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# Impact of Screen Media Usage on Early Childhood Development

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## ABSTRACT

***Objective:*** To see the impact of screen media usage on early childhood development.
***Study Design:*** Cross-sectional study.
***Place and Duration of study:*** Developmental Behavioural Paediatrics Department, Children's Hospital and Institute of Child Health, Lahore Pakistan, from Oct to Dec 2020.
***Methodology:*** This study included 100 children with an age range between 15-36 months and divided into two groups. Group-1 was children with communication behaviour disorders (CBD) (n=50), and Group-2 was typically developing (TD) children (n=50). ShaMaq Developmental Screening Tool (SDST) was administered to children to screen their development. Childhood behaviours were rated on a scale of 0-10 on a Behaviour rating scale.
***Results:*** Children with CBD had poor eye contact, response to names, poor imitation, poor pointing and poor one-step command following ($p$<0.001) compared to typically developing children. Children with CBD had poor eating habits ($p$<0.01), were more restless ($p$<0.001), and had a developmental delay ($p$<0.001) on SDST as compared to the other group. In children with CBD, the extent of screen media exposure was significantly correlated with restlessness ($p$<0.05) and poor pointing ($p$<0.01).
***Conclusion*:** Exposure to screen media at an early age and prolonged use of screens can lead to adverse developmental outcomes and behaviour issues in children. This is more evident in children with CBD than in typically developing children.

**Keywords:** Communication behaviour disorder, Early childhood development; ShaMaq developmental screening tool.

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## INTRODUCTION

Early childhood development includes optimal cognitive, language, and socio-emotional development, as well as adequate growth and nutrition.[1,2] Early childhood development includes the period from birth to 3 years, considered a crucial period for maximum brain growth. During this period, rapid cognitive development in the form of synaptic pruning and myelination occurs. Infants develop enhanced cognitive learning capacities such as classical conditioning, operant conditioning, and habituation.[3,4] All typically developing infants progress from cooing to canonical babbling to words to two-word utterances and eventually to meaningful speech.[5] Quantity and quality of language acquisition vary. Responsive parenting, play-based learning interaction, and reading with a child in the first three years of life provide the basis for sustained development and refined social skills.[6]

The relationship of the role of media on cognition is directly dependent upon the age of the child first exposed to screen media, the context and content of programs being watched, and the number of hours engaged with screens.[7] For children <2 years old, television viewing is negatively associated with language and higher mental functions.[8] There is less comprehension of the content of television programmes under two years of age. Increased indulgence in screen results in reduced play-based learning activities.[9,10] Association between screen media exposure and child development is complex. Therefore, this study aimed to see the effects of screen media usage on early childhood development and behaviours.

## METHODOLOGY

This was a cross-sectional study conducted at the Developmental-Behavioural Paediatrics Department and Filter Clinic of the OPD, Children's Hospital and Institute of Child Health, Lahore Pakistan from October to December 2020, after approval from IRB (Ref 2021-263-CHICH). According to CDC (2020), the prevalence of autism is 1 in 54.[11] Therefore, a sample size of 50 CBD children was collected using G –power analysis with medium effect size, alpha 0.05. The sample was collected through consecutive sampling.

**Inclusion Criteria:** Children, aged between 15-36 months, with communication behaviour disorders (CBD) and typically developing children with screen exposure of >2 hours were included in the study.

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**Exclusion Criteria:** Children with severe developmental delay or with known developmental issues like visual impairment, hearing impairment, or chronic diseases like heart disease, celiac disease, asthma or any other chronic ailment were excluded from the study.

A total of 100 Children, were chosen and divided into two groups. Group-1 comprised children with communication behaviour disorders (CBD=50), and Group-2 included typically developing children (TD=50). Children with CBD presented with complaints of expressive a receptive speech delay, socialization issues and atypical behaviours, diagnosed by the Developmental paediatrician and Clinical Psychologist. While typically developing children lacked any history of atypical behaviours and chronic ailment.

Demographic information includes age, parental education, socioeconomic status, birth order, psychological illness in the family, child's age at which screen time was started, the extent of exposure, screen time of parents, exposure of the child to TV, mobile, tablet, and content watched on screen, etc.

Children's Behaviours were rated on a scale of 0-10 on a Behaviour rating scale.[12] These were restlessness, eye contact, response to names, imitation, pointing, one-step command following, anger outbursts, cries out of proportion, sleep disturbances, poor eating habits and temper tantrums.

ShaMaq developmental Screening tool, an indigenous validated tool, was used in the present study to screen children for developmental delay. It screens children of 6-8 weeks, 6-10 months, 18-24 months, 3-3.5 years and 4.5 -5.5 years. It comprises four domains: locomotion and posture, vision and manipulation, hearing and speech and socialization.[12,13]

All children were assessed for their development and behaviours. In addition, a demographic form was filled out while maintaining confidentiality.

