

Study of School Mandated Screen Time in Children during COVID Lock Down Period

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Abstract

Use of screen is indispensable for education especially during this Covid period. Guidelines aren't the same from different bodies. We used an online survey to find out the impact and relation of mandatory screen time in relation to leisure screen time, physical activity, dietary habits, irritability and weight gain.

Data of 510 responses was analyzed and tabulated. Use of screen time was found to be much more than recommended limits and it has an impact on health in the form of unhealthy dietary habits, weight gain and increased irritability with various degrees of correlation. Study was limited by the use of internet availability and perceptive responses from parents.

Study implies that further research is needed to provide concrete guidelines for screen time use in children with changing times as there are possible adverse effects with use of screen for longer periods.

Keywords: School Mandated Screen Time; Children; COVID; Lock Down Period

Introduction

Screen time has become important part of children's life all around the world. Device use has increased during the COVID-19 period as children were forced to stay indoors. This curtailment is expected to increase leisure related screen-time. In addition, many schools shifted to online only education models, increasing school mandated screen-time for children. The latter increase is a non-voluntary phenomenon.

Screen time in children is a modern phenomenon and is the subject of guidelines regulating screen-time, and research activity exploring the effects of screen time. Often, guidelines have been based on weak evidence. For example, AAP has suggested that screen time for children between the ages of 2 to 5 years should not be more than one hour per day [1]. However, the NHS does not provide clear cut guidelines for optimal screen time per day for children [2].

We conducted an online survey in which parents were required to provide answers for 14 questions related to leisure and school mandated screen time, food habits, weight gain, physical activity, and irritability etc. The present study was conducted on the dataset collected in this online survey to explore the association of school mandated screen time with other factors identified in the survey.

Materials and Methods

The survey was done online via a Google® docs url https://docs.google.com/forms/d/e/1FAIpQLSd5Dp9DhRcrUOzZhj6pjV5XbcTx_b3BSBHfss6dOqix9val3XA/vieform?vc=0andc=0andw=1. The responses were submitted anonymously without collection of any data to identify the participants.

The questions raised in the questionnaire were:

1. Age of the child.
2. Estimated screen-time spent by the child for school/online teaching purposes.
3. Estimated screen-time spent by the child for non-school/leisure purposes.
4. Previous medical history of the child with regards to respiratory symptoms.
5. Has the parent noticed any increase in respiratory allergic symptoms during the COVID-19 lockdown?
6. Has the parent noticed any increase in the respiratory infectious symptoms during the COVID-19 lockdown?
7. Has the parent noticed any increase in the consumption of junk food by the child during the COVID-19 lockdown?
8. What was the estimated consumption of junk food by the child during the COVID-19 lockdown?
9. Has the child gained weight during the COVID-19 lock down?
10. The estimated time that the child spends doing vigorous physical activity during the COVID-19 lockdown?
11. The estimated time for which the parents participate with the child in the physical activity during the COVID-19 lockdown.
12. Are both the parents working?
13. The estimated number of meals the family has together.
14. Has the child become more irritable during the COVID-19 lockdown?

The null hypothesis for this study stated that there is no association between screen time for school purposes and age of the child, non-school screen time, junk food consumption, weight gain, physical activity, parental involvement in physical activity, and irritability in the child. The significance level/alpha was set at 0.05 prior to conducting the analysis.

The data was tabulated as a csv file and analysed in R version 4.0.0 using the packages stats, rafalib, dplyr, tidyverse, base, graphics, methods, and utils. Data was explored using histograms and frequency distribution tables. Datasets of screen-time related to school-work use were constructed and analysed for association with age, screen-time for leisure activities, junk food consumption, weight gain, physical activity, parental involvement in physical activity, and irritability. Contingency tables were analysed for statistically significant differences in frequency distributions.

Results

The total number of respondents in the survey were 510, out of whom 476 answered survey questions about screen-time related to school mandated activities. The results from these 476 responses is tabulated in table 1.

