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Original articles

Impact of deprivation of school physical space on child development during the pandemic: the perception of preschoolers' families

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ABSTRACT

Purposes: to characterize the family and school contexts of children enrolled in nursery schools, preschools, or kindergartens in 2020, during the COVID-19 pandemic, and verify the effects of deprivation of school physical space on their development, in the perception of families regarding cognitive-linguistic, socioemotional, and motor aspects.

Methods: the sample comprised 139 families of children aged 1 year to 5 years and 11 months, living in the state of São Paulo, Brazil, who answered an online questionnaire on the characterization of the family and school contexts and the impacts on cognitive-linguistic, socioemotional, and motor aspects. The study used the chi-square, Kruskal-Wallis, and Mann-Whitney statistical tests, with the significance set at p-values $\leq 5\%$.

Results: older children were associated with being transferred to other schools ($p = 0.0192$) and greater socioemotional impairment ($p = 0.0011$). Smaller children felt fewer positive effects on the cognitive-linguistic aspect ($p = 0.0137$). The absence from the school environment and the overall effects of the pandemic negatively influenced them ($p = 0.0404$; $p = 0.0134$).

Conclusion: the mean age of the parents/guardians was 36 years, with a Bachelor's degree, and working from home. The children enrolled in public or private schools had online activities. All children were exposed to screens, most of them for 4 or more hours per day. The socioemotional aspect was the most impaired one, followed by the cognitive-linguistic aspect. The negative effects outweighed the positive ones.

Keywords: Pandemics; COVID-19; Social Isolation; Child Development; Child, Preschool

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INTRODUCTION

The brain of developing children is constantly changing, producing new synapses capable of remodeling motor, psychosocial, cognitive, and linguistic skills based on intrinsic stimuli (i.e., originated from genetic inheritance) and extrinsic stimuli (coming from the social environment)[1].

Small children need to have an adult mediator in the process of developing neuropsychosocial skills. Parents, friends, family, means of communication, and teachers are examples of important mediators that partake in this process with plays and fun, symbolic, and communicative activities. In Brazil, early childhood extends from birth to 6 years old[2]. This is considered a sensitive period because it ensures greater biological brain readiness (brain plasticity) to learn certain skills through adequate stimulation[3].

One of the essential ways for children to explore their capacities and potentialities is in the school setting. It is estimated that 34% of the Brazilian population up to 3 years old attend pre-kindergarten, and 93% of those 4 to 5 years old attend kindergarten[4].

The active participation of children in the physical environment of schools is expected to ensure their greater development. Hence, it must be organized to meet social, cognitive, and emotional needs in a safe structure, adequate to provide opportunities and broaden experiences, such as establishing relationships with others, with themselves, and with the world around them[5].

The presence of SARS-CoV-2 in Brazil and the world impacted various sectors, including health and education[6]. In the effort to delay the progress of the coronavirus disease 2019 (COVID-19), social isolation was either recommended or mandatory[7], forcing activities to be held online.

During the pandemic, many parents of preschoolers complained of the changes in the family dynamics, due to changes in work routine. Hence they needed great resilience skills to ensure health protection measures for their children[7]. Moreover, they had to be protagonists in their children's school interventions, because this age group is totally dependent on their participation.

Whether or not school activities were held at home, the quality of the intervention and learning is questionable. The increased screen time is also questioned, as well as the effects of depriving them of the physical space of school on their development, particularly regarding cognitive-linguistic, socioemotional, and motor aspects.

Hence, this study aimed to 1) characterize the family and school context of children enrolled in nursery schools, preschools, or kindergartens in 2020, during the COVID-19 pandemic; 2) verify the effects of depriving preschoolers of the physical space of school on their development, in the family's perception, regarding cognitive-linguistic, socioemotional, and motor aspects.

METHODS

This study was approved by the Research Ethics Committee of the Clinics Hospital of Ribeirão Preto at the *Universidade de São Paulo* (HCFMRP-USP), process no. 2522/2021 and CAAE no. 44697121.8.0000.5440. All subjects read and digitally agreed with the informed consent form, in compliance with Resolution 466/2012 of the National Health Council.

This cross-sectional, descriptive, predominantly quantitative study investigated preschoolers during the pandemic.

