Original Research Article

Screentime in primary school children and its associations: a cross sectional study

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ABSTRACT

Background: With the advent of new screen technologies, childhood is increasingly being enveloped into a digital world. Parents find it difficult to limit the screen time in children. Although children may benefit from the educational potential of interactive media, there is growing concern about their overuse during the crucial period of rapid brain development. The objective of the study was to assess screen time in primary school children and its association with child behavior and language development.
Methods: A cross-sectional study was conducted in 1200, primary school children aged 4 to 12 years in Kannur district in North Kerala, India, from September 2019 to March 2020. Pre-structured questionnaires were distributed to parents to assess the total screen time in children and its associations. Behavioral problems were assessed based on Strength and difficulty questionnaire (SDQ). Language and speech problems were assessed using the Language Evaluation and Screening Tool (LEST 3 to 6 years).
Results: Majority of the children (69.4%) had screen time between 2 to 4 hours. Screen time was higher among boys, children belonging to joint families and children having low parental education. There was statistically significant association between behavioral problem and screen time. Language development was reported to be delayed with a statistically significant association with the increased electronic screen use. Visual problems were also found to be more with the increase in screen time.
Conclusions: Screen use is on the rise in young children and it adversely affect their behaviour and language development. Limiting screen time and improving the quality of the screen content for a child's overall development is the need of the hour.

Keywords: Screen time, Behavioral problems, Language delay

INTRODUCTION

Electronic devices have undoubtedly revolutionized the world and they play an indispensable role in our daily lives. With the advent of new screen technologies, childhood is increasingly being enveloped into a digital world.[1] Children may benefit from the educational potential of interactive media; however, there is growing concern about their overuse during the crucial period of rapid brain development.[2] Increased access to new digital media devices has contributed to a rapid rise in average screen exposure in children.[3]

Increased screen time affects the language development, physical, emotional and social development in children. It has deleterious effects on behavior and can result in irritability, low mood and affect the cognitive and socioemotional development, resulting in poor scholastic performance. It also alters the sleep pattern in children,

which in turn may lead to behavioral problems in young age.

The effects of electronic media on the health and behavior of primary school children in this part of North Kerala, where the children have easy access to multiple gadgets, mostly due to the high inflow of gulf money, have not been studied so far. Therefore, we undertake this study to unveil the hitherto unknown effects of increased screen use in primary school children in North Kerala.

The objective of our study was to assess screen time in primary school children and to find its association with child behavior and language development.

METHODS

We did a cross sectional school-based study from September 2019 to March 2020 with a sample size of 1200. School chil-dren aged 4 to 12 years, from kindergarten to grade seven from Kannur district in North Kerala were included in the study.

Children who were diagnosed to have progressive or non-progressive neurological disorders and those with visual, hearing defects and mental disability were excluded. A pre structured and pre tested questionnaire was developed to assess the total screen time in children and its associations. Behavioral problems were assessed based on the Strength and Difficulty Questionnaire (SDQ). Ethical committee clearance was obtained prior to the study. After taking informed consent from the parents/caretakers of these children and the head of the institutions, the questionnaire was administered.

"Screen time" was defined as the total time spent per day in viewing screens such as mobile phones, tablets, television, computer, or any handheld or visual device.[4] "Digital media" refers to content transmitted over the internet or computer networks on all devices unless particular ones are specified.[5] Screen time was assessed by parental report on the child's screen view time, during a usual weekday and a usual weekend. A weighted weekly average of weekday and weekend screen time across different mediums was calculated to yield screen time use in hours per day.

Behavioral problems include internalizing problems like emotional and peer symptoms and externalizing problems like conduct and hyperactivity symptoms. Broad-band symptom rating scales can be used for initial assessment of behavior problems.[6] Among these rating scales, the Strength and difficulty questionnaire (SDQ) was used in our study. SDQ is a brief behavioral screening questionnaire in 3- to 16-year-old children and includes about 25 attributes some positive and others negative. These 25 items are divided between 5 scales, each having 5 items; the scales being Emotional symptoms, Conduct problems, Hyperactivity/inattention, Peer relationship problems and Prosocial behavior. Items were scored

manually.[7] In the scoring, 'somewhat true' is always scored as 1, but the scoring of 'Not true' and 'certainly true' varies with the item. Total difficulties score is generated by summing scores from all the scales except the prosocial scale. SDQ scores are categorized as close to average, slightly raised/high and very high.[8]

