



## Infants' screen time: a comparison pre and during COVID-19 pandemic

### *Tempo de exposição a telas em lactentes: comparação pré e durante a pandemia da COVID-19*

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#### ABSTRACT

To compare the infants' time exposure to screens between pre- and during the COVID-19 pandemic and to investigate factors related to screen exposure during this period. The "Screen exposure time questionnaire" was answered by 63 caregivers of infants, in two periods: before and during the COVID-19 pandemic. For comparison between periods, the Wilcoxon Rank test was used. During the COVID-19 pandemic, infants' time exposure to screens increased significantly, from a median of 4 to 7 hours per week, with television being the most used device. A correlation was observed between infant age and time exposure to screens. There was an increase in infants' time exposure to screens during the COVID-19 pandemic. Total screen time showed a proportional correlation with age in the evaluated periods; however, it did not correlate with the home-office performance of those responsible.

**Keywords:** Screen Time. Infant. Pandemic. COVID-19.

#### RESUMO

Comparar o tempo de exposição a telas de lactentes entre os períodos pré e durante a pandemia da COVID-19 e averiguar fatores relacionados a exposição de tela durante esse período. Responderam ao "Questionário tempo de exposição a telas", 63 responsáveis de lactentes, em dois períodos: pré e durante a pandemia COVID-19. Para a comparação entre os períodos, foi utilizado o teste de *Wilcoxon Rank*. Durante a pandemia da COVID-19, aumentou-se significativamente o tempo de telas, passando de mediana de 4 para 7 horas semanais, destacando-se a televisão como dispositivo mais utilizado. Observou-se a correlação entre idade do lactente e tempo de exposição a telas. Houve aumento do tempo de exposição a telas durante a pandemia da COVID-19 nos lactentes avaliados. O tempo total de telas apresentou uma correlação proporcional com a idade nos períodos avaliados, porém não se correlacionou com a realização de *home-office* dos responsáveis.

**Palavras-chave:** Tempo de tela. Lactente. Pandemia. COVID-19.

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## INTRODUCTION

Due to worldwide technological advances, infants (0 - 2 years old) are surrounded by a variety of digital devices from birth <sup>1</sup>. Estimates indicate some device is present in about 68% of infants' daily time in the United States <sup>2</sup>. Even in developing countries and with lower socioeconomic status, from a very early age, infants have contact with screens <sup>3</sup>, contrary to the recommendations from the Brazilian Society of Pediatrics of no screen time until the second year of life <sup>4</sup>.

A major reason for this recommendation is due to the passive consumption of content, since exposure to screens implies the loss of several opportunities and experiences necessary for child development <sup>4</sup>, affecting the acquisition of motor skills, and the development of language and social relationships <sup>3,4</sup>. In addition, early exposure to screens has sensory repercussions, favoring the development of visual disorders related to screen glare, decreased sleep quality, increased daytime sleepiness, and future problems related to memory and concentration <sup>4</sup>.

However, the use of screens has become essential for professional communication or between family and friends in the rise of the CoronavirusDisease–2019(COVID-19) pandemic due to the recommendation of the World Health Organization (WHO) as a fundamental strategy to prevent the spread of COVID-19, with social distancing for a prolonged period <sup>5</sup>.

Adaptation related to social distancing acted as decisive environmental factors, as infants began to be confined in their home space, limiting contact with other environments, other children, and other family members <sup>6,7</sup>. Importantly, COVID-19 pandemic brought consequences related to the closure of several establishments and the change in the way of working for many parents/guardians, who had to work from home.

These obstacles between occupational demands and the intense care infants demand creates even more barriers in the environment to stimulate them <sup>8</sup>.

Taking into account that infant development depends not only on biological factors but also on external factors, such as those inherent in a pandemic. Studies for a better understanding of this period are needed. Therefore, the present study aimed to compare the screen time in infants between pre and during COVID-19 pandemic, as well as to investigate the possible factors related to screen time in infants during COVID-19 pandemic.

## MATERIAL AND METHODS

This was an observational, descriptive study <sup>9</sup>. The present study was approved by the Human Research Ethics Committee (CEPSH), CAAE 33727020.1.0000.0118.

## POPULATION AND SAMPLE

The study included guardians of term infants (37 to 42 weeks gestational age) or preterm infants (<37 weeks gestational age), whose ages at the first assessment were between 0 and 18 months of chronological or corrected age, living in the region of Florianópolis, state of Santa Catarina. Infants and their families were participants in the Extension Program "Stimulation: the child in focus" at the State University of Santa Catarina (UDESC), coming from spontaneous demand or referred from other institutions.

## DATA COLLECTION

Those responsible for the infants were instructed about the procedures and objectives, benefits and risks of the study; and, accepting

to participate, read and signed the Informed Consent.