Sample

The convenience sample comprised 139 respondents. It included the family of children aged 1 year to 5 years and 11 months, enrolled in public or private nursery schools, preschools, or kindergartens in 2020 in the state of São Paulo, Brazil. Participants were recruited through social means of communication, such as the Internet (social media – WhatsApp, Facebook, Instagram – and official webpages of newspapers and universities) and television (on a news piece that announced the link for participation). The participation consisted in filling out an online questionnaire.

Families that lived in other states of Brazil and whose answers referred to children under 1 year old were excluded. The initial proposal was to reach this age group as well, but they corresponded to less than 10% of the sample. Moreover, it did not include those who did not agree with the informed consent form or who agreed with it but did not continue to the following stage – i.e., did not answer any question in the collection instrument.

Procedures

Data were collected between April 7 and October 1, 2021. An online questionnaire was used to reach as many participants as possible. It was created in the Forms program, a research management application in Google. This system is protected with virtual locks and keys that ensure data security, according to audit SSAE 16 and ISAE 3402 satisfactory type II. The questionnaire was created following security recommendations of the Checklist for Reporting Results of Internet E-Surveys (CHERRIES), as a guideline to collect data online[8].

Before administering the online questionnaire, its content was validated by a group of 57 judges recruited through social means of communication (Internet and television). They were 11 speech-language-hearing therapists with a mean experience time in child language of 8.54 years; 15 educators with a mean experience time in child education of 11.79 years; and 31 parents/guardians of preschoolers. These categories respectively represented 19.3%, 26.3%, and 54.4% of the total number of judges.

The questionnaire was validated with the Lawshe method[9], named Content Validity Index (CVI), as follows: each question developed by the researchers was assessed on a 3-point scale as "essential", "useful, but not essential", or "unnecessary". Each question's CVI was calculated considering the proportion of speech-language-hearing therapists, educators, and parents/guardians that assessed it as "essential", using the formula CVI = (Ne - N/2)/(N/2)[10], in which "Ne" is the number of judges that assessed it as "essential" and "N" is the total number of judges. The cutoff value for each Likert item and the whole Likert scale was 0.78. Lower values and the judges' comments directed reviews and/or exclusions.

Of the 43 questions answered by the judges, 11 made up the section "Characterization of the family and child and family context during the pandemic"; however, two items were excluded (*the sex of the child; the number of children/adolescents who live in the house*), totaling nine questions. There were nine questions in the section "On the development of children" for all age groups, from which two were excluded (*to what extent the child disobeys limits and rules imposed on them; how much crying frequency has increased*), totaling seven questions. The section "On the development of children aged 1 year to 2 years and 11 months" had 13 questions, and the one "On the development of children aged 3 years to 5 years and 11 months" had nine questions. All questions were maintained in this section, but five of them were repeated in both age groups. Three questions were added: *the age of the parents/guardians*; *changing to a different school;* and *the family's capacity to stimulate the child at home*.

Altogether, there were 36 questions – 24 of them were in common to all age groups, eight were specific to children aged 1 year to 2 years and 11 months, and four were specific to those aged 3 years to 5 years and 11 months.

1. The first part had six questions on the characterization of the family and the family context during the pandemic (parent/guardian's age, state of residence, parents/guardians' educational attainment, number of people living in the house, working dynamics during the pandemic, and physical space of the house); three questions on the child and their screen use (age of the child in 2020, during the pandemic; and increased daily screen use and screen time); and four questions on school dynamics (type of school and change to a different school, school dynamics during the pandemic, and reactions to these circumstances). Most answers were multiple choice (only one answer could be checked), while only four questions had yes/no answers.

2. The second part had 23 questions on child development – 11 questions on the behavior of the child and of the family, and perceptions on child development (movement activities, interest in communication, impatience/irritability/stress/crying, resuming habits, dependence on the family, family's capacity to stimulate the children at home, reactions to the proposed activities, family's point of view of the negative reactions/emotions and their relationship with the absence from the school environment, and positive and negative effects of the pandemic on child development); eight questions for children aged 1 year to 2 years and 11 months (stimulation of hearing, vision, smell, touch, taste; progress in language and speech, new learning, and perception of the family about home activities in contrast with school activities); and four questions for those aged 3 years to 5 years and 11 months (exploring their imagination and their notion of numbers and quantity, and progress in language and speech). All answers were given on a Likert scale ranging from 1 to 10 points, from "very little" to "very much" – except for the ones on aspects of child development more negatively or positively affected by the pandemic, which had multiple-choice answers (more than one could be checked).