Language and speech problems were assessed by administering the age-appropriate questionnaire to parents of preschool children up to 6 years of age using the Language evaluation and screening tool (LEST). LEST (3-6) is a screening tool for language delay with 31 test items, developed and validated at Child Development Centre, Kerala. A delay in 2 items in LEST were taken to be statistically significant.[9]

Statistical analysis

Behavioral problem was considered as primary outcome variable. Language development delay was considered as secondary outcome variable. Screen time was considered as primary explanatory variable. Background characteristics and other variables were considered secondary explanatory variable. Descriptive analysis was carried out by frequency and proportion for background characteristics and screen time. The association between explanatory variables and categorical outcomes was assessed by cross tabulation and comparison of percentages. Chi square test was used to test statistical significance. In case of zero or low frequency in some of the categories, simulated p value was calculated wherever required.

Multivariate logistic regression analysis was performed to determine the predictors for primary outcome variable. Adjusted odds ratio along with 95% CI is present. P<0.05 was considered statistically significant. IBM Statistical package for social sciences (SPSS) version 22 was used for statistical analysis.[10]

RESULTS

A total of 1200 primary school children aged 4 to 12 years were included in our cross-sectional study and administered the pre structured questionnaire. Those with progressive/non progressive neurological defects, intellectual disabilities, visual and hearing defects and those who did not respond to the questionnaire were excluded and 1112 children were considered into the final analysis. Among them, 51.4% belonged to the 8-12 age group and 48.6% to the 4 to 7 age group. The mean age of children was 7.78 years (SD 1.98) 50.9% of the children studied were males. 52.3% of the children were living in joint family and 61.2% belonged to Hindu religion. Majority were born as term babies (94.8%) with normal birth weight (87.1%).

Most of the children studied belonged to the above poverty line socioeconomic group (78.6%).
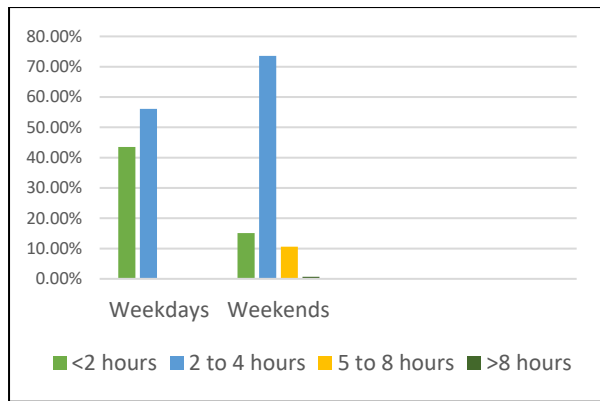
Figure 1: Screentime during weekdays and weekends.

The caretakers for most of the children were both parents together (76.4%) whereas 23.3% were being taken care by a single parent. Mothers of 36.2% children were graduates whereas fathers of 32% of children had secondary education.

The total numbers of children in majority of the households were less than 3 (66%).

Figure 1 shows the overall screen time of the children during weekdays and weekends. During weekdays, 43.5% (484) of children used screen for less than 2 hours per day and 56.1% (624) children for 2 to 4 hours per day. Only 0.4% children watched the screens for more than 5 hours during the weekdays. However, during the weekends, majority of children (73.6%) used the screen devices for 2 to 4 hours per day. 10.6% of the children watched the screens for 5 to 8 hours per day while parents of 0.7% of the children admitted that their children used the screen devices for more than 8 hours per day during the weekends.

Table 1: Association between background characteristics and screen time.

