Caspian Journal of Pediatrics
Babol University of Medical Sciences
e-ISSN: 2383-3106

# Effect of the COVID-19 Pandemic on the Linguistic and Socio-Emotional Development of Preschoolers

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## Article Info.

**Article type:**
**Research Article**

**Received:** 1 Feb. 2025
**Revised:** 4 Oct. 2025
**Accepted:** 7 Oct. 2024
**Published:** 26 Nov. 2025

**Keywords:**
*COVID-19 Pandemic, Gadget Use, Language and Speech, Language Evaluation Scale Trivandrum, Screen Time, Socio-Emotional Development, Strengths and Difficulties Questionnaire*

## ABSTRACT

**Background and Objective:** The COVID-19 pandemic and the resulting social restrictions have significantly changed the developmental atmosphere of young children, especially children aged 1-3 years, which is a critical period for social and linguistic development. The objective of this study was to investigate the effects on the linguistic and socio-emotional development of children aged 3-6 years who were affected during the pandemic at the age of 1-3 years.

**Methods:** A cross-sectional study was done on 400 eligible children aged 3-6 years, epidemiologic information and anthropometric measurements were obtained, and parents/caregivers were interviewed, using a self-developed internally validated questionnaire. The socio-emotional development and language development of eligible children were assessed using validated instruments, namely the Strengths and Difficulties Questionnaire (SDQ) and Language Evaluation Scale Trivandrum (LEST), respectively. The responses were recorded, and the results were analyzed using SPSS 23.

**Findings:** The mean age was 5.143 +/-0.85 years. Speech delay was present in 276 (69%) of the children in the study. The SDQ prosocial score was 'low' and 'very low' in a large proportion of children who used gadgets for an average of 2-4 hours per day ($p = 0.00001$). The strength of the correlation was high. The SDQ difficulty score was also 'high' and 'very high' for a significantly larger proportion of children who used gadgets for an average of 2-4 hours per day ($p = 0.032$).

**Conclusion:** Increased gadget use and reduced peer interaction during the pandemic were associated with negative impacts on preschool children's language and socio-emotional development.

**Cite this Article:** Rashmi N, Komala J. Effect of the COVID-19 Pandemic on the Linguistic and Socio-Emotional Development of Preschoolers. Caspian J Pediatrs June 2025; 11: e7.

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## Introduction

The first 3 years of life are crucial for the acquisition of speech and language skills, which develop best in a world rich in sounds and sights and where the child is constantly exposed to the speech of others. Speech is the articulation and production of speech sounds in the mouth, while language encompasses comprehension, processing, and production of communication. Expressive language is the ability to communicate and convey meaning to others through speech, but can also take the form of signs, gestures, and written language. The development of speech and language is due to a complex interplay between genetic factors and environmental stimuli [1]. Socio-emotional development is a concept commonly used in young children that refers to a process in which children develop the ability to understand, express, and handle social relationships and emotions. It is a complex and comprehensive term that allows young children to function and adapt properly to their environment [2].

The COVID-19 pandemic has ushered in an unprecedented era of upheaval, fundamentally altering social norms and daily life around the world. Among the most vulnerable populations were toddlers and preschoolers, a critical age group for basic developmental milestones. The widespread introduction of public health measures, including lockdowns, school closures, reduced social interactions, and increased screen time, has inadvertently created a unique and challenging environment for young children.

Excessive screen time can negatively impact both the language and socio-emotional development in toddlers. It can hinder the acquisition of language skills by decreasing opportunities for real-life social interactions that are crucial for developing vocabulary, pragmatic language skills, and emotional regulation. Socio-emotional development can be affected through reduced social interactions and potential sleep disturbances. Early linguistic and social development requires in-person experiences and peer-play time.

Extensive use of gadgets like smartphones, even in very young children (1-3 years of age) and infants, has resulted in reduced ability to communicate verbally and socialize. Moreover, a young child's development is largely influenced by daily interactions with a stable and nurturing network of caregivers, a peer group of children both within and outside their home. So, any disruption in the developmental process of 1-3-year-old children during the pandemic would likely lead to delays, especially in the areas of speech and language as well as socio-emotional domains. The children who were 1-3 years old during the pandemic would have been 3-6 years old 2 years after the pandemic, i.e., at the time this study was conducted. Thus, the aim of this study was to investigate the significant and diverse effects of the COVID-19 pandemic on two crucial areas of early childhood development: speech and language acquisition and socio-emotional growth.