The 10-point scales are more recommended to measure attitudes, as the grading from 0 to 10 makes it easier for interviewees to better discriminate and visualize them, providing more refined results[11].

It must be pointed out that respondents were not obligated to fill out all questions – i.e., they could leave any question unanswered when they did not know or did not want to answer it. The questionnaire took an estimated 20 minutes to be filled out.

Analysis of results

The descriptive analysis used the mean, median, and standard deviation (mean ± SD) of the quantitative variables and the frequency and percentage of the categorical variables. The statistical analysis addressed two age groups: "1 year to 2 years and 11 months" and "3 years to 5 years and 11 months". The parents/guardians' educational attainment was classified as "Bachelor's degree" and "others".

The chi-square test was used to investigate the associations of age groups with screen time, increased screen time, type of school, change to a different school, doing online activities, and satisfaction with online activities. The same test was used to investigate the association between educational attainment and screen time and increased screen time.

The Kruskal-Wallis test was used to compare the number of people in the household with the different screen time categories.

The Mann-Whitney test was used to investigate the relationship between the number of people in the household and the increased screen time. It was also used to compare the Likert scale medians with the age groups and the parents/guardians' educational attainment. The significance was set at p-values equal to or below 5%. All procedures were performed in JMP SAS software, 10.0 (SAS Institute, Inc., Cary, NC, USA).

RESULTS

The sample comprised 139 respondents who lived in the state of São Paulo, aged 22 to 53 years (mean of 36.25 years, median of 36, DP± 6.12). The age groups of the children addressed in the investigation are described in Table 1.

Table 1. Age groups of investigated children

Age groups	N	%
1 to 2 years	21	15.1
2 to 3 years	24	17.3
3 to 4 years	32	23.0
4 to 5 years	32	23.0
5 years to 5 years and 11 months	30	21.6
Total	139	100.0

Captions: N = sample number; % = percentage

The characterization of the family and family context during the pandemic is shown in Table 2.

Table 2. Characterization of the parent/guardian and family context in 2020, during the pandemic

Variables	N	%
Parent/guardian's educational attainment		
Bachelor's degree	101	72.7
Other	38	27.3
Total	139	100.0
Number of people living in the home		
2	4	2.9
3	46	33.1
4	66	47.5
5 or more	23	16.6
Total	139	100.0
Working from home		
Yes, fully	51	37.0
Yes, partially	59	42.8
No	28	20.3
Total	138	100.0
Enough physical space in the home for the child to move around		
Yes	94	68.6
No	43	31.4
Total	137	100.0

Captions: N = sample number; % = percentage

All children were exposed to screen use. The time of exposure and the reported increase in screen time, stratified per age group, are presented in Table 3.

Table 3. Distribution of preschoolers' age groups in relation to screen exposure in 2020, during the pandemic

Variables	Children 1yr to 2yr11m old	Children 3yr to 5yr11m old	Total
	N (%)	N (%)	N (%)
Screen time			
1 hour a day	3 (6.8)	3 (3.2)	6 (4.3)
2 hours a day	8 (18.2)	14 (14.9)	22 (15.9)
3 hours a day	8 (18.2)	15 (16.0)	23 (16.7)
4 hours a day	11 (25.0)	21 (22.3)	32 (23.2)
5 or more hours a day	14 (31.8)	41 (43.6)	55 (39.9)
Total	44 (100.0)	94 (100.0)	138 (100.0)
Increased screen time			
Yes	40 (90.9)	83 (89.1)	123 (89.1)
No	4 (9.1)	11 (11.7)	15 (10.9)
Total	44 (100.0)	94 (100.0)	138 (100.0)

Captions: N = sample number, % = percentage; yr = year; m = month

The time of exposure and the increase in screen time were not associated with either the age groups (respective chi-square: p = 0.64; p = 0.67) or the parents/guardians' educational attainment (respective chi-square: p = 0.94; p = 0.98). Likewise, the number of people in the household was not correlated with the time of exposure (Kruskal-Wallis test, p = 0.74) or associated with increased screen time (Mann-Whitney test, p = 0.54).

The general results of the characterization of the school context (type of school, change of schools, doing online activities) and the satisfaction of children with online activities, stratified by age group, are shown in Table 4.