Variable	Categories	Screen time total				Chi-square	P value
		<2 hours	2 to 4 hours	5 to 8 hours	>8 hours		
Age group	4 to 7	76 (14.1)	390 (72.2)	68 (12.6)	6 (1.1)	7.4687	0.058
	8 to 12	114 (19.9)	380 (66.4)	74 (12.9)	4 (0.7)		
Gender	Female	110 (20.1)	372 (68.1)	62 (11.4)	2 (0.4)	11.14	0.009
	Male	80 (14.1)	398 (70.3)	80 (14.1)	8 (1.4)		
Family Type	Joint	112 (19.2)	384 (66.0)	78 (13.4)	8 (1.4)	8.657	0.027
	Nuclear	78 (14.7)	386 (72.8)	64 (12.1)	2 (0.4)		
Community	Hindu	72 (10.6)	516 (75.9)	90 (13.2)	2 (0.3)	68.613	0.000
	Muslim	118 (27.8)	246 (58.0)	52 (12.3)	8 (1.9)		
	Christian	0 (0.0)	8 (100.0)	0 (0.0)	0 (0.0)		
Caretaker	Mother	48 (24.7)	122 (62.9)	20 (10.3)	4 (2.1)	34.351	0.014
	Father	16 (24.2)	38 (57.6)	12 (18.2)	0 (0.0)		
	Grandparent	0 (0.0)	0 (0.0)	2 (100.0)	0 (0.0)		
	Parent	126 (14.8)	610 (71.8)	108 (12.7)	6 (0.7)		
Mother's education	Below secondary	6 (21.4)	16 (57.1)	6 (21.4)	0 (0.0)	88.036	0.000
	Secondary	60 (32.3)	94 (50.5)	28 (15.1)	4 (2.2)		
	Higher secondary	60 (23.8)	160 (63.5)	30 (11.9)	2 (0.8)		
	Diploma	0 (0.0)	34 (85.0)	6 (15.0)	0 (0.0)		
	Graduate	54 (13.4)	300 (74.6)	44 (10.9)	4 (1.0)		
	Postgraduate	10 (4.9)	166 (81.4)	28 (13.7)	0 (0.0)		
Father's education	Below secondary	12 (26.1)	22 (47.8)	12 (26.1)	0 (0.0)	84.656	0.000

Continued.

Variable	Categories	Screen time total				Chi-square	P value
		<2 hours	**2 to 4 hours**	**5 to 8 hours**	**>8 hours**		
	Secondary	88 (24.7)	210 (59.0)	52 (14.6)	6 (1.7)		
	Higher secondary	48 (24.7)	126 (64.9)	18 (9.3)	2 (1.0)		
	Diploma	8 (9.1)	68 (77.3)	12 (13.6)	0 (0.0)		
	Graduate	32 (10.6)	238 (78.8)	32 (10.6)	0 (0.0)		
	Postgraduate	2 (1.6)	106 (84.1)	16 (12.7)	2 (1.6)		
Gestation	Preterm	6 (10.3)	34 (58.6)	16 (27.6)	2 (3.4)	17.566	0.004
	Term	184 (17.5)	736 (69.8)	126 (12.0)	8 (0.8)		
Birth weight	Low birthweight	26 (18.1)	92 (63.9)	24 (16.7)	2 (1.4)	3.1843	0.341
	Normal birthweight	164 (16.9)	678 (70.0)	118 (12.2)	8 (0.8)		
Total children in house	less than 3	94 (12.8)	540 (73.6)	94 (12.8)	6 (0.8)	29.143	0.000
	more than equal to 3	96 (25.4)	230 (60.8)	48 (12.7)	4 (1.1)		
Socioeconomic status	Above Poverty Line	148 (16.9)	616 (70.5)	102 (11.7)	8 (0.9)	4.8327	0.193
	Below Poverty Line	42 (17.6)	154 (64.7)	40 (16.8)	2 (0.8)		

Table 2: Association of Age group with TV viewing hours, Smartphone use, Screen hours for education and Screen hours for calming children.

Variable	Categories	Age group		Chi-square	P value
		4 to 7 years	**8 to 12 years**		
TV viewing hours	<2 hours	192(35.6)	252(44.1)	9.869	0.007
	2 to 4 hours	310(57.4)	294(51.4)		
	5 to 8 hours	38(7.0)	26(4.5)		
Smartphone use	Yes	464(85.9)	516(90.2)	4.472	0.034
	No	76(14.1)	56(9.8)		
Screen hours for education	Nil	78(14.4)	68(11.9)	5.632	0.060
	0.5 to 1 hour	440(81.5)	464(81.1)		
	more than 1 hour	22(4.1)	40(7)		
Screen hours for calming children	Nil	90(16.7)	142(24.8)	11.385	0.003
	0.5 to 1 hour	424(78.5)	408(71.3)		
	more than 1 hour	26(4.8)	22(3.8)		

Table 3: Determinants of behavioral problem using multivariate logistic regression.

Variable	Categories	aOR(95% CI)	P value
Screen time	<2 hours (Reference)		
	2 to 4 hours	2.61 (1.07-6.34)	0.035
	5 to 8 hours	8.65 (1.90-39.34)	0.005
	>8 hours	9.02 (3.50-23.28)	0.000
Age group	4 to 7 years (Ref)		

Continued.

