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Characterization of electronic device use among children and adolescents aged 6 to 14

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Introduction: Children and adolescents use computers, cell phones, and tablets, among other electronic devices, daily in non-academic activities. It is essential to characterize the impact these devices have on the socialization, interaction, and learning processes in this population segment. We should also investigate possible harmful effects that may be related to their use. The objective was to characterize how these devices are used and their impact on school performance, behavior, and physical activity in children and adolescents from 6 to 14 years of age.

Materials and methods: This is a cross-sectional analytic study of 510 schoolchildren ages 6 to 9 and 10 to 14 from Bogotá and Cundinamarca, Colombia. They were surveyed with a 38-question survey characterizing the use of the devices and the symptoms of anxiety and depression, conflict resolution, sleep, and school performance.

Results: The average age for initiation on the use of devices was four years. Cell phones were the most used in both groups (56.3% and 78.04%). Parents monitor the use of the device in 80% of cases. 40% of the time, device usage was greater than 90 minutes per day. About 16% reported sleep disturbance, frustration (48%), emotional lability (20%), and suicidal ideations (11%) also were reported. 19% did not play with their peers, and 7% did not report having close friends.

Conclusions: This study shows the high exposure to electronic devices from an early age and their relation to behavioral factors. Future studies should explore the relationship between these factors and electronic devices in depth.

Key words: MOBILE DEVICES; CHILD; ADOLESCENT; SCREEN TIME; ACADEMIC PERFORMANCE

INTRODUCTION

From an early age, children and teenagers are surrounded by Information and Communication Technologies (ICTs) on electronic devices. These devices are technological tools for storing, transporting, transforming, and visualizing information. Such devices include television, DVD/Blu-ray, video games, desktop computers, tablets, smartphones, gaming consoles, laptops, headphones, sound players, and smartwatches (1).

Generations born in the later years of the 20th century are now considered digital natives, a term coined by *Mark Prensky* in 2001 (2). This fact has affected social and family interaction, school performance, sleep dynamics, psychological well-being, obesity, sleep problems, aggressive behavior, and attention problems compared to previous generations (1–5).

This change in the daily life of the new generations brings benefits when technology usage is appropriate. These include the chance to gain knowledge early on, discover novel

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ideas and information, access diverse learning opportunities, collaborate with others on projects, communicate with individuals across distances, establish supportive social networks, acquire valuable information and knowledge, and explore innovative educational approaches for promoting health and preventing issues (1, 2, 4). In this sense, studies have reported that high-quality television programs can improve the cognitive, linguistic, and social results of children between 3 and 5 years of age (1). For example, Anderson et al. found a significant positive correlation ($p < 0.001$) between the viewing of educational programs (Sesame Street-type) by preschool-age children and the grades average (6). In the same way, a significant negative correlation ($p < 0.05$) between the viewing of violent programs by male adolescents was found (6).

Early exposure to technology can negatively affect children's behavior and physical and mental health. These consequences are often related to the amount of time spent on devices, inadequate supervision, the type of content viewed, the availability of these devices, their global reach, and their easy accessibility to different population. (1, 2, 4). All of the above makes the current evidence contradictory concerning the use of the devices.

This study aims to describe and compare non-academic use of electronic devices at home among children and adolescents aged 6 to 14 before the SARS-CoV-2 pandemic. The study will focus on students from schools in Colombia, such as Bogotá and Cundinamarca. It will evaluate the impact of electronic devices on their behavior as it relates to various variables such as sleep disturbances, physical activity, frustration, sociability, behavior, and conflict resolution.

METHODS

An analytical cross-sectional study was conducted on a sample of 255 boys and girls aged between 6 and 9 and 255 adolescents aged between 10 and 14 who attended schools in Bogotá and Cundinamarca, Colombia. Based on an outcome less than 10% prevalent, a power of 80%, and a significance level of 0.05, the sample size was initially estimated at 510 participants per group for 1020 participants. However, due to the impact of the pandemic, the sampling was halted, resulting in only 255 participants per group being obtained.