Table 4. Distribution of preschoolers' age groups in relation to the school context and continuity/satisfaction with online activities

Variables	Children 1yr to 2yr11m old	Children 3yr to 5yr11m old	Total
	N (%)	N (%)	N (%)
Type of school			
Public/Philanthropic	25 (58.1)	40 (42.6)	65 (47.4)
Private	18 (41.9)	54 (57.5)	72 (52.6)
Total	43 (100.0)	94 (100.0)	137 (100.0)
Changed schools			
Yes	9 (20.9)	39 (41.5)	48 (35.0)
No	34 (79.1)	55 (58.5)	89 (65.0)
Total	43 (100.0)	94 (100.0)	137 (100.0)
Continuity of online activities during the pandemic			
Yes	35 (81.4)	71 (76.3)	106 (77.9)
No	8 (18.6)	22 (23.7)	30 (22.1)
Total	43 (100.0)	93 (100.0)	136 (100.0)
Child's satisfaction with the online activities			
Very little	13 (37.1)	14 (20.0)	27 (25.7)
A little	3 (8.6)	8 (11.4)	11 (10.5)
Moderate	16 (45.7)	35 (50.0)	51 (48.6)
Very much	3 (8.6)	13 (18.6)	16 (15.2)
Total	35 (100.0)	70 (100)	105 (100.0)

Captions: N = sample number; % = percentage; yr = year; m = month

Changing schools was associated with the age groups – which occurred more frequently in the group of those 3 years or older (chi-square: p = 0.0192). The other aspects (type of school, doing online activities, and satisfaction with online activities) were not associated with the age groups (respective chi-square: p = 0.09; p = 0.51; p = 0.22).

Concerning child development, the general intensity of the parents/guardians' perceptions on the children's response/behavior at home in 2020, during the pandemic, stratified per age group and parent/guardians' educational attainment, is respectively shown in Tables 5 and 6.

Table 5. Perception of the parents/guardians of the child's response/behavior at home in 2020, during the pandemic, stratified per age group, on a 10-point intensity Likert scale

Variables	Children 1yr to 2yr11m old				Children 3yr to 5yr11m old				p-value (*)
	Mean	SD	Median	IQR	Mean	SD	Median	IQR	
Doing activities that require movement	7.1	2.1	7.0	2	6.2	2.6	6.0	4	0.07
Interest in communicating with the family	8.6	2.1	10.0	2.75	8.4	2.3	10.0	3	0.77
Increased impatience/irritability/stress/crying	6.9	2.3	8.0	2.75	7.2	2.4	8.0	3	0.41
Euphoric reaction to suggested plays	8.1	1.8	8.0	2.75	7.9	2.1	8.0	3	0.93
Starting habits they did not have before	3.4	2.9	2.0	4.25	3.0	2.9	1.0	4	0.30
Greater dependence on the parent/guardian	7.2	2.9	8.0	3	6.8	2.8	7.0	5	0.49
Parent/guardian's perception of negative reactions/ emotions and their relationship to the absence from the school setting	8.1	2.3	8.5	2	7.5	2.5	8.0	4	0.14
Experience with plays/activities that stimulate HEARING	7.3	2.4	8.0	3	-	-	-	-	-
Experience with plays/activities that stimulate VISION	7.7	2.3	8.0	3.75	-	-	-	-	-
Experience with plays/activities that stimulate SMELL	6.2	2.4	6.0	3.75	-	-	-	-	-
Experience with plays/activities that stimulate TOUCH	6.4	2.7	6.5	4	-	-	-	-	-
Experience with plays/activities that stimulate TASTE	6.7	2.6	6.5	4	-	-	-	-	-
Home activities involving the five senses were satisfactory in comparison with those carried out at school	6.1	2.5	6.0	3	-	-	-	-	-
Progress in language and speech (sound emissions in the attempt to communicate, first words, small sentences)	7.5	2.7	8.5	4	-	-	-	-	-
New learning (learning colors, numbers, parts of the body, gestures)	7.1	2.6	8.0	4	-	-	-	-	-
Exploring the imagination (make believe, play house, doctor, doing the groceries, or other situations that imitate real life)	-	-	-	-	7.2	2.6	8.0	5	-
Exploring the idea of numbers and quantities (toys with numbers, handling play money, plays and songs that involve numbers/quantities)	-	-	-	-	6.6	2.5	7.0	4	-
Progress in language and speech (ability to name objects around them, ask questions, use different verb tenses, and form and understand complex sentences)	-	-	-	-	8.2	2.0	9.0	3	-
Progress in the ability to tell stories	-	-	-	-	7.6	2.5	8.0	4	-
Ability to stimulate children at home	6.7	2.2	7.0	3	6.2	2.4	6.5	3	0.47
Negative influence of the absence from the school setting on the progress of the previously cited aspects	6.8	2.8	7.0	3.75	7.2	2.7	8.0	5	0.41
Negative effects of the changes triggered by the pandemic	7.3	2.5	8.0	3	7.6	2.4	8.0	4	0.40
Positive effects of the changes triggered by the pandemic	4.6	2.5	5.0	4.75	4.8	2.9	5.0	5	0.80