Groups	Classes					
Group 1: School mandated device use (N = 476)	Less than 2 hours per day	2-4 hours per day	4-6 hours per day	6-8 hours per day	More than 8 hours per day	Not enrolled in school
Frequencies/proportions	43 (9%)	40 (8.4%)	179 (37.6%)	66 (13.9%)	19 (4%)	129 (27.1%)
Group 2: Age, (N = 476)		Less than 5 years	5-7 years	8-10 years	11-13 years	14 years or above
Frequencies/proportions		171 (35.9%)	82 (17.2%)	88 (18.5%)	41 (8.6%)	94 (19.7%)
Group 3: Device use for leisure (non-school) activities, (N = 464)			Less than 1 hour per day	1-2 hours per day	2-3 hours per day	4 hours or more per day
Frequencies/proportions			119 (25.6%)	142 (30.6%)	135 (29.1%)	68 (14.7%)
Group 5: Number of times junk food is consumed (N = 464)	No consumption	Less than once per week	1-2 per week	3-4 times per week	5 times per week	Daily
Frequencies/proportions	34 (7.3%)	80 (17.2%)	240 (51.2%)	63 (13.6%)	19 (4.1%)	28 (6%)
Group 5A: Has junk food consumption increased during lockdown? (N = 471)					Yes	No
Frequencies/proportions					94 (20%)	377 (80%)
Group 6: Weight Gain Parental Perception, (N = 473)					Yes	No
Frequencies/proportions					117 (24.7%)	356 (75.3%)
Group 7: Duration of physical activity, (N = 474)	No physical activity	Less than once per day	Less than 1 hour per day	1-2 hours per day	More than 2 hours per day	
Frequencies/proportions	59 (12.4%)	20 (4.2%)	178 (37.6%)	95 (20%)	122 (25.7%)	
Group 8: Parental Involvement in physical activity, (N = 474)			No involvement	1-2 times per week	3-4 times per week	Daily
Frequencies/proportions			126 (26.6%)	122 (25.7)	67 (14.1%)	159 (33.5%)
Group 9: Has the irritability of the child increased during the period, (N = 474)					Yes	No
Frequencies/proportions					232 (48.9%)	242 (51.1%)

Table 1: Basic rates.

Association of school mandated device use with age

Screen-time related to schoolwork showed a general increase with age. Children of age 11 years or more were significantly more likely to use a device for school related work more than 6 hours per day. In the age group 11 - 13 years, proportion of children using a device less than 2 hours per day was 2.32%, while the proportions using devices 6 - 8 hours was 22.7% ($P < 0.00001$) and device use more than 8 hours was 26.3% ($P = 0.01$). Similar values were observed in the age group 14 years or more, with the proportion using devices less than 2 hours being 4.6%, which increased to 45.4% for device use 6 - 8 hours and 47.3% for device use more than 8 hours per day ($P < 0.00001$ and $P = 0.002$ respectively). Children of ages between 5 and 7 years were much more likely to use a device for school related work less than 6 hours per day (proportion less than 2 hours per day 37.2% ($P = 0.006$), proportion 2 - 4 hours 37.5% ($P = 0.0004$) and

proportion 4 - 6 hours 22.9% (P = 0.01)), while no children in this age group used a device for more than 8 hours per day (P = 0.04). In the age group less than 5 years, the maximum frequency (26/53) of school related device use was observed in the group 4 - 6 hours, which was significant (P < 0.00001) and not expected in this age group. Children in this age group were also much less likely to use a device for school related work for more than 6 hours per day (proportion in group 6 - 8 hours: 3% (P < 0.00001), and proportion in group > 8 hours: 0% (P 0.002)). Most children in all age groups used a device for school related work for 4 - 6 hours every day, which was significant for all age groups less than 10 years (age < 5Y, n = 15, P < 0.00001; age 5 - 7Y, n = 41, P = 0.01; and age 8 - 10Y, n = 53, P < 0.00001 respectively).

		School mandated device use / screen time					
		Less than 2 hours per day	2-4 hours per day	4-6 hours per day	6-8 hours per day	More than 8 hours per day	
Age	Less than 5 years	N	15 (34.9%)	10 (25%)	26 (14.5%)	2(3%)	0 (0%)
		P Value	0.88	0.13	<0.00001	<0.00001	0.002
			Not Significant	Not Significant	Significant	Significant	Significant
	5-7 years	N	16 (37.2%)	15 (37.5%)	41 (22.9%)	7(10.6%)	0 (0%)
		P Value	0.006	0.0004	0.01	0.17	0.04
			Significant	Significant	Significant	Not Significant	Significant
	8-10 years	N	9 (20.9%)	6 (15%)	53 (29.6%)	12(18.1%)	5 (26.3%)
		P Value	0.66	0.55	<0.00001	0.94	0.55
			Not Significant	Not Significant	Significant	Not Significant	Not Significant
	11-13 years	N	1 (2.32%)	1 (2.5%)	17 (9.4%)	15(22.7%)	5 (26.3%)
		P Value	0.21	0.25	0.59	<0.00001	0.01
			Not Significant	Not significant	Not Significant	Significant	Significant
	14 or more	N	2 (4.6%)	8 (2%)	42 (23.4%)	30(45.4%)	9 (47.3%)
		P Value	0.01	0.96	0.11	<0.00001	0.002
			Significant	Not Significant	Not significant	Significant	Significant

Table 2: Association of school mandated screen time with age.