The study inclusion criteria were children between the ages of 6 and 14 who expressed a desire to participate, obtained explicit assent, and whose parents provided informed consent. Children with pre-existing diagnoses of behavioral or underlying mental illness (whether genetic or congenital) were not included. The data was collected via a simple random sampling method, utilizing manual surveys completed by parents of children between 6 and 9 years old and self-administered surveys for children between 10 and 14. All survey data was stored and transcribed into an Excel file, accessible only to researchers. Forty surveys were excluded due to more than 80% missing data.

The survey used in the study was created using the following instruments in their Spanish versions: Reporting Questionnaire for Children RQC-10, which consisted of an intermediate segment of 10 questions that identified signs and symptoms of childhood anxiety and depression (7); the BASC scale (Behavior Assessment System for Children) which analyzed conflict resolution, behavior disorders, sociability, and depression (8); and a sleep scale with a segment of 5 questions that evaluated sleep disturbances (9). Additional inquiries were added to assess the variables mentioned earlier related to low academic performance, sleep disturbances, physical activity, frustration, sociability, behavior, and conflict resolution.

A descriptive statistical analysis of both continuous and categorical variables was performed. It examined the central tendency and dispersion measures for the continuous variables and frequencies for the categorical variables. Additionally, a stratified analysis was done to better understand the relationships and patterns within the data. Bivariate analyses were performed to see the possible correlations between the time of exposure to electronic devices and the behavioral variables. Data were analyzed using Epidat 4.2.

The study did not follow up with the participants; therefore, we did not store any contact details. This investigation followed the national recommendations established in resolution 8430 of 1993 of the Ministry of Health, being classified in the category without risk by article N.11. Additionally, the Ethics and Research Committee of the Pontificia Universidad Javeriana and Javesalud approved the research protocol.

RESULTS

The demographic characteristics of the 510 respondents are in Table 1. The average age for each group was 7.8 years and 12 years. The predominant sex was female in both groups (64.13% and 58.1%). The most frequent socioeconomic status was 5 (middle-high class). The average age for beginning the use of electronic devices in the first group was 4.3 years, and for the second was 6.4 years. Surveillance and control by parents for the usage of electronic devices were 92.5% and 80.4%, respectively. There were three schools in Bogotá and four in Cundinamarca. Most of them were bilingual schools. In the group of 6 to 9-year-olds, 6.7% of them had lost some school year. In the 10 to 14 years group, 31% reported failing courses the previous year.

Sports practice and reading were the predominant activities, with sports being the activity with the longest dedica-