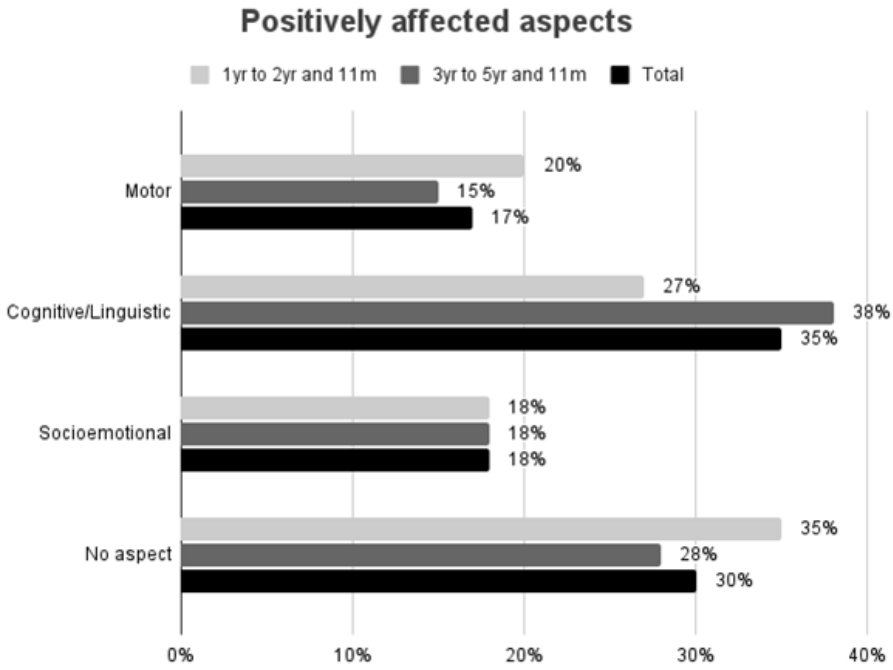
(*) Mann-Whitney test. SD = standard deviation. IQR = interquartile range; yr = year; m = month

Table 6. Perception of parents/guardians on the children's response/behavior at home in 2020, during the pandemic, stratified per educational attainment on a 10-point intensity Likert scale