SPSS-25 was used for the data analysis. Demographics were analyzed using frequency and percentages. An Independent sample t-test was done to see the differences in development and behaviours between typically developing children and children with communication disorders regarding screen time usage in early child development. Chi-square analysis was applied to compare developmental outcomes in children with a communication behaviour disorder and typically developing children. Pearson Correlation was done to examine the relationship of demographic variables with the behaviours of children with CBD. The *p*-value of ≤0.05 was set as the cut-off value for significance.

## RESULTS

A total of 100 participants comprising 50 children with a communication behaviour disorder (CBD) and 50 typically developing children (TD), were enrolled in this study. In the Table-I, the mean age of the CBD-Group was 29.0±5.86 months, and the TD-Group was 27.0±6.95 months. The childrens' age at the time screen media exposure started was 9±6.19 months in the CBD-Group and 11.0±5.55 months in typically developing children. The mean length of exposure to screen time in CBD children was 6.0±3.09 hours and in typically developing children was 5.0±2.41 hours per day.

**Table-I: Demographic Characteristics of the Study Participants (n=100)**

| Characteristics | Communication Behaviour Disorder (n=50) Mean±SD | Typically Developing Children (n=50) Mean±SD |
|---|---|---|
| Age (years) | 29.34±5.86 | 27.06±6.95 |
| No. of children | 2.02±0.55 | 2.48±1.32 |
| Exposure to screen time started since age | 9.74±6.19 | 11.26±5.55 |
| Extent of exposure of screen time in children | 6.54±3.09 | 5.74±2.41 |
| No. of screens at home | 4.38±2.55 | 4.46±2.98 |
| Screen time of parents (hrs) | 3.64±2.14 | 3.48±2.01 |
| **Socio-Economic Status** | | |
| Low | 7(14) | 8 (16) |
| Middle | 35(70) | 32 (64) |
| High | 8(16) | 10 (20) |
| **Birth Order** | | |
| First born | 26(52) | 21 (42) |
| Middle born | 8(16) | 8 (16) |
| Last born | 16(32) | 21 (42) |
| **Any Psychological Illness in Family** | | |
| Yes | 1(2) | 4 (8) |
| No | 49(98) | 46 (92) |
| **Relatives with Developmental-Behavioural Disorder** | | |
| Yes | 6(12) | 6 (12) |
| No | 44(88) | 44 (88) |
| **Exposure to TV** | | |
| Yes | 30(60) | 46 (92) |
| No | 20(40) | 4 (8) |
| **Exposure to Mobile** | | |
| Yes | 42(84) | 37 (74) |
| No | 8(16) | 13 (26) |
| **Exposure to Tablet** | | |
| Yes | 31(62) | 12 (24) |
| No | 19(38) | 38 (76) |
| **Content Watched Over Screen** | | |
| Supervised | 5(10) | 11 (22) |
| Not Supervised | 45(90) | 39 (78) |
| **Educational Content** | | |
| Yes | 17 (34) | 20 (40) |
| No | 33 (66) | 30 (60) |
| **Recreational Content** | | |
| Yes | 48 (96) | 47 (94) |
| No | 2 (4) | 3 (6) |

The mean screen time of parents/caregivers was approximately 3 hours per day in both the CBD and the Typically Developing groups. On the other hand, 45(90%) of children in the CBD Group and 39(78%) of typically developing children were watching unsupervised content over the screen (Table-I).

Children with CBD had poor eye contact ($p$ <0.001) and response to names ($p$<0.001) as compared with typically developing children. CBD-Group also had poor imitation ($p$<0.001), poor pointing ($p$<0.001) and poor one-step command following ($p$<0.001) than typically developing children. In addition, children with CBD had poor eating habits ($p$<0.01) and were more restless ($p$<0.001) as compared to typically developing children (Table-II).

**Table-II: Comparison of Behaviours between Communication Behaviour Disorder and Typically Developing Children (n=100)**

| Parameters | Communication Behaviour Disorder (n=50) (Mean±SD) | Typically developing children (n=50) (Mean±SD) | *p*-value |
|---|---|---|---|
| Restless | 7.19±1.96 | 5.27±1.84 | <0.001 |
| Eye Contact (Seconds) | 2.83±0.78 | 30.42±12.96 | <0.001 |
| Response To Name | 1.73±1.16 | 7.52±1.71 | <0.001 |
| Imitation | 1.61±1.49 | 6.83±2.41 | <0.001 |
| Pointing | 1.08±1.53 | 6.68±2.36 | <0.001 |
| One Step Instruction | 0.75±1.31 | 6.35±2.25 | <0.001 |
| Anger Outburst | 4.81±2.92 | 4.92±2.47 | 0.84 |
| Cries out of Proportion | 4.88±2.82 | 4.58±2.12 | 0.55 |
| Sleep Disturbance | 2.58±3.51 | 1.79±2.77 | 0.22 |
| Eating Habits | 3.62±2.79 | 1.98±2.52 | 0.003 |
| Temper Tantrums | 5.67±2.57 | 5.39±1.87 | 0.54 |

Table-III showed a significant association between ShaMaq Developmental screening tool (SDST) and the two groups ($p$<0.001). The extent of exposure was positively correlated with restlessness ($p$<0.05), which showed that as the number of hours of screen exposure increa-sed, there was an increase in restlessness in children with CBD (Table-IV).