TABLE 1. Demographic characteristics

Variable	6 to 9 (N=255)	10 to 14 (N=255)	Overall (N=510)
Sex			
F	164 (64.3%)	150 (58.4%)	314 (61.4%)
M	91 (35.7%)	105 (41.2%)	196 (38.4%)
Age			
Mean (SD)	7.76 (0.985)	11.9 (1.37)	9.85 (2.41)
Weight			
Mean (SD)	26.2 (5.29)	41.8 (8.97)	33.8 (10.7)
Missing	50 (19.6%)	61 (23.9%)	111 (21.8%)
Height			
Mean (SD)	1.81 (7.29)	1.51 (0.111)	1.66 (5.05)
Missing	79 (31.0%)	64 (25.1%)	143 (28.0%)
BMI			
Mean (SD)	16.4 (2.53)	18.0 (2.62)	17.2 (2.69)
Missing	83 (32.5%)	84 (32.9%)	167 (32.7%)
Grade			
1	103 (40.4%)	0 (0%)	103 (20.2%)
2	80 (31.4%)	0 (0%)	80 (15.7%)
3	58 (22.7%)	7 (2.7%)	65 (12.7%)
4	8 (3.1%)	49 (19.2%)	57 (11.2%)
5	5 (2.0%)	16 (6.3%)	21 (4.1%)
6	0 (0%)	69 (27.1%)	69 (13.5%)
7	0 (0%)	51 (20.0%)	51 (10.0%)
8	0 (0%)	33 (12.9%)	33 (6.5%)
9	0 (0%)	25 (9.8%)	25 (4.9%)
10	0 (0%)	2 (0.8%)	2 (0.4%)
Missing	1 (0.4%)	3 (1.2%)	4 (0.8%)
Bilingual School			
Yes	216 (84.7%)	228 (89.4%)	444 (87.1%)
No	39 (15.3%)	27 (10.6%)	66 (12.9%)
Socioeconomic Status			
2	21 (8.2%)	11 (4.3%)	32 (6.3%)
3	37 (14.5%)	47 (18.4%)	84 (16.5%)
4	38 (14.9%)	55 (21.6%)	93 (18.2%)
5	88 (34.5%)	73 (28.6%)	161 (31.6%)
6	65 (25.5%)	25 (9.8%)	90 (17.6%)
Missing	6 (2.4%)	44 (17.3%)	50 (9.8%)
Age of beginning of use			
-	0 (0%)	1 (0.4%)	1 (0.2%)
1	7 (2.7%)	18 (7.1%)	25 (4.9%)
2	49 (19.2%)	4 (1.6%)	53 (10.4%)
3	23 (9.0%)	13 (5.1%)	36 (7.1%)
4	47 (18.4%)	13 (5.1%)	60 (11.8%)
5	48 (18.8%)	18 (7.1%)	66 (12.9%)
6	36 (14.1%)	36 (14.1%)	72 (14.1%)
7	18 (7.1%)	34 (13.3%)	52 (10.2%)
8	8 (3.1%)	28 (11.0%)	36 (7.1%)
9	2 (0.8%)	11 (4.3%)	13 (2.5%)
10	0 (0%)	12 (4.7%)	12 (2.4%)
11	0 (0%)	12 (4.7%)	12 (2.4%)
12	0 (0%)	5 (2.0%)	5 (1.0%)
13	0 (0%)	1 (0.4%)	1 (0.2%)
Missing	17 (6.7%)	49 (19.2%)	66 (12.9%)

tion time (105.4 and 201.7 minutes) (Table 2). 84% of respondents did not report sleep disturbance. However, in the group between 10 and 14 years, 19.6% presented daytime sleepiness and 52.5% difficulty waking up in the morning (Tables 3 and 4). The effective sleep time during weekdays was 9 and 8 hours in the first group and 10 and 11 in the second group, both groups with good sleep quality at 93.7% and 83.7%, respectively.

Regarding developmental disorders, more than 79% of the children thought they had normal language development at their age, and more than 89% deemed they had good school performance.

A high number of them had *enuresis* and *encopresis* (2.4% in the first group and 3.1% in the second one), *sudden anxiety* (9.8% and 42.4%), *emotional lability* (1.2% and 20.8%), *suicidal ideation* (1.6% and 11.4%), *anhedonia* (2.4% and 29.4%) and *irritability* (30.2% and 39.6%) (Table S1 and 3). Regarding conflict resolution and frustration, 62.7% and 42.7% cried in situations of frustration or stress. 18.4% and 41.6% had problems at the time of making decisions. 20.4% and 27.5% of the kids had problems waiting their turn. 29.8% and 45.5% got upset with sudden changes in plans. 23.5% and 44.3% got angry quickly. Regarding sociability, 9.4% and 19.6% did not play with their peers, 4.7% and 12.9% did not participate in group activities, and 7.4% and 5.4% did not report having close friends. The average number of people who qualified as friends was 5.7 and 13.1 (Table S1 and 3).

92% of the participants reported use of electronic devices at home. The most used was the cell phone, with 56.3% and 78.04% in each group, followed by the personal computer (PC) with the highest average time, 67.6 minutes for the first group (Table 4). In the group from 6 to 9 years old, the cell phone was used mainly to play games (57.3%), videos, and movies (45.5%). In the group from 10 to 14 years old, cell phone use focused on playing games (63.1%) and consulting social networks (60.8%). The PC was used mainly for tasks (72.9%) (Table S2).