Variables	N	Other				Bachelor's degree				p-value (*)
		Mean	SD	Median	IQR	Mean	SD	Median	IQR	
Doing activities that require movement	138	6.7	2.8	8.0	4.5	6.4	2.4	6.0	3.0	0.35
Interest in communicating with the family	138	8.8	2.1	10.0	2.3	8.3	2.2	9.5	3.0	0.07
Increased impatience/irritability/stress/crying	138	6.9	2.7	7.5	4.3	7.2	2.3	8.0	3.0	0.69
Euphoric reaction to suggested plays	138	7.9	2.5	9.0	4.3	8.0	1.8	8.0	3.0	0.55
Starting habits they did not have before	135	3.2	3.0	1.0	4.8	3.1	2.8	1.0	4.0	0.96
Greater dependence on the parent/guardian	138	6.8	3.4	8.0	5.3	7.0	2.6	7.5	4.0	0.69
Parent/guardian's perception of negative reactions/ emotions and their relationship to the absence from the school setting	137	8.2	2.5	9.0	3.0	7.5	2.4	8.0	4.0	0.06
Experience with plays/activities that stimulate HEARING	44	6.7	3.1	7.0	4.5	7.5	2.1	8.0	2.0	0.52
Experience with plays/activities that stimulate VISION	44	7.8	2.5	9.0	4	7.6	2.2	8.0	4.0	0.62
Experience with plays/activities that stimulate SMELL	44	6.5	3.1	7.0	5.5	6.0	2.2	6.0	4.0	0.48
Experience with plays/activities that stimulate TOUCH	44	6.4	3.4	6.0	6.5	6.4	2.4	7.0	4.0	0.74
Experience with plays/activities that stimulate TASTE	44	6.2	3.3	7.0	6.0	6.8	2.3	6.0	4.0	0.65
Home activities involving the five senses were satisfactory in comparison with those carried out at school	44	6.6	3.2	8.0	5.0	5.9	2.1	6.0	2.0	0.21
Progress in language and speech (sound emissions in the attempt to communicate, first words, small sentences)	44	8.5	2.2	9.0	2.0	7.0	2.8	7.0	5.0	0.11
New learning (learning colors, numbers, parts of the body, gestures)	44	8.1	2.3	9.0	2.0	6.7	2.7	7.0	5.0	0.13
Exploring the imagination (make believe, play house, doctor, doing the groceries, or other situations that imitate real life)	94	7.1	3.2	8.0	5.0	7.2	2.4	8.0	4.5	0.73
Exploring the idea of numbers and quantities (toys with numbers, handling play money, plays and songs that involve numbers/quantities)	94	6.0	3.1	6.0	6.0	6.9	2.2	7.0	2.5	0.26
Progress in language and speech (ability to name objects around them, ask questions, use different verb tenses, and form and understand complex sentences)	94	8.0	2.4	9.0	4.0	8.2	1.9	9.0	3.0	0.99
Progress in the ability to tell stories	94	7.0	3.3	8.0	5.5	7.8	2.1	8.0	4.0	0.56
Ability to stimulate children at home	138	6.2	2.2	6.0	3.0	6.5	2.4	7.0	3.0	0.45
Negative influence of the absence from the school setting on the progress of the previously cited aspects	138	7.8	2.7	8.5	4.3	6.8	2.7	7.0	4.0	**0.0404**
Negative effects of the changes triggered by the pandemic	136	8.2	2.4	9.5	3.3	7.2	2.4	8.0	4.0	**0.0134**
Positive effects of the changes triggered by the pandemic	137	4.7	3.3	5.0	6.5	4.8	2.5	5.0	4.0	0.76

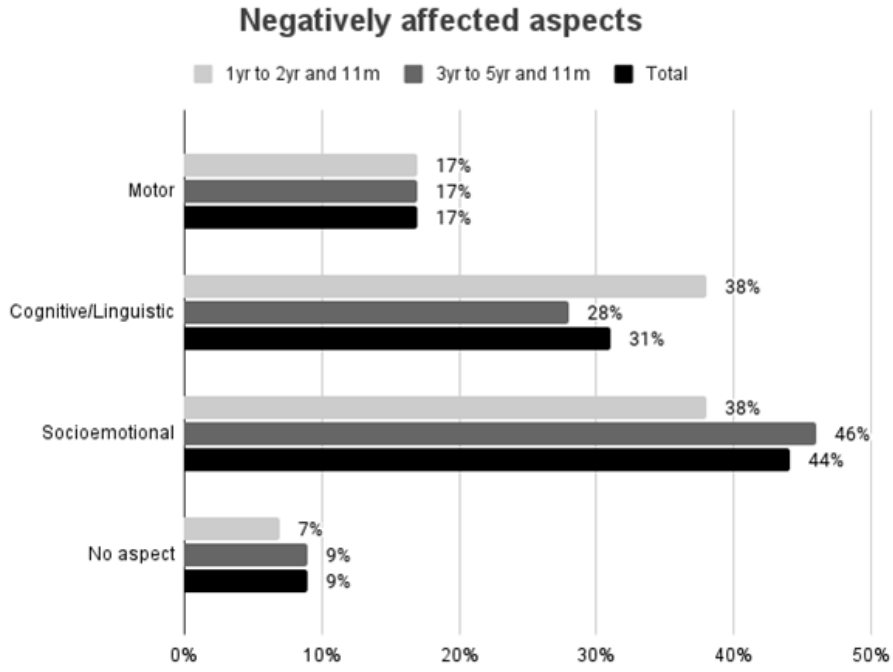
(*) Mann-Whitney test. SD = standard deviation. IQR = interquartile range; N = number of respondents

The general results regarding the most positively or negatively affected aspects of child development in 2020, during the pandemic, stratified per age group, are respectively shown in Figures 1 and 2.



