions.

Moreover, social engagement fosters assertiveness, responsiveness, and conversational skills. Widyaningsih and Tamrin [38] noted that limited interaction can result in shyness and reduced confidence, while Abbot-Smith et al. [39] emphasised the role of interaction in developing conversational abilities. These findings reinforce the concern that high screen exposure may hinder children's opportunities to build and refine essential language competencies.

In summary, the study supports existing evidence that excessive screen time may negatively affect various aspects of speech and language development by limiting opportunities for meaningful linguistic and social interactions during early childhood. By reducing opportunities for rich linguistic input and meaningful social interactions during early childhood, these effects have the potential to influence real-world developmental outcomes, underscoring the importance of early intervention and informed parental guidance.

Limitation of Study

This study has several limitations that may affect the generalisability of its findings. Firstly, the sample comprised only children of staff from a public university, which may limit the representativeness of the findings for the wider population. Secondly, data collection was constrained by a short timeframe resulting from delayed ethical approval. This limitation reduced both the volume and diversity of data obtained, thereby restricting the generalisability of the findings. Additionally, the study utilised a cross-sectional design, capturing data at only one point in time. This approach restricts the ability to establish causal relationships or assess the long-term effects of screen time on children's speech and language development. Another limitation lies in the reliance on parent-reported data, which may be affected by biases such as social desirability and recall errors, potentially

influencing the accuracy of reported screen time and content types. Lastly, the study did not account for other potential influencing factors, such as the home language environment, educational opportunities, and related variables.

CONCLUSION

This study highlights critical findings about the correlation between screen time and the speech and language development of preschool aged children. It reveals that most children exceed the recommended screen time, primarily engaging with passive content such as videos and television shows, while educational and interactive content is used far less frequently. Importantly, there is a significant inverse relationship between screen time and children's speech and language scores across various domains, including assertiveness, responsiveness, semantics, syntax, and articulation.

These findings emphasise the importance of managing not only the duration but also the type of screen content children are exposed to. Parental involvement, such as monitoring content and co-viewing, can play a key role in supporting children's language development. Effective screen time management and active engagement from caregivers are essential to promote healthier speech and language outcomes in young children. In addition to that, we would recommend future studies to explore in-depth on the aspects of the screen time contents, larger and more diverse samples and possibly longitudinal studies in the future.

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REFERENCES

1. Ponti M, B  langer S, Grimes R, Heard J, Johnson M, Moreau E, Norris M, Shaw A, Stanwick R, van Lankveld J, Williams R. Screen time and young children: promoting health and development in a digital world. Oxford University Press. 2017;20(8):461-77.
2. Sanders, T., Parker, P. D., del Pozo-Cruz, B., Noetel, M., & Lonsdale, C. Type of screen time moderates effects on outcomes in 4013 children: Evidence from the Longitudinal Study of Australian Children. *International Journal of Behavioral Nutrition and Physical Activity*, 2019;16(1). doi: <https://doi.org/10.1186/s12966-019-0881-7>.
3. Sweetser P, Johnson D, Ozdowska A, Wyeth P. Active versus passive screen time for young children. *Australas J Early Child*. 2012;37(4). doi: <https://doi.org/10.1177/183693911203700413>.
4. Ishtiaq A, Ashraf H, Iftikhar S, Baig-Ansari