Variable	Categories	aOR(95% CI)	P value
	8 to 12	0.76 (0.49-1.18)	0.226
Gender	Female (Ref)		
	Male	1.12 (0.73-1.74)	0.604
Family type	Joint (Reference)		
	Nuclear	1.79 (1.12-2.86)	0.016
Community	Hindu (Reference)		
	Muslim	0.72 (0.4-1.32)	0.286
Caretaker	Mother (Reference)		
	Father	0.35 (0.1-1.19)	0.092
	Parent	0.63 (0.35-1.15)	0.133
Mother's education	Below secondary (Reference)		
	Secondary	0.67 (0.16-2.76)	0.575
	Higher secondary	0.27 (0.06-1.22)	0.088
	Diploma	0.2 (0.03-1.27)	0.088
	Graduate	0.42 (0.09-1.92)	0.265
	Post Graduate	0.47 (0.09-2.34)	0.353
Father's education	Below secondary (Reference)		
	Secondary	4.37 (0.75-25.37)	0.101
	Higher secondary	1.27 (0.18-8.99)	0.811
	Diploma	8.95 (1.3-61.45)	0.026
	Graduate	2.64 (0.4-17.47)	0.314
	Post Graduate	5.33 (0.77-36.62)	0.089
Gestation	Preterm (Reference)		
	Term	0.41 (0.14-1.17)	0.096
Birth weight	Low birth weight (Reference)		
	Normal birth weight	1.03 (0.44-2.42)	0.941
Total children in house	Less than 3 (Reference)		
	More than equal to 3	1.24 (0.69-2.24)	0.470
Socioeconomic status	Above Poverty Line (Reference)		
	Below Poverty Line	1.5 (0.88-2.59)	0.139
Traditional play hours	<2 hours (Reference)		
	2 to 4 hours	0.9 (0.58-1.42)	0.660
	5 to 8 hours	2.19 (0.92-5.23)	0.078

Table 4: Association between behavioral problem and screen time.

Variable	Categories	Behavioral problem		Chi-square	P value
		Normal	**Abnormal**		
Screen time total	<2 hours	184 (96.84)	6 (3.2)	47.539	0.001
	2 to 4 hours	704 (91.43)	66 (8.6)		
	5 to 8 hours	110 (77.46)	32 (22.5)		
	>8 hours	6 (60.0)	4 (40.0)		
Screen time weekdays	<2 hours	458 (94.63)	26 (5.4)	19.194	0.013
	2 to 4 hours	542 (86.86)	82 (13.1)		
	5 to 8 hours	2 (100.0)	0 (0.0)		
	>8 hours	2 (100.0)	0 (0.0)		
Screen time weekends	<2 hours	166 (98.81)	2 (1.2)	43.946	0.001
	2 to 4 hours	740 (90.46)	78 (9.5)		
	5 to 8 hours	94 (79.66)	24 (20.3)		

Continued.

Variable	Categories	Behavioral problem		Chi-square	P value
		Normal	Abnormal		
	>8 hours	4 (50.0)	4 (50.0)		
Screen time during meals	Yes	612 (87.93)	84 (12.1)	11.077	0.001
	No	392 (94.23)	24 (5.8)		
Screen time 1 hour before bed time	Yes	120 (81.08)	28 (18.9)	15.314	0.000
	No	884 (91.7)	80 (8.3)		

Table 5: Association between language problems and screen time.

Variable	Categories	Language development		Chi-square	P value
		Normal	Delayed		
Screen time Total	<2 hours	184 (96.8)	6 (3.2)	16.067	0.006
	2 to 4 hours	746 (96.9)	24 (3.1)		
	5 to 8 hours	130 (91.5)	12 (8.5)		
	>8 hours	8 (80.0)	2 (20.0)		
Screen time weekdays	<2 hours	468 (96.7)	16 (3.3)	49.24	0.003
	2 to 4 hours	598 (95.8)	26 (4.2)		
	5 to 8 hours	2 (100.0)	0 (0.0)		
	>8 hours	0 (0.0)	2 (100.0)		
Screen time weekends	<2 hours	166 (98.8)	2 (1.2)	33.425	0.000
	2 to 4 hours	792 (96.8)	26 (3.2)		
	5 to 8 hours	104 (88.1)	14 (11.9)		
	>8 hours	6 (75.0)	2 (25.0)		
Screen time during meal time	Yes	668 (96.0)	28 (4.0)	6.06E-30	1.000
	No	400 (96.2)	16 (3.8)		
Screen use just before bed time	Yes	140 (94.6)	8 (5.4)	0.554	0.457
	No	928 (96.3)	36 (3.7)		

Table 6: Association of screen time with traditional learning hours and traditional play hours.