Regarding the time of exposure to screens, it was documented that although there was control over the usage of electronic devices in their homes, more than 40% had a daily usage time longer than 90 minutes. When evaluating the time of use of these devices with each of the assessed variables, the daily time of exposure to screens for more than 90 minutes was more frequent in the group of 6 to 9-year-olds with a failure to approve the school year in about 3% of the kids; and in the group from 10 to 14-year-olds with a loss of a school subject in the last year in up to 25% of the students. Additionally, sleep problems appeared in 5% of children from 6 to 9 years of age and in 1.56% of those from 10 to 14 years of age. Likewise, the second group reported a higher percentage of close friends (74.5%). On

TABLE 2. Activities and recreational time

	6 to 9 years				10 to 14 years		
Recreational activities engaged in	Yes (%)	No (%)	Days a week	Daily average in minutes	Yes (%)	No (%)	Daily average in minutes
Sports	226 (88.6)	29 (11.3)	3.30 (1.63)	105.46 (74.95)	176 (69.0)	79 (30.9)	201.77 (190.53)
Reading	208 (81.6)	47 (18.4)	4.13 (1.98)	86.14 (173.85)	153 (60.0)	102 (40.0)	103.06 (122.36)
Drawing and/or coloring	199 (78.0)	56 (21.9)	3.95 (2.06)	99.48 (173.62)	138 (54.1)	117 (45.8)	116.16 (182.46)
Singing	124 (48.6)	131 (51.3)	3.25 (2.38)	79.32 (108.33)	88 (34.5)	167 (65.4)	128.10 (225.23)

TABLE 3. Characteristics of sleep. Development, behavior, mood, and sociability

	10 to 14 years (n=255)		
Question.	Yes (%)	No (%)	Missing
Do you have any problems at bedtime?	40 (15.7)	215 (84.3)	0.0*
Do you have difficulties waking up in the morning?	134 (52.5)	121 (47.4)	0.0*
Are you very sleepy during the day?	50 (19.6)	205 (80.3)	0.0*
Do you have trouble going back to sleep when you wake up?	86 (33.7)	169 (66.2)	0.0*
Do you consider your language to be normal for your age?	203 (79.6)	52 (20.3)	0.0*
Do you feel that learning is difficult for you?	29 (11.4)	226 (88.6)	0.0*
Do you think you have poor school performance?	27 (10.6)	228 (89.4)	0.0*
Do you wet the bed at night or defecate on your clothes?	8 (3.1)	247 (96.8)	0.0*
Have you run away from home?	23 (9.0)	232 (90.8)	0.0*
Do you usually take things without permission from home?	49 (19.2)	206 (80.7)	0.0*
Do you ever get nervous for no reason?	108 (42.4)	147 (57.6)	0.0*
Do you usually feel sad?	53 (20.8)	202 (79.2)	0.0*
Do you usually enjoy everyday activities?	203 (79.6)	52 (20.3)	0.0*
Do you feel like you have lost interest in general?	75 (29.4)	180 (70.5)	0.0*
Have you ever thought of ending your life?	29 (11.4)	226 (88.6)	0.0*
Do you have a bad temper?	101 (39.6)	154 (60.3)	0.0*
Do some things make you very angry?	194 (76.1)	61 (23.9)	0.0*
Do you find it difficult to make decisions?	106 (41.6)	149 (58.4)	0.0*
Do you usually cry when a stressful or frustrating situation occurs?	109 (42.7)	146 (57.2)	0.0*
Do you consider yourself to be a useful person?	211 (82.7)	44 (17.2)	0.0*
Do you have problems waiting for your turn?	70 (27.5)	185 (72.5)	0.0*
Do you get upset when there are sudden changes in plans?	116 (45.5)	139 (54.5)	0.0*
Do you get angry easily?	113 (44.3)	142 (55.6)	0.0*
When you get angry. Does your anger last long?	58 (22.7)	197 (77.2)	0.0*
Do you normally play with other children?	205 (80.4)	50 (19.6)	0.0*
Do you find it difficult to start conversations with people you barely know?	107 (42.0)	148 (58.0)	0.0*
Do you refuse to participate in group activities?	33 (12.9)	222 (87.0)	0.0*
Do you participate in groups or group activities?	213 (83.5)	42 (16.4)	0.0*
Do you have close friends?	241 (94.5)	14 (5.49)	0.0*

