

Article

What Do Preschool Teachers and Parents Think about the Influence of Screen-Time Exposure on Children's Development? Challenges and Opportunities

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Abstract: Children's exposure to screens has been increasing in recent years and so has the concern about its impact on children's development. This study aims to analyze preschool teachers' and parents' views on the influence of screen-time exposure on children's development. Semi-structured interviews with preschool teachers ($n = 9$), as well as data from a previous quantitative study, based on an online questionnaire applied to parents of children in preschool ($n = 266$) were used for data collection. For this study, eminently of qualitative nature, the following dimensions were analyzed: children's habits of exposure to screens at home, changes in children's play habits at school, strategies/methodologies used by preschool teachers, use of technologies at school and children's language development. The results from the study with parents show that screen-time exposure of children is between 1 h to 2 h of television per day, mostly to watch cartoons. Parents also report that most of the children use vocabulary in other languages at home. Most preschool teachers agreed that children are changing their play habits and mainly their behaviors and attitudes, influenced by screen-time exposure. They believe that language development is also changing, mentioning more language problems in children. Changes in pedagogic strategies and specialized training on educational technology are needed to get closer to children's interests.

Keywords: early education; child development; language development; screen-time



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1. Introduction

In the last few decades, technology use has been rising all over the world, extending to young children. The impact of screen-time on child development is being extensively studied. Some studies reveal a positive impact of technologies on readiness and cognitive development [1,2] and better visual short-term memory [3]. But most of the evidence points to a negative impact on several components of child development, namely cognitive and language delays [4–6], difficulties in attention and self-regulation [3], and physical, nutritional, and behavioral problems [7]. However, these effects are dependent on the age of the child, the extension of the exposure, the content visualized, and the interaction between child and caregiver during the exposure [3,8,9].

From 2011 to 2013, in the United States, children's access to mobile devices has doubled and the exposure time to screens has tripled [10]. Currently, 40% of children under 2 years old have already used mobile media and, on average, children under 8, use about 2.30 h of screen media a day [11]. Studies carried out in Portugal [12–15] revealed that exposure to screens begins early (between 0–3 years) and increases as the children grow, with more than 1.30 of screens exposure per day. This exceeds the American Academy of Pediatrics (AAP) and World's Health Organization (WHO) recommendations about screen time, which

discourage the use of media by children younger than 18 to 24 months, limit the use to 1 h per day and encourage co-viewing [16,17].

Exposure to screens is also changing the way children interact with the world, learn, and play [18,19] which is consequently, bringing some challenges to early childhood educational contexts. Despite some concerns about the negative effects of screens, many teachers recognize the potential of information and communication technologies (ICT) on preschool classes for early learning and development [20,21], but in fact, they are not being actively used [20]. A study developed in China [21] revealed that teachers do not use ICT as a pedagogical transformative power but as a supplementary tool to support their traditional materials and methods. Evidence from Greece [22] reveals that preschool teachers' beliefs about integrating ICT in the classroom depend on their years of teaching experience, years of computer experience, and computer self-efficacy, being more positive when teachers have fewer years of teaching experience and more years of computer years and higher computer self-efficacy.

This paper presents a study that is part of a broader research project aimed to analyze the impact of screen-time on the development of the expressive language of children aged from three years to six years and eleven months old, based on the correlation between these two variables (screen-time and expressive language). We collected data about children's patterns of exposure to screens and language development and complemented with the analysis of the perspectives of preschool teachers, who play an important role in the child's development and learning process. The aim of this study is to analyze preschool teachers' perceptions about children's screen-time and its relationship with play patterns and language development, reflecting on which strategies should be implemented when working with young children.

2. Participants and Methods

2.1. Participants

Recognizing the advantages of the complementarity between the quantitative and qualitative research paradigms [23], semi-structured interviews were carried out with a group of preschool teachers to understand their perceptions about children's exposure to screens and the implications for child's development and learning. This is an exploratory study that does not allow a generalization of the results. Participants were preschool teachers from the kindergartens where the quantitative study was developed, who were willing to participate. The study included preschool teachers, from different classrooms of four different kindergartens schools, from cities located in the North region of Portugal, working for at least 7 years. The interviews were conducted face-to-face, with the interviewee and the researcher. All interviews were audio-recorded, after previous authorization and informed consent by the participants. Before the interview, all the participants agreed to participate in the study, signing an informed consent according to the World Medical Association Helsinki Declaration [24], containing the description and purpose of the study; an explanation that the data collected will be used for research purposes only; an assurance that participation was voluntary and that the individual could withdraw from the study at any time without prejudice to them; a statement that privacy and confidentiality of all data collected would be protected. Age, gender, academic qualification, number of years working as a preschool teacher, professional experience and background, and previous participation in training on educational technology were collected. At the end of the interview, participants were pseudonymized to prevent identification during data analysis.