Variable	Categories	Screen time				Chi-square	P value
		<2 hours	2 to 4 hours	5 to 8 hours	>8 hours		
Traditional learning hours	<2 hours	110 (19.9)	362 (65.3)	78 (14.1)	4 (0.7)	12.254	0.059
	2 to 4 hours	80 (14.5)	404 (73.5)	60 (10.9)	6 (1.1)		
	5 to 8 hours	0 (0.0)	4 (50.0)	4 (50.0)	0 (0.0)		
Traditional play hours	<2 hours	62 (14.6)	304 (71.4)	56 (13.1)	4 (0.9)	20.394	0.010
	2 to 4 hours	118 (18.7)	426 (67.4)	84 (13.3)	4 (0.6)		
	5 to 8 hours	10 (18.5)	40 (74.1)	2 (3.7)	2 (3.7)		

Note: Simulated p-value was calculated when one or more expected cell count was 0

Table 7: Association between screen time and visual problem.

Screen time	Visual problem		Chi-square	P value
	Yes	No		
<2 hours	2 (1.1)	188 (98.9)	15.3	0.002
2 to 4 hours	54 (7.0)	716 (93.0)		
5 to 8 hours	14 (9.9)	128 (90.1)		
>8 hours	2 (20.0)	8 (80.0)		

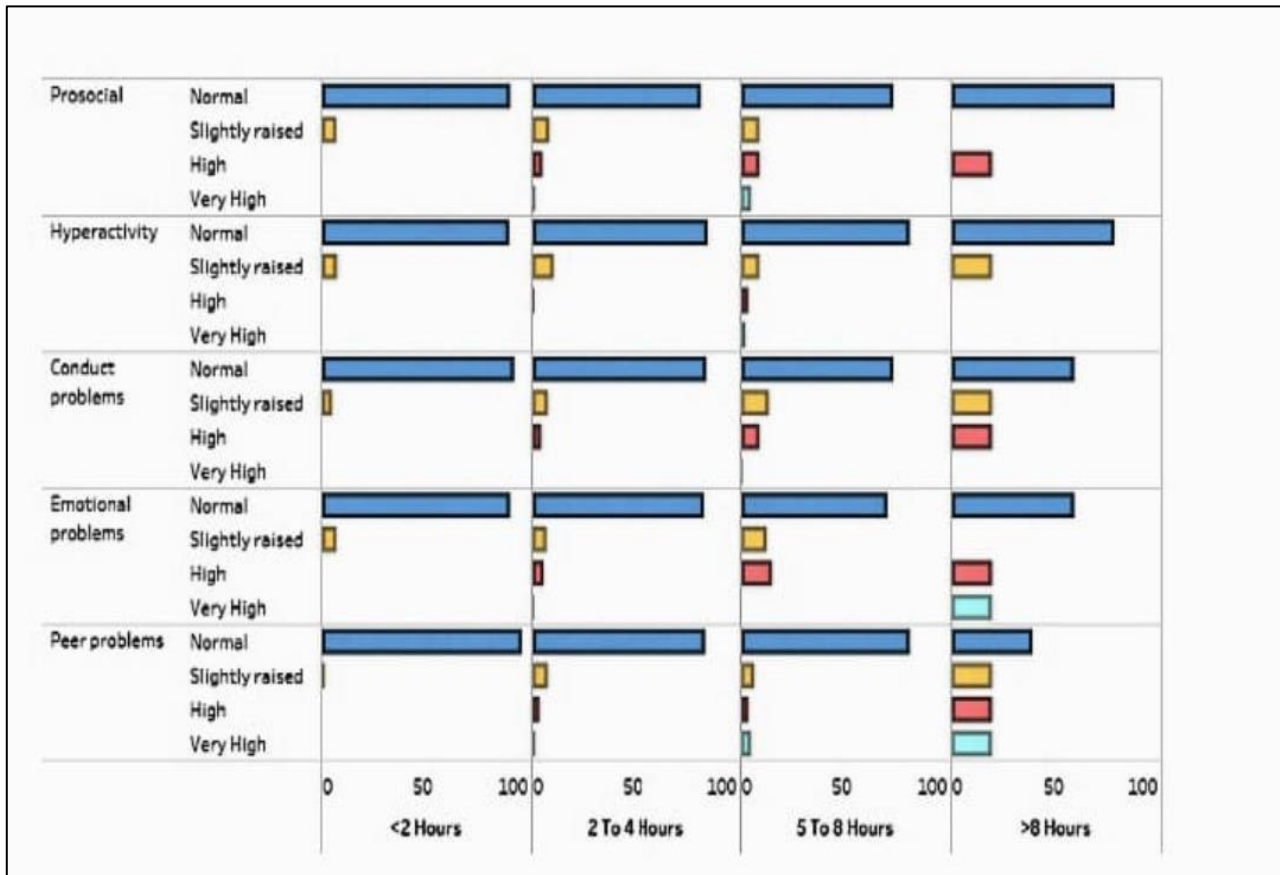Note: Simulated p-value was calculated when one or more expected cell count was 0