By examining how altered communication patterns, limited peer engagement and increased family stress during the pandemic have influenced young children`s abilities to articulate their thoughts, comprehend language, form social bonds and regulate their emotions, the aim of this study was to shed light on the long-term effects and the need for targeted support and interventions.

Furthermore, to our knowledge, there are very few or no studies on this topic in our country and also in the international context, which has increased the need for this study.

The aim of this study was to investigate the effects of social restrictions and lockdown during the COVID-19 pandemic on the language development and socio-emotional development of children aged 3-6 years.

## Methods

This cross-sectional observational study was conducted on 400 children aged 3-6 years attending our hospital, both outpatient and inpatient, who met the eligibility criteria after obtaining informed consent from the participants' parents/guardians, over an 18-month period from August 2022 to February 2024. Based on the prevalence of both socio-emotional and language delay, which was 3%–27% [3, 4] in previous studies, a minimum sample size of 303 was calculated with a 95% confidence interval and a 5% margin of error.

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Ethical approval was obtained from our Institutional Ethical Committee before starting the study. A convenience sampling was drawn among children aged 3-6 years attending the pediatric department (including outpatients and inpatients) who met the eligibility criteria. Most of the children attending our hospital come from rural areas and belong to a low to middle socio-economic status. A large proportion of them are admitted with infections. Children with known autism spectrum disorder, attention deficit hyperactivity disorder, intellectual retardation or any other developmental disorder, children admitted to the neonatal intensive care unit or with perinatal insults such as birth asphyxia, prematurity, neonatal hyperbilirubinemia, CNS insults, intracranial hemorrhage and known cases of deafness and children with acute or chronic suppurative otitis media were excluded from the study.

Preliminary information, including demographics and other relevant information about play, quality of time with parents, interaction with peers and duration of gadget use, was collected from parents/guardians using a self- developed, internally validated questionnaire through an interview, either in person in a separate room to maintain confidentiality, or through a telephone interview in some cases when parents were not available at the hospital. Subsequently, socio-emotional and language development were assessed using validated instruments, namely the Strengths and Difficulties Questionnaire (SDQ) and the Language Evaluation Scale Trivandrum (LEST). The entire process took 15-20 minutes for each participant.

### *Strengths and Difficulties Questionnaire (SDQ):*

The SDQ is a widely used instrument to identify potential emotional and behavioral problems in children and adolescents aged 3-16 years. It is a brief behavioral screening tool with good internal consistency. Cronbach's alpha, a measure of internal consistency reliability, is often used to assess the SDQ and is generally in an acceptable range (around 0.75) for the difficulty score. However, some subscales, such as behavioral and peer problems, may have lower reliability. It consists of 25 items divided into five subscales, namely, emotional symptoms, behavioral problems, hyperactivity/attention, peer problems and prosocial behavior [5, 6].

Language evaluation screening test (LEST:3-6 years): This is a simple, valid, community screening instrument with 31 items that was validated against the extended REELS with a community sample, with the LEST delay with one item and two items having a sensitivity of 81%, 47%, a specificity of 68%, 94%, a positive predictive value of 12%, 31% and a negative predictive value of 98%, 97% and accuracy of 68.5%, 92%, respectively. [7]

These screening tools were used for this study because they were easy to use and less time-consuming, while having good validity and reliability. [7-10]

The collected data were tabulated in Microsoft Excel and statistically analyzed using appropriate methods in SPSS 23. Descriptive statistics such as mean (SD) were used for continuous variables, and frequency, percentage and proportions were used for categorical variables. The significance of the relationship between the two categorical variables was tested for independence using the chi-square test.