Association of school mandated device use with device use for non school/leisure activity

School mandated device use and device use for leisure activities did not show any statistically significant association for most values. However, in the group of school mandated device use more than 8 hours per day, the proportion of children using their devices for leisure activities was found to be 42.1% for 2 - 3 hours per day (P = 0.2), and 42.1% for 4 or more hours per day (P = 0.001).

		School Screen time					
		Less than 2 hours per day	2-4 hours per day	4-6 hours per day	6-8 hours per day	More than 8 hours per day	
Non-School Screen time	Less than 1 hours	N	9 (20.9%)	14 (35%)	38 (21.5%)	7(10.6%)	2(10.5%)
		P Value	0.45	0.15	0.11	0.002	0.2
			Not Significant	Not Significant	Not Significant	Significant	Not Significant
	1-2 hours per day	N	16 (37.2%)	10 (25%)	67 (38%)	29(43.9%)	1 (5.2%)
		P Value	0.32	0.42	0.006	0.01	0.02
			Not Significant	Not Significant	Significant	Significant	Significant
	2-3 hours per day	N	13 (30.2%)	10 (25%)	50 (28.4%)	20(30.3%)	8 (42.1%)
		P Value	0.86	0.55	0.79	0.81	0.2
			Not Significant	Not significant	Not Significant	Not Significant	Not significant
	4 or more hours per day	N	5 (11.6%)	6 (15%)	21 (11.9%)	10(15.1%)	8 (42.1%)
		P Value	0.55	0.94	0.19	0.9	0.001
			Not Significant	Not significant	Not significant	Not significant	Significant

Table 3: School mandated screen time vs non-school screen time per day.

Device use association with junk food consumption

Children whose school mandated screen-time was less than 6 hours showed a tendency to consume less junk food, as can be seen in table 4. This difference reached statistical significance in the group screen-time less than 2 hours (Junkfood1 proportion 18.6% (P = 0.003), Junkfood2 proportion 30.2% (P = 0.02), and Junkfood3 32.5% (P = 0.008) respectively) and group screen-time 4-6 hours (Junkfood2 proportion 12% (P = 0.02) and Junkfood3 proportion 62.1% (P = 0.0005) respectively). Significantly more parents perceived that the junk food consumption of their child increased when the school mandated device use exceeded 8 hours per day (52.6%, P = 0.0002).

Less than 2 hours per day 2-4 hours per day			School Screen time n=476				
			4-6 hours per day	6-8 hours per day	More than 8 hours per day		
Has Junk food Increased	Yes	N	8 (18.6%)	5 (12.5%)	44 (24.6%)	14 (22.2%)	10 (52.6%)
	No (N)	N	35 (81.4%)	35 (81.6%)	135 (75.4%)	49 (77.8%)	9 (47.3%)
		P Values	0.82	0.21	0.06	0.75	0.0002
			Not significant	Not Significant	Not significant	Not Significant	Significant
Junk food Consumption: Number of times	1	N	8 (18.6%)	6 (15%)	2 (1.1%)	1 (1.5%)	1 (5.3%)
		P Value	0.003	0.1	0.0001	0.09	0.72
			Significant	Not Significant	Significant	Not Significant	Not Significant
	2	N	13 (30.2%)	9 (22.5%)	21 (12%)	4 (6.2%)	1 (5.3%)
		P Value	0.02	0.36	0.02	0.01	0.27
			Significant	Not Significant	Significant	Significant	Not significant
	3	N	14 (32.5%)	18 (45%)	108 (62.1%)	32 (49.2%)	8 (42.1%)
		P Value	0.008	0.47	0.0005	0.76	0.39
			Significant	Not significant	Significant	Not Significant	Not significant
	4	N	1 (2.3%)	4 (10%)	30 (17.2%)	15 (23.1%)	4 (21.1%)
		P Value	0.04	0.65	0.07	0.02	0.53
			Significant	Not Significant	Not Significant	Significant	Not Significant
	5	N	3 (6.9%)	0 (0%)	4 (2.3%)	7 (10.8%)	3 (15.7%)
		P Value	0.55	0.34	0.2	0.009	0.04
			Not Significant	Not Significant	Not Significant	Significant	Significant
	6	N	4 (9.3%)	3 (7.5%)	9 (5.2%)	6 (9.2%)	2 (10.5%)
		P Value	0.54	0.95	0.54	0.37	0.40
			Not Significant	Not Significant	Not significant	Not Significant	Not Significant

Table 4: Screen time association with junk food consumption.