TABLE 4. Use of electronic devices at home

	6 to 9 years				10 to 14 years			
	Yes	No	Missing	Average usage in minutes	Yes	No	Missing	Average usage in minutes
Use any device	236 (92.55)	19 (7.45)	-	-	253 (99.2)	2 (0.7)	-	-
Cell phone	143 (56.3)	111 (43.70)	1	62.80 (123.89)	199 (78.04)	56 (21.96)	1	159.24 (195.46)
Tablet/ iPad	103 (40.71)	150 (59.29)	2	47.18 (82.34)	153 (60)	102 (40)	2	73.94 (186.03)
Personal computer	141 (55.73)	112 (44.27)	2	67.66 (104.70)	198 (77.95)	57 (22.35)	2	104.64 (126.80)
Video game console	59 (23.23)	195 (76.77)	1	23.47 (57.09)	122 (47.84)	133 (52.16)	1	49.61 (100.13)

TABLE 5. Daily exposure time to screens

	6 to 9 years n=255			10 to 14 years n=255		
	Over 90 minutes	Under 90 minutes	p-value	Over 90 minutes	Under 90 minutes	p-value
Sex (%)						
Female	59 (23.13)	105 (41.17)		120 (47.05)	29 (11.3)	
Male	57 (22.35)	34 (13.33)	<0.001	81 (31.7)	24 (9.4)	0.618
Missing	-	-		1 (0.39)	-	
Failed the school year/subjects (%)						
Yes	7 (2.74)	10 (3.92)		64 (25.0)	15 (5.8)	
No	109 (42.74)	128 (50.19)	0.611	138 (54.1)	38 (14.9)	0.59
Missing	-	1 (0.39)		-	-	
Devices control at home.						
Yes	102 (40)	134 (52.54)	<0.001	161 (63.1)	44 (17.25)	0.72
No	14 (5.49)	5 (1.96)		41 (16.0)	9 (3.5)	
Close friends.						
Yes	108 (42.35)	127 (49.80)		190 (74.5)	51 (20)	
No	8 (3.13)	11 (4.31)	0.487	12 (4.7)	2 (0.78)	0.78*
Missing	-	1 (0.39)		-	-	
Quality of sleep						
Good	103 (40.39)	136 (53.33)		171 (67.0)	39 (15.2)	
Moderate	13 (5.09)	3 (1.17)	0.006	24 (9.4)	12 (4.7)	0.13
Bad	-	-		4 (1.56)	1 (0.39)	
Missing	-	-		3 (1.17)	1 (0.39)	
Trouble falling asleep						
Yes	16 (6.27)	21 (8.23)	0.90	31 (12.1)	9 (3.5)	0.93
No	100 (39.21)	118 (46.27)		171 (67.05)	44 (17.2)	
Daytime sleepiness or tiredness						
Yes	5 (1.96)	5 (1.96)	1.00	41 (16.0)	9 (3.5)	1.00
No	111 (43.52)	134 (52.54)		161 (63.1)	44 (17.2)	
Sleep enough						
Yes	102 (40)	118 (46.27)		-	-	
No	13 (5.09)	21 (8.23)	0.48	-	-	
Missing	1 (0.39)	-		-	-	
Learning difficulties						
Yes	5 (1.96)	7 (2.74)	1.00	20 (7.8)	9 (3.5)	0.22
No	111 (43.52)	132 (51.76)		182 (71.3)	44 (17.2)	
Poor school performance						
Yes	5 (1.96)	5 (1.96)		21 (8.2)	6 (2.3)	
No	111 (43.52)	133 (52.15)	1.00	181 (70.9)	47 (18.4)	1.00
Missing	-	1 (0.39)		-	-	
Nervousness						
Yes	11 (4.31)	14 (5.49)		83 (32.5)	25 (9.8)	
No	105 (41.17)	124 (48.62)	1.00	119 (46.6)	28 (10.9)	0.52
Missing	-	1 (0.39)		-	-	
Suicidal ideation						
Yes	3 (1.17)	1 (0.39)	0.33*	23 (9.01)	6 (2.3)	1.00
No	113(44.31)	138 (54.11)		179 (70.1)	47 (18.4)	
Interest in things in general						
Yes	1 (0.39)	5 (1.96)		58 (22.7)	17 (6.66)	
No	114 (44.70)	134 (52.54)	0.22*	144 (56.4)	36 (14.1)	0.75
Missing	1 (0.39)	-		-	-	