Caption: yr = year; m = month

Figure 1. Child development aspects positively affected by the pandemic in 2020



Caption: yr = year; m = month

Figure 2. Child development aspects negatively affected by the pandemic in 2020

There were differences between the age groups concerning the perception of socioemotional impairments – the number of parents/guardians of older children who perceived negative effects on this aspect was significantly higher than that of smaller children (chi-square: p = 0.0011). Moreover, the parents/guardians of smaller children felt a less positive effect on cognitive-linguistic development than those of older children (chi-square: p = 0.0137).

DISCUSSION

Concerning the respondents' demographic data, their mean age was 36.25 years. This finding is coherent with information from the State Data Analysis System of São Paulo (SEADE, in Portuguese)[12], which indicates ages above 30 years for 43% of the parental population.

As for educational attainment, most participants had a Bachelor's degree, which does not agree with the Brazilian reality – according to the Continuous National Household Sample Survey (Continuous PNAD, in Portuguese)[13], concerning Educational Attainment and Years at School, only 17% of the population 25 years or older belong to this group. Almost half of the people in this age range had only finished middle school or had an equivalent diploma. As for the state of São Paulo, most of the population had finished high school or had an equivalent diploma (relatively better than the overall Brazilian index), while those with a Bachelor's degree were the least frequent (22.8%).

The investigation of the family context showed that 80.6% of the respondents had three or four people living in their homes, nearing the national mean of 3.3 inhabitants per household[14]. According to the literature, people who reported family stress situations during the pandemic lived with more people in the same home. Moreover, regarding the environment, the great inequality in the country raises issues regarding the quality of the houses; hence, the comfort and structure of these places may indicate differences, especially during social isolation[15].

Most respondents in this study reported households with enough physical space for moving around, which is positive from the standpoint of child development, as they can explore the motor aspect. Furthermore, people who live in comfortably sized homes are known to report greater well-being and better relationships during confinement[15].

Also, a significant number of respondents (79.8%) started working from home. According to PNAD COVID-19[16], 8.7 million people were working remotely in 2020, corroborating other studies[17].

The sudden change to this format during the pandemic had effects on the relationship between work and family life. Despite the difficulties to harmonize work demands with care for children, there have been reports on rapport built with the small children and more quality time with the family for physical and leisure activities, for instance[18].

According to the results, all children were exposed to screens. Moreover, the screen time of both age groups increased (89.1%), and most children had 4 or more hours of screen use. According to the Brazilian Society of Pediatrics[19], children under 2 years old should not be exposed to screens, and those aged 2 to 5 years should use screens for a maximum of 1 hour per day. In this critical phase (early childhood), brain development is dynamic and complex, and the attractive content on the screen makes children increasingly lose contact with the real world around them. Hence, online activities must be supervised and regulated, counting on the parents' participation[19].

Based on the literature, exaggerated screen use can negatively impact neurolinguistic and psychosocial development, possibly causing delays in speech and language development, insomnia, obesity, and technostress, which potentialize loss of empathy, increased irritability, aggressiveness, anxiety, and depression, changing behaviors and social relationships[19-22].

Thus, child behavior is affected because they miss opportunities to practice and mature sensory circuits – such as the tactile (with touches that communicate pleasure and comfort), visual (seeing the mother and family around them), and auditory and olfactive (which model brain architecture and cannot be replaced with the passive distraction of screens)[19,23].

Regarding the school environment, most children up to 3 years old attended public schools, while the older ones attended private ones. Regardless of the type of school, families cannot be expected to have the necessary means and resources to carry on formal education at home, as they would simultaneously play the roles of parents, teachers, and facilitators, having to balance complex parental and educational skills. Particularly in the case of public schools and poorer communities, this is even more unfeasible because of personal barriers (lack of training, support, technical know-how, and limited skills to use digital technologies) and material barriers (lack of access to devices)[24,25].

Most children in the study did not change to another school. However, the changes were statistically more frequent in the group of older children. It can be suggested that the main reasons include dissatisfaction with the dynamics of online classes and the need for balancing the finances due to the economic crisis triggered by the pandemic[26].

Online school activities were strikingly present (77%), which is alarming data. Remote learning is not indicated in early childhood. According to the National Education Council[27], the education of children up to 5 years and 11 months is essentially interactional. The National Early Childhood Network[28] and the National Association of Postgraduation and Research on Education[29] took a stand against remote preschool, reaffirming the specificity of pedagogical practices with small children.