Data collection was divided into two evaluations and carried out individually, the first collection was carried out in the pre-pandemic period (2019), that is, the data used are part of a research that was already in progress, before COVID-19 (project approved at CEPESH, CAAE 07750819.0.0000.0118). While the second collection was carried out in online mode, in 2020.

The first evaluation was performed in person at a physical therapy clinic at UDESC, between February 2019 and March 2020. The guardians/parents answered the infant characterization form and a questionnaire regarding the use of technology. The infant characterization form was developed by the researchers and was used to collect information regarding the characterization of the sample regarding the identification of personal data.

In the form regarding the use of technology, the guardian quantitatively answered the daily hours of screen time of the infant, as well as the weekly frequency in which they used the pictured screens, including the use of television, tablet, and cell phone. They were also asked to answer about the type of program the infant watched on television, or which activity was related to the use of a tablet or cell phone. The questionnaire also included questions about the use of screens by parents/guardians, considering these programs or activities may influence the infant. Finally, they were asked about their opinion regarding the relationship between the use of screens and the infant's motor development.

In the second evaluation, the questionnaire on the use of technologies was applied using the "Google Forms" platform, between September and November 2020, and included some additional questions regarding the changes resulting from COVID-19 pandemic. Those responsible for the infants were contacted

twice, with an interval of 7 days, via message application, in which the online form was sent. In this form, other questions were added, mainly related to COVID-19 pandemic and social distancing involving the practice of physical activity by those responsible, pre and during the pandemic, about the characteristics of the residence, whether the general screen time of the infant increased during COVID-19 pandemic, how long this increase was, if the infant watched screens while eating, and also if the responsible worked from home during the pandemic.

## STATISTICAL ANALYSIS

Data of this study were systematized using the Statistical Package for Social Sciences version 20.0 software (SPSS - IBM Corporation, Armonk, USA). Data from guardians who did not respond to the second questionnaire were considered sample losses. To check the normal distribution of the data, the Kolmogorov-Smirnov test was applied.

For comparisons between the periods pre and during COVID-19 pandemic, the Wilcoxon Rank test was applied for non-parametric variables, and data were expressed as median, minimum, and maximum. As to correlation, Spearman's correlation test was used for non-parametric data. The significance level used was  $p \leq 0.05$ , and the correlation strength was considered from the following parameters: perfect correlation ( $\rho = 1$ ), very strong correlation ( $\rho = 0.9-1$ ), strong correlation ( $\rho = 0.7-0.9$ ), regular ( $\rho = 0.4-0.6$ ) and weak ( $\rho < 0.3$ )<sup>10</sup>.

## RESULTS

In the first assessment, 80 guardians of infants aged 0 to 18 months answered the questionnaire, however, in the second assessment, 63 guardians returned the completed online questionnaire. The characterization of the final sample is listed in Table 1.

**Table 1.** Characterization of infants' sample evaluated in pre-pandemic period and during COVID-19 pandemic. Data presented in absolute and relative frequency (n=63)

Variables	N	%
<b>Age on the first assessment (pre-pandemic)</b>		
0 < 6 months of age	35	55.5%
6 < 12 months of age	19	30.2%
12 < 18 months of age	9	14.3%
<b>Age on the second assessment (during COVID-19 pandemic)</b>		
6 < 12 months of age	2	3.1%
12 < 18 months of age	16	25.4%
18 < 24 months of age	29	46.1%
> 24 months of age	12	25.4%
<b>Sex</b>		
Male	35	55.6%
Female	28	44.4%
<b>Gestacional age classification</b>		
Preterm	10	15.9%
Term	53	84.1%
<b>Type of residence</b>		
Apartment	41	65.1%
House	21	33.3%
Other	1	1.6%
<b>Parents' education</b>		
High school	14	22.2%
Graduated	49	77.8%

Legend: n: %.

Table 2 presents the results obtained in the first assessment (pre-pandemic) and in the second assessment (during COVID-19 pandemic) exclusively referring to infants. As for total screen

time, in the first evaluation, 22 (34.9%) out of the 63 infants evaluated had zero screen time. In the second evaluation, 60 (95.3%) out of the 63 infants were exposed to a screen.

**Table 2.** Data regarding infant's screen time pre and during COVID-19 pandemic. Data expressed as median, minimum and maximum (n=63)

Variables (hours per week)	Pre-pandemic	COVID-19 pandemic	p
TV	4 [0-28]	7 [0-35]	0.000
Tablet or cell phone	0 [0-4]	0 [0-24]	0.001
Total Infant's Screen Time	4 [0-28]	7 [0-59]	0.000

Legend: TV- television; Data compared by *Wilcoxon* Test.