TABLE 5. Continued

	6 to 9 years n=255			10 to 14 years n=255		
	Over 90 minutes	Under 90 minutes	p-value	Over 90 minutes	Under 90 minutes	p-value
Enjoyment of activities						
Yes	111 (43.52)	129 (50.58)	0.47	161 (63.1)	42 (16.4)	
No	5 (1.96)	10 (3.92)		41 (16.07)	11 (4.3)	
Bad temper						
Yes	40 (15.68)	37 (14.50)	0.22	83 (32.5)	18 (7.05)	0.43
No	76 (29.80)	102 (40)		119 (46.6)	35 (13.7)	
Stress crying						
Yes	75 (29.41)	85 (33.33)	0.65	85 (33.3)	24 (9.4)	0.79
No	41 (16.07)	54 (21.17)		117 (45.8)	29 (11.3)	
Difficulty making decisions						
Yes	23 (9.01)	24 (9.41)	0.71	81 (31.7)	25 (9.8)	0.43
No	93 (36.47)	115 (45.09)		121 (47.4)	28 (10.9)	
Difficulty waiting your turn						
Yes	23 (9.01)	29 (11.37)	0.96	54 (21.1)	16 (6.2)	0.74
No	93 (36.47)	110 (43.13)		148 (58.0)	37 (14.5)	
Alteration of behavior with changes in plans						
Yes	34 (13.33)	42 (16.47)	0.98	94 (36.8)	22 (8.6)	0.61
No	82 (32.15)	97 (38.03)		108 (42.3)	31 (12.1)	
Difficulty socializing with other children						
Yes	14 (5.49)	10 (3.92)	0.26	162 (63.5)	43 (16.8)	1.00
No	102 (40)	129 (50.58)		40 (15.6)	10 (3.9)	
Difficulty starting conversations						
Yes	26 (10.19)	46 (18.03)	0.081	79 (30.9)	28 (10.9)	0.09
No	90 (35.29)	93 (36.47)		123 (48.2)	25 (9.8)	
Not Participating in Group Activities						
Yes	6 (2.35)	6 (2.35)	0.98	24 (9.4)	9 (3.5)	0.45
No	110 (43.13)	133 (52.15)		178 (69.8)	44 (17.2)	
Participation in group activities						
Yes	100(39.21)	121 (47.45)	0.99	173 (67.8)	40 (15.6)	0.11
No	16 (6.27)	18 (7.05)		29 (11.3)	13 (5.09)	

the contrary, with the use of devices for less than 90 minutes, the group of 6 to 9-year-olds reported the highest percentage of close friends (49.8%), and both groups had fewer suicidal ideas (0.39% and 2.3%) (Table 5).

A bivariate analysis was performed on a total sample of 510 participants. The relation between exposure time higher than 90 minutes per week or weekend was cross-tabulated with questions regarding feelings of sadness, suicidal thoughts, bad temper, stress, difficulties waiting in turn, anger with the change of plans, anger easily, and difficulties in starting a conversation This table is part of the supplementary material..

DISCUSSION

The prevalence of electronic devices among children has risen due to early exposure to ICTs. (2, 4, 10). By 2019, 98% of people between the ages of 5 and 15 used some electronic device (11). Of all the devices they used, the smartphone has the highest increase from 15% in 2018 to 27% in 2019, with adolescents reporting the highest use (36%) (11). In the sample analyzed, the onset ages were 4 and 6. However, nowadays, the time children start using cell phones reported in the literature is 12 months of age (2, 4, 10), and evidence has emerged that the start of interaction with them occurs as early as three months of age (12).