Figure 2: Association between the Subcategories of SDQ and screen time.
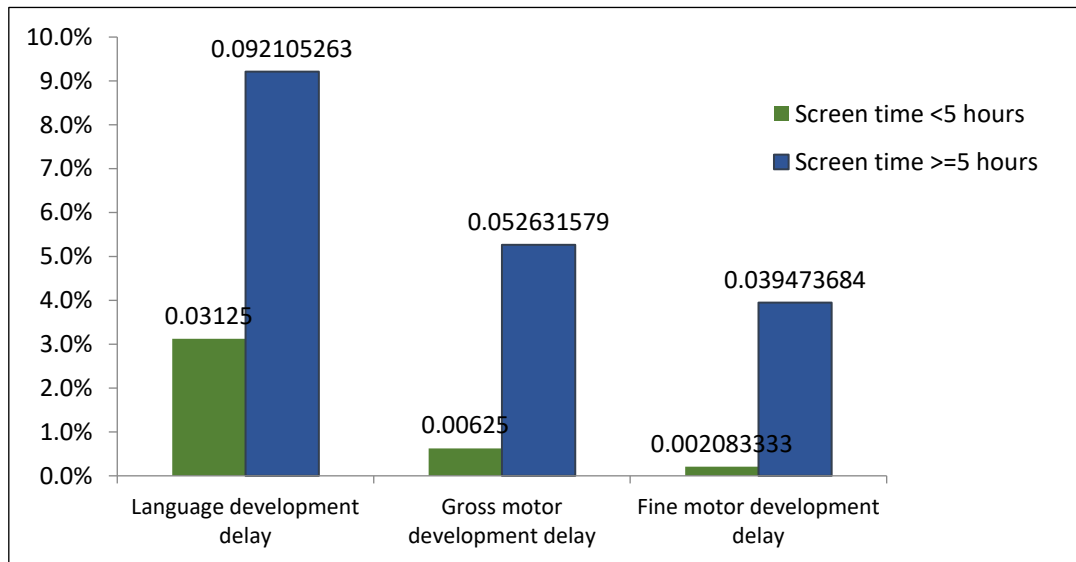

Figure 3: Comparison of development delay in language, gross motor and fine motor according to screen time.

The total screen time of majority of the children was between 2 to 4 hours per day (69.4%). The screen time of the children was more during the weekends than the weekdays.

Most of the children 70.5 % (784) used screen devices during meals and 29.5% of the children watched the screens for more than 2 hours during meal time.

Parents of 13.3% (148) of the children admitted that their children used screen just before bed time, within 1 hour of going to bed.

Table 1 shows the association of screen time with the background characteristics of the study subjects. Chi-square test was used to assess the association. Community, Caretaker, Mother's education, Father's education, Gestation and total children in house were found to have statistically significant association with screen time (p<0.05).

The screen time was found to be higher (5 hours or more) among the boys (p=0.009), children born preterm (p=0.04), children belonging to joint families (p=0.027), children from Muslim community (p=0.00), children having caretaker as father (p=0.014) and children having mother's and father's education higher secondary and/or diploma.

Table 2 shows the association of age group with TV viewing hours, smartphone use and screen hours for calming children and this was found to be statistically significant (p<0.05).

Children in the age group 4 to 7 years had higher TV viewing hours as compared to children in the age group 8 to 12 years (p=0.007). There was a statistically significant increase in the smartphone use in children in the age group 8 to 12 years (90.2%) as compared to children in the age group 4 to 7 years (85.9%) (p=0.034)

The screen hours for calming children were higher in the age group 4 to 7 years as compared to children in the age group 8 to 12 years (p=0.003)

However, no significant association was found between the age group and screen hours for educational purposes (p>0.05).