## Results

The mean age of the study population was 5.143 +/-0.85 years. The percentage distribution between male (n=202, 50.5%) and female (n=198, 49.5%) children was almost equal. The number of children belonging to urban (n=222, 55.5%) and rural (n=177, 45.5%) populations was almost equal in the present study. The majority of children were born in a non-consanguineous marriage (n=325, 81.25%) and belonged to the nuclear family (n=309, 77.25%) of the study population. A substantial number of children used gadgets for an average of 2-4 hours per day (n=246, 61.5%) and 2-3 hours per day of time interacting with peers (n=326, 81.5%). The average amount of time spent playing outdoors and indoors per day is shown in Table 1. A significant number of children (n=276; 69%) were found to have a speech and language delay as assessed by the LEST (Figure 1). However, there was no significant correlation

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between the duration of gadget use and language development (Table 2). There was also no significant relationship between language development and other parameters like the length of time (in hours) the child was home alone, the quality of time spent with parents, outdoor and indoor play, interaction with peers and gadget use. There was a significant association between SDQ score and gender, with most children who had a 'slightly elevated' difficulty score being females (p< 0.01). A statistically significant relationship (p value < 0.03) was also found between socio-emotional development (total difficulty score) and hours/day of gadget use. The majority of children with a 'high' total difficulty score had an average gadget usage time of 2-4 hours/day.

The observation of a significant relationship between interaction with peers and socio-emotional development showed that the lower the duration of interaction with peers, the higher the total difficulty score (p-value < 0.039) and the lower the prosociality score (p-value < 0.001), which is illustrated in Table 3. In addition, a statistically significant relationship was observed between socio-emotional development (prosocial score) and duration of play. The majority of children with 'near average' prosocial scores played on average 2 hours indoors (p<0.001) and 1 hour outdoors (p<0.007) daily, as shown in Table 4. This may suggest that an average daily play time of 1to 2 hours both indoors and outdoors may promote prosocial behavior in preschool children. There was a significant relationship between prosocial score and peer interaction (p<0.001), i.e., the majority of children who had a prosocial score “close to average” had an average of 2 hours of peer interaction time per day.

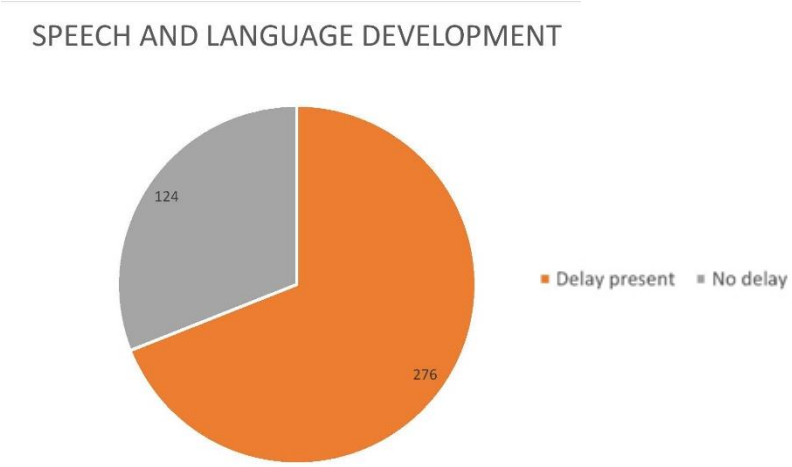


**Figure 1: Pie chart showing the proportion of speech and language delay**

**Table 1: Average hours/day of outdoor and indoor play for children**

| Type of Play | Duration (hours/day) | Number (%) |
|---|---|---|
| Outdoor | 1 | 132(33) |
| | 2 | 87(21.75) |
| | 3 | 47(11.75) |
| | 4 | 63(15.75) |
| | 4-6 | 3(0.75) |
| | 4-8 | 17(4.25) |
| | 6 | 1(0.25) |
| | Never | 50(12.5) |
| Indoor | 1 | 85(21.25) |
| | 2 | 101(25.25) |
| | 3 | 69(17.25) |
| | 4 | 36(9) |
| | 4-6 | 2(0.05) |
| | 5 | 37(9.25) |
| | 6 | 22(5.5) |
| | Never | 48(12) |

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**Table 2: Relationship between hours/day of gadget use and language development**

| Speech and language development | Hours/day of gadget use | | | | | Chi-square value | P-value |
|---|---|---|---|---|---|---|---|
| | 0-2 | 2 | 2-4 | 4-6 | 6-8 | | |
| Negative screening for speech delay | 17 | 20 | 75 | 11 | 1 | 3.8689 | 0.5684 |
| Positive screening for speech delay | 45 | 36 | 171 | 18 | 6 | | |