Table 3 lists the results obtained in the first assessment (pre-pandemic) and the second assessment (during COVID-19 pandemic)

exclusively referring to data from parents or guardians in their leisure time.

**Table 3.** Data regarding parents' screen time pre and during COVID-19 pandemic. Data expressed as median, minimum and maximum (n=63)

Variables (hours per week)	Pre-pandemic	COVID-19 pandemic	p
TV	12 [0-35]	7 [0-28]	0.202
Tablet or cell phone	14 [0-35]	14 [0-35]	0.140
Total Screen Time	21 [0-70]	21 [0-63]	0.182

Legend: TV- television; Data compared by *Wilcoxon* Test.

Data regarding the changes in pandemic are listed in table 4, presenting the frequency of responses obtained.

**Table 4.** Characteristics of infant's environment during COVID-19 pandemic. Data in absolute and relative frequency (n=63)

Variables	n	%
<b>During pandemic, infants increased screen time</b>		
Yes	47	74.6
No	16	25.4
<b>Mother/Father did "home office"</b>		
Yes	44	69.8
No	19	30.2
<b>Who took care for the infant during the "home office"</b>		
The Other parent	27	42.8
Nanny or caregiver	5	7.9
Parent in "home office"	11	17.4
Did not answer	20	31.7
<b>Infant spent most of the time during the "home office"</b>		
Playing	35	55.5
Screen exposed	9	14.2
Did not answer	19	30.1

Possible factors that could be related to the infant's total screen time are shown in table 5.

**Table 5.** Correlation between total screen time of infants pre and during COVID-19 pandemic (n=63)

	P	rho	Classification
<b>PRE-PANDEMIC</b>			
Parents education	0.10	-0.2	NC
Type of residence	0.45	0.1	NC
Infant's age	0.02*	0.3	Week
Parents' total Screen Time	0.77	0.4	NC
Parents's total Screen Time in cell phone/tablet	0.25	-0.1	NC
Parents's total Screen Time in TV	0.19	0.2	NC
<b>DURING COVID-19 PANDEMIC</b>			
Infant's age	0.009*	0.3	Week
Parents education	0.2	-0.2	NC
Type of residence	0.66	-0.1	NC
Parents' total Screen Time	0.18	0.2	NC
Parents's total Screen Time in cell phone/tablet	0.7	0.2	NC
Parents's total Screen Time in TV	0.98	-0.1	NC
Perception of parents about the screen time	0.03*	-0.7	Regular
Parent in "Home-office"	0.83	0.1	NC
Who take care of infant during the pandemic	0.41	0.1	NC

Legend: NC – Non-correlated.

\*means correlation between the variables.

## DISCUSSION

The present study aimed to compare the screen time in infants between pre and during COVID-19 pandemic. Based on our findings, there was a significant increase in the total screen time per infant during COVID-19 pandemic compared to the previous period. In addition, the study showed a reduction in the number of infants with zero screen time between assessments, indicating that infants who did not use screens before COVID-19 pandemic began to use them during the social isolation period. Thus, most of the study sample does not follow the recommendations from the Brazilian Society

of Pediatrics about not exposure infants to screen under two years<sup>4</sup>.

A probable explanation for the significant increase in screen time is related to the measures to control COVID-19 pandemic, mainly regarding the closure of schools and parks, changes in routine, and a decrease in social life and physical activities<sup>6,7,11</sup>. In their systematic review, Araújo et al.<sup>6</sup> (2020) state that the balance of daily living activities of children, between 0 and 18 years old, and of parents were altered due to the pandemic, decreasing the level of outdoor activities and increasing the use of electronic devices, such as TVs, cell phones and tablets<sup>6</sup>.

The increase in total screen time per infant during COVID-19 pandemic compared to

the previous period corroborates other studies. In a cohort study, Kahn et al.<sup>12</sup> (2021) compared screen time and infant sleep in 2019 and 2020, and reported that in 2020, there was a 37.5% increase in screen time in American infants compared to the pre-pandemic period. A similar result was found by Shinomiya et al.<sup>13</sup> (2021) who, through a cross-sectional study, concluded that the time spent on screens, especially TV and cell phones, was significantly higher for infants and children during the period of social isolation compared to data from the beginning of 2019, the period before the global COVID-19 pandemic.

Contradicting the result found by Shinomiya et al.<sup>13</sup> (2021) on the use of cell phones by infants, when analyzing exposure to tablets and cell phones, the present study showed that the median remained null in both periods, indicating that such devices were not used or were used in a shorter amount of time by the evaluated sample. Similar to the present study, Waisman<sup>14</sup> (2018) found that the average daily minutes in which infants under 2 years old watched TV was almost three times higher than other devices. The author also observed that the weekly hours spent watching TV remained constant at all ages evaluated, however the use of mobile devices tended to increase with age. A possible explanation for this is that it is easier to set the TV parameters and keep them entertained, but for the use of mobile devices, a responsible person is necessary to accompany them to control the use, as they need help<sup>14</sup>.