Multivariate ordinal logistic regression was used to examine the determinants of behavioral problem (Table 3). Screen time and family type were found to be significant predictors of behavioral problem in the adjusted analysis. Children with screen time 2 to 4 hours per day were 2.61 times more likely to have behavioral problem (aOR 2.61, 95% CI 1.07-6.34) as compared to children with screen time <2 hours per day; children with screen time 5 to 8 hours per day were 8.65 times more likely of behavioral problem (aOR 8.65, 95% CI 1.90-39.34) as compared to children with screen time <2 hours per day; children with screen time > 8 hours per day were 9.02 times more likely of behavioral problem (aOR 9.02, 95% CI 3.50-23.28) as compared to children with screen time <2 hours per day.

Children of nuclear family were 1.79 times more likely of behavioral problem (aOR 1.79 95% CI 1.12-2.86) than children of joint family in our study.

Chi-square test was used to assess the association between behavioral problems and screen time (Table 4). In the Strength and SDQ to assess the behavioral problems, the category Average was taken as Normal and 3 categories (Slightly raised, High and Very High) were taken as Abnormal.

There was statistically significant association between behavioral problem and screen time (p<0.05). As the screen time increased, behavioral problems were also found to be increased. Children who used screen during meal time had higher behavioral problems as compared to those who didn't use screen during meal time (p =0.001). Those children who used screen just before bed time had higher behavioral problems as compared to those who didn't use screen just before bed time (p=0.000).

Figure 2 gives the association between the subcategories of SDQ with the screen time of children. It is evident that behavioral problems like hyperactivity, conduct problems, emotional problems and peer problems increased with the increase in screen time. Children whose screen viewing time was more than 8 hours per day had the maximum behavior problems.

The association between each SDQ subcategory and screen time was found statistically significant. (p<0.05 and/or simulated p<0.05).

Chi-square test was used to assess the association between screen time and language and speech problems in preschool children. In our study, we found that there was statistically significant association between the total time the children spent with the electronic screens and the delay in language development in these children (p=0.006) (Table 5).

Language development was also found to be delayed in children spending more time with the screen devices during the weekdays (p=0.003) as well as weekends (p=0.00). Delayed language development was found to be higher among the children with higher screen time in the present study.

However, no significant association was found between screen use during meal time and language development delay and between and screen use just before bed time and language development delay (p>0.05) in our study.

On comparing the language development milestones of these children with their gross motor and fine motor development milestones (figure 3), it was found that higher screen time delayed language development more than gross motor and fine motor development.

As shown in table 6, there was statistically significant association found between screen time and traditional play hours (p<0.05). As the traditional play hours increased, the screen time was found to be decreased. Meanwhile, there

was no statistically significant association found between screen time and traditional learning hours (p>0.05).

Table 7 shows the association between screen time and visual problem and it was found be statistically significant (p<0.05). Visual problems like drying and irritation of eyes and increased incidence of refractive errors in children were found to be more with the increase in screen time.

DISCUSSION

There is growing concern about the impact of electronic devices on the health and wellbeing of children. Excessive screen time in young children can result in behavioural problems and a delay in attaining language milestones. IAP guidelines for parents recommends that children below 2 years should not be exposed to any type of screen with the exception of occasional video call with relatives. Screen time for children between the age of 2 to 5 years should not exceed 1 hour along with an emphasis on selecting high -quality programs, supervised viewing and co-viewing. For older children and adolescents, it is important to balance screen time with other activities that are required for overall development.[4] The present study was undertaken just before the closure of schools in the wake of COVID-19 pandemic. Following school closure children are receiving online education, where screen use has become inevitable and this had led to considerably increased screen use in the school aged children as they use the screens for educational purposes in addition to the regular entertainment purposes. In this study we have attempted to find out the effects of excessive screen use on the behavior and language development in primary school children aged 4 to 12 years.

The total screen time of majority of children in our study was between 2 to 4 hours per day. Nimran et al, in their review article, have quoted that the prevalence of excess screen time varies from 10% to 93.7% across the high-income countries, and 21% to 98% in the middle-income countries and overall, the screen time ranged from 1 to 5 hours per day among under-fives.[11]

Ilamarithi et al, in their study regarding the association between screen time and behavioral health problems among urban and rural students in early and mid - adolescent age group, found that the average screen time was 6.59+1.24 hours in urban boys, 3.28+0.17 hours in rural boys, 4.28+0.49 hours in urban girls and 4.07+0.49 hours in rural girls.[12]

Our study showed that the screen time was higher (>5 hours) among boys, children from joint families and children belonging to the Muslim community. This can be explained by the fact that the children in joint families may have easy access to more advanced gadgets and it may be difficult to set limits on the screen time. Ham et al, in their study of factors associated with screen time among school age children in Korea, showed similar results.[13]

Children whose parents were educated up to diploma or lower were found to have increased screen time in the present study. This may be because highly educated parents might be setting limits for screen time and they would be engaging their children in different screen free activities.