**Table 3: Relationship between socio-emotional assessment (total difficulty and prosocial scores) and hours/day children interact with peers**

| Socio-emotional assessment | | Hours/day of peer interaction | | | | | | | | | Chi-square value | p-value |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 0-2 | 1 | 1-2 | 2 | 2-3 | 2-4 | 3 | 3-4 | 4 | 4-5 | |
| A: Total Difficulties Score | Close to average | 0 | 2 | 1 | 9 | 1 | 0 | 12 | 0 | 0 | 0 | 94.439 | 0.0392 |
| | High | 1 | 8 | 0 | 65 | 1 | 5 | 43 | 0 | 2 | 1 | | |
| | Slightly raised | 0 | 6 | 3 | 54 | 2 | 1 | 63 | 2 | 1 | 0 | | |
| | Very High | 1 | 26 | 2 | 58 | 1 | 1 | 22 | 0 | 6 | 0 | | |
| B: Prosocial Score | Close to average | 2 | 10 | 1 | 105 | 2 | 3 | 94 | 2 | 1 | 0 | 239.69 | 0.00001 |
| | High | 0 | 13 | 0 | 27 | 0 | 2 | 18 | 0 | 2 | 0 | | |
| | Slightly raised | 0 | 8 | 4 | 38 | 3 | 1 | 21 | 0 | 4 | 1 | | |
| | Very High | 0 | 11 | 2 | 15 | 0 | 1 | 7 | 0 | 2 | 0 | | |

**Table 4: Socio-emotional assessment (Prosocial Score) vs. duration of indoor and outdoor play in hours/day**

| Socio-emotional assessment (Pro-social score) | | Duration (in hours/day) | | | | | | | | Chi-square value | P-value |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 1 | 2 | 3 | 4 | 4-6 | 5 | 6 | Never | | |
| Indoor Play | Close to average | 44 | 55 | 39 | 25 | 0 | 18 | 11 | 29 | 219.87 | 0.00001 |
| | Low | 19 | 12 | 16 | 3 | 0 | 5 | 1 | 10 | | |
| | Slightly lowered | 20 | 27 | 7 | 3 | 1 | 9 | 8 | 5 | | |
| | Very low | 7 | 7 | 7 | 5 | 1 | 5 | 2 | 4 | | |
| Outdoor Play | Close to average | 79 | 43 | 27 | 32 | 1 | 6 | 0 | 33 | 149.88 | 0.00073 |
| | Low | 21 | 12 | 4 | 11 | 0 | 4 | 0 | 9 | | |
| | Slightly lowered | 23 | 24 | 15 | 7 | 2 | 2 | 1 | 4 | | |
| | Very low | 9 | 8 | 6 | 6 | 0 | 5 | 0 | 4 | | |

## Discussion

The COVID-19 pandemic has significantly impacted children's lives and had indirect effects on various aspects of child development, including school readiness, educational achievement, social skills and psychological well-being. [11] This pandemic has had short- and long-term effects on children's physical, psychological, educational, developmental (especially socio-emotional and language), behavioral, and social health. It has been observed that the use of screens among young children is increasing after the pandemic. Excessive screen use in children aged 3to 6 years can lead to delays in language development as it reduces opportunities for human interaction, limits vocabulary and hinders conversational skills [12]. Socio-emotional effects of screen time include impaired recognition of nonverbal cues, decreased empathy, and increased behavioral problems. [13] However, we were only able to identify a few studies that looked at the effects of the pandemic on the linguistic and socio-emotional development of young children. Therefore, the aim of this cross-sectional study was to investigate the impact of social restrictions during the pandemic on the vulnerable age group of 1-3 years, which is crucial for linguistic and socio-emotional development. These children would have been 3-6 years old after the pandemic, i.e., at the start of this study. The aim of the present study was to find out the effects on the above-mentioned domains in preschoolers (3-6 years), who were exposed to the social restrictions during the lockdown at the age of 1-3 years.