In a 2011 US survey, smartphones and tablets were the most employed devices at 51% and 44%, respectively, with children using them daily for about 1 hour (13). Findings related to this study show that the PC had the highest average usage time in minutes in the first group (67 minutes) and the mobile phone in the second group (160 minutes).

When analyzing the usage patterns of various devices among the children, it was observed that over 57% of the

subjects primarily used cell phones for recreational activities. Additionally, 45% of them utilized it for viewing videos and movies, whereas roughly 60% of children engaged in social networking activities. These findings align with existing literature, which reported 56% of children using the internet for recreational purposes and 75% engaging in social media and similar activities. (2). Conversely, according to Osman et al., the most frequent activity on mobile devices (70%) was viewing videos (14).

This study examined two age groups regarding language disorders, learning difficulties, and poor school performance. The results showed that in both groups, less than 15% had learning problems compared to other children of the same age. Additionally, only 4% and 10% in each group felt they had poor school performance. However, there is a lack of evidence in the current literature regarding these developmental disorders. Most published studies focus on the impact of devices on children under two years of age, which can negatively affect cognitive development, particularly in language and executive function (15). Other studies have shown that watching educational programs at preschool age can provide better academic performance in adolescence (6, 15).

As per the recommendations set by the American Society of Pediatrics (AAP) in 2012 (16), for children up to 15 years of age, the maximum recommended screen time is 1.5 hours. This limit has been set to ensure that children's sociability is not affected due to excessive exposure to screens (16). Research has shown that incorporating technological devices into one's daily life can positively impact socio-affective development by promoting social communication with peers (3, 17). The study findings contradict this work. The results show that the participants with the higher percentage of close friends in the 6 to 9 years group had exposure to devices for less than 90 minutes. In contrast, the second group had the highest rate of close friends (74%) reported having exposure for more than 90 minutes. One study reported that 10 to 14-year-olds who frequently use electronic devices interact more with more children than those who do not use electronic devices as much (18).

When evaluating the quality of sleep in relation to daily screen exposure time larger than 90 minutes, the findings of this study are not in sync with what appears in other studies. A 2016 systematic review of 67 studies evaluating screen time and sleep in school-age children and adolescents found that screen time was negatively associated with sleep health (19). Computer use was associated with sleep problems and video games in 83% and 57% of the studies, respectively (19). In this study, less than 5% of the respondents stated alterations in their sleep patterns. When evaluating adequate hours of sleep, evidence showed that both groups complied with the recommendations of the National Sleep Foundation (NSF) (20) and the American Academy of Sleep Medicine (AASM) (21), which indicate that in children between 6 and 14 years old, sleep should be from 9 to 12 hours (22).

Concerning changes in behavior and mood related to time spent on screens, both groups reported fewer suicidal ideas with daily device use for less than 90 minutes (Table 5). These findings are similar to those in a 2018 United States study examining the associations between screen exposure time and psychological well-being (23). That study found that adolescents between 14 and 17 years of age who use screens daily for more than 7 hours are twice as likely to present a diagnosis of depression (RR 2.39 95% CI 1.54, 3.70), and anxiety (RR 2.26, CI 1.59, 3.22) than those with less than 1 hour of daily use (23). In this study, users who spent more than 7 hours a day on screens were significantly more likely to show poor emotional regulation (not likely to be calm, argued too much, and had difficulty getting along with others) and unable to finish tasks (23). Other studies report associations between the use of computers, video games, and television and psychological difficulties, including social anxiety, depression, and loneliness (23, 24). These studies also show that screen users of 7 or more hours a day had twice the risk of low well-being (lack of calm, not completing tasks, not curious, and more likely to be diagnosed with anxiety and depression) compared to users who used a screen for 1 hour or less per day (23, 24). They were also more likely to have been assessed by a mental health professional (RR 2.22, CI 1.62, 3.03) and to require drug treatment (RR 2.99, CI 1.94, 4.62) (23, 24). These findings concur with the results of the children surveyed, given that in both groups, the kids were exposed daily to electronic devices for over 90 minutes, and close to 30% cried in the face of a stressful or frustrating situation, and 36% became upset when facing sudden plan changes.