De Craemer et al in their longitudinal EYHS study on changes in children's television and computer time according to parental education, parental income and ethnicity, concluded that the most influential socioeconomic measure of screen-based behavior in children was parental education.[14]

Our study showed that parents were using the electronic screens to calm their children and the screen hours for calming children were higher in the age group 4 to 7 years as compared to children in the age group 8 to 12 years and this difference was statistically significant. Previous studies have shown that parents use screen devices to calm their children.[15] Most parents turn to screen devices to engage and entertain their children rather than resorting to books or other non- screen activities for calming them. Offering screens has been known to be a popular strategy when parents do not wish to be disturbed. It can be seen in our study (table 6) that more the traditional play hours, less the screen time.

On considering the association between the screen time and behavioral problems, our study revealed that higher the screen time, more the behavioral problems. Children with screen time 2 to 4 hours per day, were 2.6 times more likely to have behavioral problems as compared to children with screen time less than 2 hours per day. Children with screen time 5 to 8 hours were 8.65 times and screen time greater than 8 hours per day were 9.02 times more likely to have behavioral problems as compared to children with screen time less than 2 hours per day.

In our study behavioral problems were assessed using the SDQ. Scoring of all the 5 scales in SDQ revealed that hyperactivity and inattention, conduct problems, emotional problems and peer relationship problems increased with increase in screen time. Similar results were obtained in previous studies.[1,2,10] Oswald et al, in their systematic review found high levels of screen time appearing to be associated with unfavorable psychological outcomes.[16]

Our study revealed that children who watched the screens just before bedtime had increased behavior problems. Excessive use of screens before going to bed may result in shorter sleep duration and affect the sleep quality and this in turn will lead to behavioral disturbances. Lauren Hale et al, in their study on Screen time and sleep among school aged children and adolescents, obtained similar results.[17] We analyzed the association between the screen time and language development in children up to 6 years included in our study and found a statistically significant association between language development delay and the total screen

time. Language development was found to be more delayed in children with increased screen hour exposure, when compared to their delay in gross motor and fine motor development. Duch et al their study found that 2 hours of television per day had increased odds of low communication scores.[18] Dong et al in their study showed that longer the screen time the more severe the symptoms of autistic spectrum disorder and the more obvious the language development delay.[19] All this support the mounting literature on the deleterious impact of screen media in the child's language development.

In our study, visual problems in children like dryness and irritation of eyes were found to be increased with increase in screen time and there was high incidence of refractive errors in these children. Cristina et al in their study of relationship between screen and outdoor time with rates of myopia in Spanish children concludes that, children with myopia have more screen time use and shorter outdoor activity time when compared to those without myopia.[20]

Studies have shown that the children who are exposed to electronic screens during meals were consuming more junk foods and these children had more behavioral problems as reported by their parents.[21] Our study showed similar results. Most of the children (70.5 %) used screen devices during meals and 29.5% used screens for more than two hours during meals. Those children who used screen devices during meals were found to have more behavioral problems as compared to children who do not watch screens during meals.

Thus, in summary, the children today are increasingly being exposed to advanced electronic devices and this has deleterious effects on their health and overall development. Excessive use of screens in this age group can result in detrimental effects on their behavior and language development. It can also lead to visual problems, unhealthy dietary habits and sleep disturbances in these children. Excess screen time also reduces the time spent for physical activities and traditional play and this in turn affects the health and wellbeing in young children.

Limitations of our study is that the information about screen time and visual problems were parent- reported, it could not be validated against objective measures. We were unable to determine the media content also.

CONCLUSION

Use of screen devices is on a rise in young children. The current finding suggests that excess screen time is associated with adverse behavioral problems in children. It also results in language development delay and visual problems. The negative impact of excessive screen time in young children should be highlighted to the care givers. Targets for intervention should include both parents and children. They are to be made aware of the consequences of excessive screen time. Avoid the use of screen devices as the only means to calm the child. Limiting the screen time as well as the content should be emphasized and encourage the child to get involved in other developmentally healthy activities.

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