- N. Parental perception on screen time and psychological distress among young children. *J Family Med Prim Care*. 2021;10(2):765. doi: https://doi.org/10.4103/jfmpc.jfmpc_1720_20.
5. Bennetts SK, Mensah FK, Westrupp EM, Hackworth NJ, Reilly S. The agreement between parent-reported and directly measured child language and parenting behaviours. *Front Psychol*. 2016;7:43. doi: <https://doi.org/10.3389/fpsyg.2016.01710>.
6. World Health Organization. To grow up healthy, children need to sit less and play more [Internet]. Geneva: WHO; 2019 [cited 2025 May 24]. Available from: <https://www.who.int/news/item/24-04-2019-to-grow-up-healthy-children-need-to-sit-less-and-play-more>
7. Alibrahim RAA. The impact of screen time on language development among preschool-age Saudi children. *Arab World Engl J*. 2023;4(7):1–61. doi: <https://doi.org/10.24093/awej/th.289>.
8. Beatty C, Egan SM. Screen-time and vocabulary development: Evidence from the growing up in Ireland study. *Child Links - Children and the Digital Environment*. 2018;3:18–22.
9. Dore RA, Logan J, Lin TJ, Purtell KM, Justice LM. Associations between children's media use and language and literacy skills. *Front Psychol*. 2020;11. doi: <https://doi.org/10.3389/fpsyg.2020.01734>.
10. Gath M, McNeill B, Gillon G. Preschoolers' screen time and reduced opportunities for quality interaction: Associations with language development and parent-child closeness. *Curr Res Behav Sci*. 2023;10(4):100140. doi: <https://doi.org/10.1016/j.crbeha.2023.100140>.
11. Karani NF, Sher J, Mophosho M. The influence of screen time on children's language development: A scoping review. *S Afr J Commun Disord*. 2022;69(1). doi: <https://doi.org/10.4102/sajcd.v69i1.825>.
12. Madigan S, Browne D, Racine N, Mori C, Tough S. Association between screen time and children's performance on a developmental screening test. *JAMA Pediatr*. 2019;173(3):244–50. doi: <https://doi.org/10.1001/jamapediatrics.2018.5056>.
13. Mustonen R, Torppa R, Stolt S. Screen time of preschool-aged children and their mothers, and children's language development. *Children*. 2022;9(10). doi: <https://doi.org/10.3390/children9101577>.
14. Vereecken CA, Keukelier E, Maes L. Influence of mother's educational level on food parenting practices and food habits of young children. *Appetite*. 2004;43(1):93–103. doi: <https://doi.org/10.1016/j.appet.2004.04.002>.
15. Joginder Singh S, Mohd Azman FNS, Sharma S, Razak RA. Malaysian parents' perception of how screen time affects their children's language. *J Child Media*. 2021;15(4):588–96. doi: <https://doi.org/10.1080/17482798.2021.1938620>.
16. Hadley PA, Rice ML. Parental judgements of preschoolers' speech and language development: A resource for assessment and IEP planning. 1993;18(3):1–8.
17. Chong SC, Teo WZ, Shorey S. Exploring the perception of parents on children's screen time: A systematic review and meta-synthesis of qualitative studies. *Pediatr Res*. 2023;94(3):915–25. doi: <https://doi.org/10.1038/s41390-023-02555-9>.
18. Raj D, Mohd Zulkefli N, Mohd Shariff Z, Ahmad N. Determinants of excessive screen time among children under five years old in Selangor, Malaysia: A cross-sectional study. *Int J Environ Res Public Health*. 2022;19. doi: <https://doi.org/10.3390/ijerph>.
19. Lee ST, Wong JE, Chan GKL, Poh BK. Association between compliance with movement behavior guidelines and obesity among Malaysian preschoolers. *Int J Environ Res Public Health*. 2023;20(5):3737. doi: <https://doi.org/10.3390/ijerph20053737>.
20. Tandon PS, Zhou C, Lozano P, Christakis DA. Preschoolers' total daily screen time at home and by type of child care. *J Pediatr*. 2011;158(2):297–300. doi: <https://doi.org/10.1016/j.jpeds.2010.08.005>.
21. Frata B, Souza JM, Montemezzo D, Henning E, Menegol NA, Okubo R, et al. Predictors for screen time exposure among children between 3 and 5 years old in Southern Brazil. *J Trop Pediatr*. 2021;67(5). doi: <https://doi.org/10.1093/tropej/fmab092>.
22. Algethami RG, Tamur SA, Alsafyani RM, Alfaifi HH, Qattan FM, Alharthi MS, et al. Parents' knowledge, attitudes, and practices regarding baby walkers, baby car seats, oral health, and child screen time in Saudi Arabia: A cross-sectional study. *Cureus*. 2024;16(1):1–11. doi: <https://doi.org/10.7759/cureus.52464>.
23. Sigmundov6 D, Sigmund E, Badura P, Vokáčová J, Trhlíkov6 L, Bucksch J. Weekday-weekend patterns of physical activity and screen time in parents and their pre-schoolers. *BMC Public Health*. 2016;16(1). doi: <https://doi.org/10.1186/s12889-016-3586-8>.
24. Zelik E, Lizer Y, Lizer S. Screen time of preschool children in relation to their parent's screen usage habits and family functions. *Cukurova Med J*. 2021;46(1):343–51. doi: <https://doi.org/10.17826/cumj.780582>.
25. Carson V, Spence JC, Cutumisu N, Cargill L. Association between neighborhood socioeconomic status and screen time among pre-school children: A cross-sectional study. *BMC Public Health*. 2010;10:367. doi: <http://www.biomedcentral.com/1471-2458/10/367>.
26. Goncalves WSF, Byrne R, Viana MT, Trost SG. Parental influences on screen time and weight status among preschool children from Brazil: A cross-sectional study. *Int J Behav Nutr Phys Act*. 2019;16(1). doi: <https://doi.org/10.1186/s12966->