Junk Food Classes: 1: Not taking junk food at all; 2: Once or twice in a month; 3: 1 to 2 times in a week; 4: 3 to 4 Times in a week; 5: 4 to 5 times in a week; 6: Almost every day.

Screen-time comparison with weight gain

Parental perception of whether the child gained weight showed a significant association with school mandated screen-time. For a screen-time less than 2 hours, 14% of parents perceived a weight gain in their child, while this proportion increased progressively to 63% when the school mandated screen-time increased more than 8 hours per day ($P < 0.00001$).

Less than 2 hours per day		Screen time				
		2-4 hours per day	4-6 hours per day	6-8 hours per day	More than 8 hours per day	
Weight gain	Yes	6 (14.2%)	7 (17.5%)	55 (30.7%)	24 (36.3%)	12 (63.1%)
	No	36 (85.7%)	33 (82.5%)	124 (69.2%)	42 (63.6%)	7 (36.8%)
P value		0.1	0.26	0.02	0.02	<0.00001
		Not significant	Not Significant	Significant	Significant	Significant

Table 5: Screen-time comparison with weight gain.

School screen-time association with physical activity

School mandated screen-time showed an inverse relationship with physical activity, though this difference did not reach statistical significance in all groups. For the group school screen-time less than 2 hours per day, the proportion of children not playing at all was 0% ($P = 0.02$), while it increased to 30% (less than 1 hour per day) ($P = 0.29$), 32.5% (1 - 2 hours per day) ($P = 0.03$), and 30.2% (more than 2 hours per day) ($P = 0.47$). For the group of school mandated screen-time of more than 8 hours per day, the proportion of children not playing at all was 41.1% ($P < 0.00001$), which decreased to 0% for play 1 - 2 hours per day ($P = 0.05$) and 5.3% for playtime more than 2 hours per day ($P = 0.07$). Children who were using a device for school related work for more than 8 hours per day were much more likely to not to indulge in physical activity.

Less than 2 hours per day			Screen time				
			2-4 hours per day	4-6 hours per day	6-8 hours per day	More than 8 hours per day	
Duration of physical activity	Not playing	N	0 (0%)	3 (7.5%)	25 (13.9%)	8 (12.1%)	8 (41.1%)
		P Value	0.02	0.45	0.44	0.93	<0.00001
			Significant	Not significant	Not significant	Not Significant	Significant
	Less than 30 min per day	N	3 (6.9%)	3 (7.5%)	9 (5%)	0 (0%)	2 (10.5%)
		P Value	0.58	0.50	0.49	0.13	0.41
			Not Significant	Not Significant	Not Significant	Not significant	Not significant
	30 min to 1 hr per day	N	13 (30.2%)	12 (30%)	79 (44.1%)	41 (62.1%)	8 (42.1%)
		P Value	0.29	0.30	0.02	<0.00001	0.67
			Not Significant	Not significant	Significant	Significant	Not Significant
	1-2 hrs per day	N	14 (32.5%)	12 (30%)	35 (19.6%)	11 (16.7%)	0 (0%)
		P Value	0.03	0.10	0.84	0.46	0.05
			Significant	Not Significant	Not significant	Not Significant	Not significant
	More than 2 hr per day	N	13 (30.2%)	10 (25%)	31 (17.3%)	6 (9%)	1 (5.3%)
		P Value	0.47	0.91	0.001	0.001	0.07
			Not Significant	Not Significant	Significant	Significant	Not significant

Table 6: School screen-time association with physical activity.

Association of schoolwork related device use with parental involvement in physical activity

The proportion of parents who were not involved in the physical activity of their child increased as the school related device use increased. The proportion of parents exhibiting no parental involvement was 14% (P = 0.049) when the device related screen-time was less than 2 hours, which rose to 73.7% when the device related screen-time increased to more than 8 hours per day (P < 0.00001). The proportion of parents participating in their child’s activity every day decreased from 39.5% when the device use was less than 2 hours per day (P = 0.38), to 5.2% when the school related device use was more than 8 hours per day (P = 0.015).