Concerning the effects of depriving children of the school's physical environment on child development, almost half of the families felt incapable of stimulating children at home. The literature highlights that most parents, guardians, and caregivers are not adequately prepared to educate/stimulate children at home, as it requires specific didactics, knowledge, and skills[24]. Moreover, such feelings of unpreparedness and confusion were likewise present in teachers and students[30].

In the perception of respondents, the negative effects of the pandemic outweighed the positive ones, regardless of the age group – which was also perceived in other studies and documents[4,7,31,32]. In the present study, educational attainment influenced the intensity of the perception, as individuals with a Bachelor's degree felt the effects of the pandemic on the children less negatively. Hence, supposing satisfactory parental cognitive skills, it can be inferred that their years of study not only enhanced the information baggage on child development but also potentialized the use of such information, helping broaden their behavioral repertoire, leading to better results in the development of their children[33].

The socioemotional aspect of child development was the most perceived as negatively affected by the pandemic. Furthermore, this perception was more intense in the group of children older than 3 years. Stressful factors such as social distancing, school closures, economic recession, domestic violence, and uncertainty over the course of the pandemic negatively influenced the mental health of children, even resulting in an increased prevalence of psychosomatic disorders[31]. Long-term effects of social distancing can cause more significant suffering. In a study conducted by Saurabh et al.[34], quarantined children had significantly more psychic suffering than non-quarantined ones ($p < 0.001$). Approximately 68% of the quarantined participants had some type of psychological problem; the most experienced feelings were worry, helplessness, and fear.

Socioemotional impairments can impact the possible return to in-person classes after the period of social distancing. Hence, there must be a support network based on socioemotional support to minimize the psychological effects of the COVID-19 pandemic on children. Even though the disease clinically affected the general population, the consequences of the pandemic are closely related to social multifactorial determinants of the health-disease process[31].

The cognitive-linguistic aspect of child development was the second most negatively affected by the pandemic. According to Yogman et al.[35], genetic development programming is strongly influenced by the environment. In a restricted social environment – where fun and leisure activities are only possible at home, where people wear masks, and learning facial expressions, communication, and language is restricted, and where signs of affection are discouraged by many – the formation of certain areas of the brain tend to be limited, consequently impairing the acquisition of cognitive, behavioral, social, and communication skills.

In comparison with the motor and socioemotional aspects, the cognitive-linguistic one was more perceived as positively affected by the pandemic. It can be suggested that parents with high educational attainment (which were the majority in this study) expose children earlier to the highly technological adult world to use interactive media as a learning resource[21] – which can positively contribute to their cognitive and linguistic development when moderately used[36]. On the other hand, the number of respondents who did not find positive effects of the pandemic was strikingly greater than that of subjects who perceived negative effects. These data point to the current need for a support network to minimize the psychological and cognitive-linguistic effects of the COVID-19 pandemic on children.

Regarding the limitations of the study, the population in question – which was a convenience sample – was only part of the parents/guardians of preschoolers in the state of São Paulo. Therefore, collected data cannot be generalized to the state or

country population. Moreover, the respondents' high educational attainment does not represent the reality of the population of São Paulo and Brazil. Although the online questionnaire reached more people in different geographical locations at a low cost, it may have prevented the participation of individuals of other social spheres – e.g., illiterate people and/or those who do not know how to use such new technologies. An option would be to randomly select households and interview them via phone calls.

The data in this study are relevant because they initially address a current topic that will reveal consequences in the long run. Learning the experience at the home of children who in their window of opportunities were deprived of the school environment and its experiences grounds future research in the field of health, education, and more specifically, speech-language-hearing sciences.

The effects of the pandemic on the life of preschoolers must be further investigated to assess and understand the acquisition and improvement of specific skills in each area of child development, as well as later effects on the academic and personal life of future students and young people. Furthermore, this study reinforces the importance of investigating the impacts of the exaggerated increase in screen use both on social interaction and oral and written language development.

CONCLUSION

Concerning the characterization of the sample, the mean age of the children's parents/guardians was 36 years, with a Bachelor's degree, and working from home. Three to four people on average lived in the households, which had enough physical space for moving around. All children had been exposed to screens, more than half of them for more than 4 hours a day. Most children had online school activities, and older children significantly changed schools during this period.

The negative effects of the pandemic outweighed the positive ones in the perception of the parents/guardians. Most respondents reported that the socio-emotional aspect was the most impaired one, followed by the cognitive-linguistic aspect. In comparison with the motor and socioemotional aspects, the cognitive-linguistic one was the most perceived as positive, during the pandemic.

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