In their study from 2022 [14], Claire Hughes et al. found that children with one or more older siblings had fewer adjustment problems compared to their

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peers without siblings. Conversely, children from single-parent families had more adjustment difficulties, as did children whose parents reported higher levels of sibling conflict. The study found a negative correlation between children's adjustment difficulties and family socioeconomic status, while a positive correlation was observed with measures of COVID-19 family disruption and state restrictions. However, the current study revealed no significant correlation between birth order or number of siblings and behavioral problems in terms of total difficulties score (SDQ) as well as language development in this age group (3-6 years).

A 2020 study by Zipfel [15] has shown that urban areas are likely to have a greater impact, as they are expected to have a stricter implementation of restrictions than rural areas, which are isolated from these restrictions as they are only partially connected to urban markets and environments. In addition, a significant proportion of rural residents were assumed to be self-employed in subsistence agriculture. The results of our study also showed that the number of subjects from the urban population exceeded that of the rural population, which clearly affected the children from urban areas and contributed to delays in language development, supporting this assumption.

Children have become accustomed to using digital platforms for their tasks, resulting in less opportunity for traditional reading and writing. Children of different ages, particularly those who spent more screen time during this period, were exposed to significant risks associated with the negative effects of excessive screen use on their mental and physical well-being [16]. Wearing masks has had a negative impact on children's developmental progress, particularly in areas such as language development, literacy acquisition, cognitive development, and the ability to recognize emotions, which in turn leads to a reduced ability to develop social-emotional skills, and a notable isolation between teachers and students, as well as a reduction in interactions with peers [17]. A study published by Bett Hauser, BA, Bach-Mortensen AM, and Engzel lP in 2023 found that the pandemic adversely affected the academic performance of school-age children, particularly elementary school students and children from low socioeconomic backgrounds [18]. Another study by Stephanie Hoffmann in 2024 [19] on social inequalities in early childhood language development during the COVID-19 pandemic, a descriptive study with data from three consecutive school enrollment surveys in Germany, found that low socioeconomic status was the most important factor for language delays, with prevalence rates of 42.5% and 43.4%. The present study also suggests a significant relationship between socioeconomic status and language development in children aged 3 to 6 years, which was observed in both rural and urban populations, especially in children from the upper and lower classes.

In another study by DiGiorgio E [20], based on the responses of 245 mothers, it was found that children aged 2 to 5 years showed more emotional symptoms and self-regulation problems during the quarantine period. The current study came to similar conclusions, showing a significant association between duration of gadget use and socio-emotional development. Although the current study found that slightly more than 2/3$^{rd}$ of our study children (69%) had a speech and language delay, our analysis showed no significant relationship between this delay and other parameters like duration of gadget use and peer interaction, in contrast to socio-emotional development.

An interesting study by Heffler KF, Sienko DM, Subedi K, et al. [21] revealed that prolonged screen time in early childhood was associated with a higher likelihood of behavioral problems resembling autism spectrum disorder. This can be explained by the concept that excessive screen time has negative effects on social learning and processing in the brain, and may even foster visual brain hyperconnectivity. The present study supports this finding as we noted a significant association between socio-emotional development and the duration of peer interaction and gadget use, as well as the indoor and outdoor play durations.

### *Strengths and Limitations*

One of the strengths of the current study is the relatively large sample size, even though it is from a single center. Some of the limitations of the ongoing study would be selection bias due to convenience

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sampling and response and recall bias due to the interview method used. Moreover, the participants in the present study are limited to a single geographical area. Further studies with a large number of children from different parts of the world could shed light on the true extent of the problem.

### *Conclusion*

Increased screen use and reduced peer interaction, especially during and after the COVID-19 pandemic, have led to a significant increase in the number of young children who show a delay in the development of language and speech skills and the socio-emotional component. Screen dependency disorder is an emerging problem that can affect individuals at a very early age in all aspects of development. Hence, prevention strategies need to be developed not only for older children and adults, but special attention needs to be paid to toddlers and preschoolers. If parents express concern that their child is spending too much time with screens in today's world, whether for educational or entertainment purposes, pediatricians should give this story due importance, investigate further and offer suggestions and appropriate control measures to limit passive screen time as much as possible.

## Acknowledgments

Nil.

## Ethical Considerations

Ethical approval was obtained from our Institutional Ethical Committee (No. JSS/MC/PG/IEC 67/2022-23) before starting the study.

## Funding

There was no financial support for this research.

## Conflict of interest

There is no conflict of interest.

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