Less than 2 hours per day			School Screen time				
			4-6 hours per day	6-8 hours per day	More than 8 hours per day		
Parental Involvement in physical activity of child	No involvement	N	6 (14%)	10 (25%)	55 (30.7%)	18 (27.2%)	14 (73.7%)
		P Value	0.049	0.81	0.11	0.89	<0.00001
		Significant	Not significant	Not Significant	Not Significant	Significant	
	1-2 time per week	N	12 (27.9%)	8 (20%)	55 (30.7%)	20 (30.3%)	3 (15.8%)
		P Value	0.73	0.38	0.053	0.36	0.45
		Not Significant	Not Significant	Not Significant	Not Significant	Not Significant	
	3-4 times per week	N	8 (18.6%)	9 (22.5%)	30 (16.8%)	11 (16.7%)	1 (5.3%)
		P Value	0.37	0.11	0.20	0.52	0.42
		Not Significant	Not Significant	Not Significant	Not significant	Not Significant	
	Every day	N	17 (39.5%)	13 (32.5%)	39 (21.8%)	17 (25.8%)	1 (5.2%)
		P Value	0.38	0.88	0.00004	0.15	0.015
		Not Significant	Not Significant	Significant	Not Significant	Significant	

Table 7: Screen time school association with parental involvement in physical activity.

Association of school work related device use with parental perception of increase of irritability in the child

The proportion parents who noticed that their child became more irritable increased from 41.9% (P = 0.33) when the school related screen-time was less than 2 hours, to 68.4% when the school mandated device use increased to more than 8 hours per day. This increase was not statistically significant (P = 0.08).

Discussion

Guidelines for the screen time use per day from the WHO, AAP, and CDC have been published, but much of the evidence behind these guidelines is disputed, especially in older children [1-5]. Children aged 8 to 18 spend up to 7.5 hours in front of screen for entertainment (excluding school-work), which adds up to 114 days in a year [3]. CDC recommends at least 60 minute of physical activity per day and

Less than 2 hours per day		Screen time				
		2-4 hours per day	4-6 hours per day	6-8 hours per day	More than 8 hours per day	
Increase in irritability	Yes	18 (41.9%)	15 (38.5%)	95 (53.1%)	(53%)	13 (68.4%)
	No	25 (58.1%)	24 (61.5%)	84 (46.9%)	(47%)	6 (31.6%)
	P Value	0.33	0.17	0.16	0.47	0.08
		Not significant	Not significant	Not Significant	Not Significant	Not Significant

Table 8: Comparison of school mandated screen time with increase in irritability of child.

limiting screen time to no more than 1 to 2 hours a day [3]. WHO recommends that children should have either no screen-time, or limited screen-time before 5 years of age, while children between the ages of 1 - 5 years should have three hours of physical activity per day [4]. AAP does not recommend any screen time before 18 months of age and limited or no screen time from 2 year to 5 year age. It suggests THAT children with a higher rate of screen time exposure had lower language skills [1,5]. One AAP study has associated the use of hand-held devices with speech delay [1].

There is evidence that higher levels of screen time are associated with a variety of health harms for CYP, with evidence strongest for adiposity, unhealthy diet, depressive symptoms, and quality of life [6]. There is general trend observed for increasing screen time with age in the study. A significant finding was 49% children under 5 age were using a device for 4 -6 hours a day for school mandated online activities during the COVID-19 associated lockdown. This finding is in direct conflict with existing guidelines for this age group [1,3,4].

In our study 93% children were reported by their parent to consume junk food at least one or more times per week. Children who reported more than 6 hours per day on screen were more likely to consume higher quantities of junk food. Our study found that overall junk food consumption did not increase during the lock down period. Multiple studies have reported an association between increasing screen time and increasing junk food consumption [7-10].

Weight gain and screen time have a positive association in our study. Studies previously performed in US and New Zealand populations have also found an association between screen-time and weight gain.

In our study, Physical activity in children in general declined with increasing school mandated screen time, while parental involvement in physical activity with children reduced with increasing school mandate screen time. This association between weight gain and physical activity on one hand and screen-time on the other has been disputed in a previous study, which found that that sedentary adolescent behaviour and screen-time did not predict BMI and physical activity [13].

Conclusion

In conclusion, our study showed that school mandated screen-time exceeded current recommendations for screen-time exposure in young children less than 5 years of age. There was a weak association between school mandated screen-time, junk food consumption, and physical activity. There was no association between school mandated screen-time and irritability in children, while there was a strong association with weight gain.

The major limitation of this study was that answers in the survey were based on parental perception rather than direct paired measurements, introducing individual bias of the parents in the answers provided. The survey was conducted online on a completely voluntary basis.

Disclosure

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