Quantitative data about children were obtained by parents from selected kindergarten schools in northern Portugal and personal contacts of the research team. To participate, parents had to be aged at least 18 years old, caring for preschool-aged children (from 3 years to 6 years and 11 months), and give consent to participate in the study through an online informed consent form. For the purpose of the present study, only data from the sections relative to the screen-time exposure habits at home and language development sections of the questionnaire were used.

2.2. Instruments

The survey for the quantitative analysis included questions about sociodemographic data of parents and children; children's exposure to screens: digital devices used at home, exposure time (hours per day) to digital devices on weekdays and weekends, having a TV in the bedroom or having his own smartphone or tablet, programs or applications used and in which circumstances parents leave children using digital devices; and children language development: using vocabulary in a second language, which second languages are being used and circumstances of contact with these languages. Data collection started in June of 2020 and ended in April of 2021.

For the qualitative study, an interview guide was elaborated including the following main categories/themes: information about the participant; changes in children's play habits/patterns; teaching strategies/methodologies used; use of technology in school; children's language development; and additional information. Subsequently, after the first two interviews, one new question was added, related to the need for specific training and professional development activities. Questions for each category are presented in Table 1.

Table 1. Interview guide with questions by category/theme.

Categories/Themes	Questions
Information about the interviewed	-How many years have you been working as a preschool teacher?
Changes in children's play habits/patterns	-Comparing the children of today with those of 10 years ago, or when you started working, do you feel that there has been a change in the children's playing habits? Which ones? Is there an episode that you can tell that reveals this trend?
Teaching strategies/methodologies used	-Over the last decade, did you feel the need to change your work strategies to increase children's motivation? What had to be modified? -Do you feel that children get more motivated when using technology? Do you have any examples you can tell?
Technologies in schools	-Does the institution/school where you work have a computer? And internet access? And other technological devices? Which ones? -How often do you use these devices in the classroom? How do children react to these devices?
Need of specialized training	-Do you feel that you had to make adjustments in your professional attitude or acquire more training (formal or informal) to face the new challenges posed by technology? -Do you feel that, over the last decade, children reveal more language disorders? How would you describe these changes?
Children's language development	-What about the vocabulary used? And sentence formation? Articulation? Socialization and interaction with peers and adults? -Do you feel that some of these difficulties may be associated with screen-time? In what way? -Do children tend to use words in other languages? Which ones? Where do you believe they get in touch with these languages? Do you have any story you would like to share that reveals this trend?
Additional information	-Do you have any outstanding moments that you would like to share concerning your own experience within this theme?

2.3. Data Analysis

Descriptive statistics (absolute and relative frequencies) were computed for relevant variables. After conducting the interviews, the researcher transcribed to a word processor and then used the software WebQDA (Qualitative Data Analysis) to support the data content analysis, identifying the categories and subcategories, encoding the registration units [25]. Main categories for the content analysis were defined according to the themes that supported the interview guide.

3. Results

3.1. Sociodemographic Analysis

A total of 266 parents, 241 mothers (90.6%) and 25 fathers (9.4%), of 133 boys and 133 girls, aged between 37 and 76 months (Mean (SD) = 58.44 (9.90)) responded to the questionnaire. Respondents were aged 24 to 61 years (Mean (SD) 37.18 (4.86)) and the majority had the standard Portuguese educational level, third cycle, the equivalent of 10–12 years (40.2%; $n = 107$). For about 29.3% ($n = 78$) had a bachelor's degree, and 11.7% ($n = 31$) had a masters' degree or similar. Most of the parents (82.3%; $n = 219$) had a full-time job, 8.3% ($n = 22$) were working part-time, and 5.6% ($n = 15$) were unemployed. Regarding family income, it was mostly above one minimum wage per adult (42.5%; $n = 113$), and only 3.8% were living with less than one minimum wage per adult ($n = 10$).