- 019-0788-3.
27. Axelsson EL, Purcell K, Asis A, Paech G, Metse A, Murphy D, Robson A. Preschoolers' engagement with screen content and associations with sleep and cognitive development. *Acta Psychol.* 2022;230. doi: <https://doi.org/10.1016/j.actpsy.2022.103762>.
28. Suleman M, Sughra U, Riaz A, Akbar M. Effect of screen time on behaviour of pre-schoolers in Islamabad. *Pak J Med Sci.* 2023;39(2):502–7. doi: <https://doi.org/10.12669/pjms.39.2.6883>.
29. Susilowati IH, Nugraha S, Alimoeso S, Hasiholan BP. Screen time for preschool children: Learning from home during the COVID-19 pandemic. *Glob Pediatr Health.* 2021;8. doi: <https://doi.org/10.1177/2333794X211017836>.
30. Ho SNJ, Yu ML, Brown T. The relationship between children's screen time and the time they spend engaging in play: An exploratory study. *J Occup Ther Sch Early Interv.* 2024;4:2–17. doi: <https://doi.org/10.1080/19411243.2024.2333276>.
31. Mustonen R, Torppa R, Stolt S. Screen time of preschool-aged children and their mothers, and children's language development. *Children.* 2022;9(10). doi: <https://doi.org/10.3390/children9101577>.
32. Gath M, McNeill B, Gillon G. Preschoolers' screen time and reduced opportunities for quality interaction: Associations with language development and parent-child closeness. *Curr Res Behav Sci.* 2023;10(4):100140. doi: <https://doi.org/10.1016/j.crbeha.2023.100140>.
33. Khan KS, Purtell KM, Logan J, Ansari A, Justice LM. Association between television viewing and parent-child reading in the early home environment. *2017;0:1–7.*
34. Cameron-Faulkner T, Noble C. A comparison of book text and child-directed speech. *First Lang.* 2013;33:268–79. doi: <https://doi.org/10.1177/0142723713487613>.
35. McGillion M, Pine JM, Herbert JS, Matthews D. A randomised controlled trial to test the effect of promoting caregiver contingent talk on language development in infants from diverse socioeconomic status backgrounds. *J Child Psychol Psychiatry.* 2017;58:1122–31. doi: <https://doi.org/10.1111/jcpp.12725>.
36. Dowdall N, Melendez-Torres GJ, Murray L, Gardner F, Hartford L, Cooper PJ. Shared picture book reading interventions for child language development: A systematic review and meta-analysis. *Child Dev.* 2020;91(2):383–99. doi: <https://doi.org/10.1111/cdev.13225>.
37. Hirsh-Pasek K, Adamson LB, Bakeman R, Owen MT, Golinkoff RM, Pace A, et al. The contribution of early communication quality to low-income children's language success. *Psychol Sci.* 2015;26(7):1071–83. doi: <https://doi.org/10.1177/0956797615581493>.
38. Widyaningsih TS, Tamrin T. The effect of stimulated group interaction on pre-school children's social development. *Asian Community Health Nurs Res.* 2021;39. doi: <https://doi.org/10.29253/achnr.2020.23956>.
39. Abbot-Smith K, Dockrell J, Sturrock A, Matthews D, Wilson C. Topic maintenance in social conversation: What children need to learn and evidence this can be taught. *First Lang.* 2023;43(6):614–42. doi: <https://doi.org/10.1177/01427237231172652>.