When analyzing data referring to parents or guardians between the periods pre and during COVID-19 pandemic, the total screen time (TV, cell phone, and tablet) maintained the same median. A possible explanation is the overload of those responsible during pandemic, due to the increased demand for their home and work activities with remote work, in addition to the increased concerns caused by the period of

socioeconomic instability<sup>6</sup>. In contrast to such results, Carrol et al.<sup>7</sup> (2020) compared the periods pre and during pandemic for parents' screen time and concluded that there was an increase of 74% for mothers and 61% for fathers during the period of social isolation, emphasizing that several guardians reported that such an increase is due to the need to work from home<sup>7</sup>. The study by Wagner et al.<sup>15</sup> (2021) after a comparison of data between the years 2018 and 2020, concluded that recreational screen time among American adults also had a significant average increase of three hours during COVID-19 pandemic.

The present study detected no significant correlation between the total screen time of infants and the remote work of guardians or the need for another caregiver during the parents' workday. No other studies were found in the literature that dealt directly with the relationship between the screen time of infants and the remote work of parents and guardians. A study found a non-significant correlation between remote work and the decrease in the level of physical activity of children and adolescents<sup>5,16</sup>. The study by Eyimaya; Irmak<sup>11</sup> (2021) analyzed the relationship between parenting practices and screen time of children aged 6 to 13 years during the COVID-19 pandemic and concluded that there are significant correlations between family income and work regime of mothers with increasing screen time for children in this age group. Nevertheless, further studies are needed to directly correlate socioeconomic conditions and remote work with the screen time of infants.

Also, in the present study, significant correlations were verified between infant age and the infant's total screen time in both evaluated periods, indicating that an increase in age is related to extended exposure to screens. Duch et al.<sup>2</sup> (2013) observed similar results in a systematic review with children up to 3 years old, in which they identified a correlation between age and

screen time in 88% of the analyzed articles, pointing out that older children are more exposed than younger ones<sup>2</sup>. This result also corroborates Kahn et al.<sup>12</sup> (2021), who concluded that the increase in total screen time of infants during the pandemic period was significantly moderated by age, as infants aged between 13 and 18 months had significantly longer screen time compared to infants at 12 months.

The increased screen time in older infants may be influenced by the need for care related to each stage of development, since older infants have gross motor skills that allow greater mobility and, therefore, a greater need for supervision and security. Younger infants, on the other hand, have more limited motor skills and a greater need for sleep time, allowing caregivers to carry out professional or domestic activities simultaneously with care<sup>12,17</sup>.

The first years of life are decisive for the physical, cognitive, motor, and social development of the infant. Experiences or the lack thereof, in this crucial period, have positive or negative consequences throughout childhood and adult life<sup>18-21</sup>. It is during the first months of life that infants learn to establish an emotional and secure bond with their caregivers and to know their bodies and the environment in which they live<sup>18,22,23</sup>. In these moments of exchanging glances, smiles, cries, and games, the infant learns to signal their physical and affective needs. Therefore, interaction with the caregiver and the environment is essential for the infant's motor and socio-emotional development<sup>24</sup>. Though, screen exposure leads to a decrease in this interaction with the caregiver, as well as a decrease in movement, in exploring their body and environment, delaying the acquisition of these motor and social skills<sup>25</sup>, consequently, impacting throughout childhood and adult life.

Also, in the period of COVID-19 pandemic, infants were more exposed to screen along with

reduced playing time and social interactions due to social isolation, as well as their parents showed anxious, stressful, and depressive behavior, directly affecting the interaction with the infant<sup>26-29</sup>. Therefore, further longitudinal studies are required to better understand the consequences of COVID-19 pandemic and the excessive use of screens, following up with children and those responsible for them, so that one can understand the impacts of this unique moment in history, on growth and child development.

The main limitation of the study was the difference in the application of the assessment between the two periods, the first was carried out in person, and the second, using a self-applied online form subjected to interpretation by the parents, making it more subjective. In addition, the sample loss between the two assessments is highlighted.

## **5 CONCLUSION**

In conclusion, there was an increase in screen time of the evaluated infants during COVID-19 pandemic, and most of the study sample did not follow the guidelines from the Brazilian Society of Pediatrics, in the second assessment. The total screen time was proportionally correlated with age in the two periods, but no determining factors for this increase were found since it did not correlate with the remote work of those responsible and with the different caregivers.

Despite the limitations, this study has an important practical implication: the need to disseminate the recommendations of zero screen time for infants, from the Brazilian Society of Pediatrics; either through public health campaigns, guidance from early childhood education teachers, or health professionals.



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