**Table-III: Developmental Outcome in Children with Communication Behaviour Disorder and Typically Developing Children (n=100)**

| ShaMaq Developmental Screening Tool (SDST) | Groups n(%) | |
|---|---|---|
| | Communication Behaviour Disorder (n=50) | Typically developing children (n=50) |
| Satisfactory | 0 (0) | 50 (100) |
| Unsatisfactory | 50 (100) | 0 (0) |

## DISCUSSION

In the present study, it was also found that the mean screen exposure time in both groups was more than 5 hours per day. These findings concord with the study done by Mistry *et al*. who reported that at the age of 30-33 months, 1 in 6 children viewed >2 hours of television daily, and the majority of the parents were at least college graduates.[13]

Both the groups in our study were exposed to screen time in different ways before one year of age. Children had unsupervised access to mobiles (84%), tablets (62%) and TV (60%) in the CBD group, while typically developing children had exposure to TV (92%), mobiles (74%) and tablets (24%). Similarly, a survey conducted by Rideout *et al*. also reported that children under six years were engaged on different types of screens for more than 2 hours per day. The majority of them were exposed to screen media before their first birthday. He attributed this to parents' perception of the positive impact of TV on children's behaviour.[14] Another study stated that commonly used devices by children were TV (98%), smartphones (80%) and tablets (52.7%).[15]

**Table-IV: Inter-Correlations for Demographic Variables and Behaviour Rating Scale in Communication Behaviour Disorder Children (n =50)**

| Variable | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|---|---|
| Extent of Exposure (in hours) | - | | | | | | | | | |
| Exposure started since age (in months) | -.26 | - | | | | | | | | |
| Content Watched | .06 | -.19 | - | | | | | | | |
| Restless | .29* | .00 | .05 | - | | | | | | |
| Eye contact | .11 | .08 | -.23 | -.31* | - | | | | | |
| Response to name | .03 | .10 | -.10 | -.13 | .48** | - | | | | |
| Imitation | -.09 | .19 | -.23 | -.13 | .58** | .69** | - | | | |
| Pointing | -.17 | .21 | -.40** | -.18 | .50** | .68** | .83** | - | | |
| One step instruction | -.15 | .19 | -.19 | -.22 | .47** | .79** | .74** | .83** | - | |
| Anger outburst | -.21 | .17 | -.08 | .18 | -.28 | .17 | .07 | .13 | .17 | - |
| Mean±SD | 6.54±3.08 | 9.74±6.18 | 1.90±0.30 | 7.30±1.91 | 2.74±0.66 | 1.56±0.79 | 1.42±1.14 | 0.84±0.98 | 0.54±0.78 | 4.92±2.89 |

Due to screen time, children with CBD had poor eye contact and response to names compared to typically developing children. CBD group also had poor imitation, pointing, and one-step command following than typically developing children. Barbaro *et al.* compared typically developing children and autism spectrum disorder in domains of socialization and communication. He reported that children with ASD lacked ageappropriate socializing skills (poor eye contact, poor social interaction, and preferred ignoring people). They had poor joint attention skills, lack of age-appropriate verbal/non-verbal communication and no imitation.[16] Harle *et al*. related the problematic symptoms of children with ASD to excessive screen exposure. He declared screen media as a trigger for Virtual ASD and even suggested improvement in symptoms of Children with CBD after the removal of the screen and improved parentchild interaction.[17]

Parents of children with CBD reported more eating problems than typically developing children. Eating habits of ASD children were studied by Emond *et al*. and reported feeding problems, such as specific food preference, food refusal, fussiness and slow feeding, were frequently found in children with autism.[18]

Children with CBD showed developmental delay when screened on SDST, while typically developing children did not show any delay. Mathew *et al.* also reported that children with CBD significantly differed in developmental screening tools compared to typically developing children.[19]

The extent of exposure was positively correlated with restlessness in the CBD group. It can be inferred that watching the screen for longer than recommended is responsible for increased restlessness in the CBD group. Hermawati *et al*. reported that children viewing ≥3hours/day had inattention and hyperactivity.[20]

## LIMITATIONS OF STUDY

The limitations of the study were that the rating of behaviours and estimated screen time for both the groups were taken through parental reporting only.

## CONCLUSION

Exposure to screen media at an early age and prolonged use can lead to adverse developmental outcomes and behaviour issues in children. This is more evident in children with CBD than in typically developing children.

**Conflict of Interest:** None

**Author Contribution**

Following authors have made substantial contributions to the manuscript as under:

MM& SM: Study design, drafting the manuscript, data interpretation, critical review, approval of the final version to be published.

AA & HA: Conception, data acquisition, data analysis, drafting the manuscript, approval of the final version to be published.

EU & AF: Critical review, drafting the manuscript, approval of the final version to be published.

Authors agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

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