The latest recommendations from the American Society of Pediatrics (AAP) state no specific limit for screen time in children older than five years. Instead, they suggest that parents individualize the approach to screen use and use calculators to develop a plan based on the child's age, physical activity, and sleep needs (24). It is important to remember that the recommended duration of screen time is based mainly on expert advice and considers the type of use and content viewed. However, it is also important to note that excessive screen time can lead to decreased physical activity, play, exercise, and sports.

Lastly, this study's limitations were the parents' non-availability of time and the SARS-CoV-2 pandemic. Likewise, it is crucial to consider that having two age groups with a self-administered survey by children from 10 to 14 could create

problems when understanding some questions in the survey, generating confusion and some interpretation issues. Therefore, it is necessary to carry out prospective cohort studies and studies with a larger sample size to establish more evident associations.

CONCLUSION

The increasing use of electronic devices among children aged 6 to 14 significantly impacts their family, school, and social environment. However, this influence will vary depending on the characteristics of their use, caregiver supervision, and their purpose. Although this study was not intended to provide strict correlations and needs to be understood as exploratory work, some coincidences were found that are worthy of note. It was found that children who used these devices for more than 90 minutes daily were also likelier to experience lower academic performance, socialization difficulties, and conflict resolution challenges. At the same time, those who used electronic devices for less than 90 minutes daily used to have fewer suicidal ideations.

The findings of this study highlight the need for careful consideration of electronic device usage in children. While devices can benefit, excessive use may negatively affect emotional responses, conflict resolution skills, and social interactions. Caregiver supervision promoting healthy device habits and ensuring a balanced approach to device usage may be crucial in mitigating potential adverse impacts and promoting healthy child development.

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SAŽETAK

Karakteristike uporabe elektroničkih uređaja u djece i adolescenata dobi 6-14 godina

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Uvod: Djeca i adolescenti svakodnevno koriste računala, mobitele i tablete, uz ostale elektroničke uređaje, u neakademskim aktivnostima. Bitno je karakterizirati utjecaj ovih uređaja na procese socijalizacije, interakcije i učenja u ovom segmentu populacije, a također je potrebno istražiti moguće štetne učinke povezane s njihovom uporabom. Cilj je bio opisati kako se ti uređaji koriste i njihov utjecaj na školski uspjeh, ponašanje i tjelesnu aktivnost djece i adolescenata od 6 do 14 godina.

Materijali i metode: Ovo je presječna analitička studija 510 školske djece u dobi od 6 do 9 i od 10 do 14 godina iz Bogote i Cundinamarce, Kolumbija. Ispitani su pomoću ankete od 38 pitanja koja su karakterizirala korištenje uređaja i simptome anksioznosti i depresije, rješavanje sukoba, spavanje i školski uspjeh.

Rezultati: Prosječna dob za početak korištenja uređaja bila je četiri godine. U obje skupine najviše su korišteni mobiteli (56,3% i 78,04%). Roditelji prate korištenje uređaja u 80% slučajeva. U 40% slučajeva upotreba uređaja bila je duža od 90 minuta dnevno. Oko 16% je također prijavilo poremećaje spavanja, frustraciju (48%), emocionalnu labilnost (20%) i suicidalne ideje (11%). 19% se nije igralo sa svojim vršnjacima, a 7% je izjavilo da nema bliske prijatelje.

Zaključci: Ova studija pokazuje visoku izloženost elektroničkim uređajima od rane dobi i njihovu povezanost s čimbenicima ponašanja. Buduće studije trebale bi dublje istražiti odnos između ovih čimbenika i elektroničkih uređaja.

Ključne riječi: MOBILNI UREĐAJI; DIJETE; ADOLESCENT; VRIJEME PRED EKRANOM; AKADEMSKI USPJEH