A total of nine preschool teachers were interviewed, all women, aged between 30 to 56 years (Mean (SD) = 46.33 (8.53)). Most (66.7%) have higher education and 33.3% have a master's degree. The number of years working as a preschool teacher varied from 8 to 33 years (Mean (SD) = 24.56 (8.85)) most of them on public education services, for most of the time. About half (55.6%) of the preschool teachers have had training on new technologies (Table 2).

Table 2. Demographics.

	Age	Gender	Academic Qualification	Years as Preschool Teacher	Professional Experience	Training on New Technologies
Ed01	35	Female	Higher Education	14	Private Education	No
Ed02	52	Female	Higher Education	33	2 y Private Education + 31 y Public Education	Yes
Ed03	30	Female	Master's degree	8	Private Education	No
Ed04	56	Female	Higher Education	33	Public Education	Yes
Ed05	49	Female	Higher Education	26	8 y Private Education + 18 y Public Education	Yes
Ed06	46	Female	Higher Education	21	20 y Private Education + 1 y Public Education	No
Ed07	46	Female	Higher Education	24	13 y Private Education + 11 y Public Education	Yes
Ed08	52	Female	Master's degree	31	9 y Private Education + 2 y Childcare Center + 20 y Public Education	Yes
Ed09	51	Female	Master's degree	31	6 y Private Education + 12 y as Coordinator + 13 y Public Education	No

3.2. Descriptive Statistics

The results about children's patterns of exposure to screens are summarized in Table 3. Parents reported that the most used devices are television ($n = 253$; 95.11%), smartphones ($n = 176$; 66.17%), and tablets ($n = 162$; 66.17%). Most of the children spends between 1 to 2 h per day watching the TV (45.49%) on weekdays and more than 2 h on weekends (62.03%). For most children, smartphones and tablets are used less than 1 h per day, both on weekdays and weekends. Most of the children do not have a TV in the bedroom ($n = 159$; 59.77%), neither do they own a smartphone or tablet ($n = 183$; 68.80%). Almost all

($n = 254$; 94.49%) use digital devices to watch cartoons. Music videos ($n = 151$; 56.77%) and educational games ($n = 140$; 52.63%) are also used by most of the children, at home. Most of the parents reported allowing children to use digital devices while they are busy, doing chores at home, or away from home.

Table 3. Descriptive statistics about children's patterns of exposure to screens.

Devices Used at Home						
	Television	Computer	Videogames	Smartphone	Tablet	Internet
	253 (95.11%)	52 (19.55%)	51 (19.17%)	176 (66.17%)	162 (60.90%)	174 (65.41%)
Exposure time (hours per day) on weekdays						
	Television	Computer	Videogames	Smartphone	Tablet	Internet
<1 h	71 (26.69%)	258 (96.99%)	254 (95.49%)	171 (64.29%)	198 (74.44%)	193 (72.56%)
(1–2 h]	121 (45.49%)	5 (1.88%)	8 (3.01%)	61 (22.93%)	47 (17.67%)	44 (16.54%)
(2–3 h)	43 (16.17%)	1 (0.38%)	2 (0.75%)	24 (9.02%)	14 (5.26%)	21 (7.89%)
>3 h	31 (11.65%)	2 (0.75%)	2 (0.75%)	10 (3.76%)	7 (2.63%)	8 (3.01%)
Exposure time (hours per day) at weekends						
	Television	Computer	Videogames	Smartphone	Tablet	Internet
<1 h	23 (8.65%)	252 (94.74%)	233 (87.59%)	132 (49.62%)	163 (61.28%)	163 (61.28%)
(1–2 h)	78 (29.32%)	12 (4.51%)	20 (7.52%)	56 (21.05%)	58 (21.80%)	44 (16.54%)
(2–3 h)	77 (28.95%)	2 (0.75%)	8 (3.01%)	41 (15.41%)	30 (11.28%)	27 (10.15%)
>3 h	88 (33.08%)	0 (0%)	5 (1.88%)	37 (13.91%)	15 (5.64%)	32 (12.03%)
TV in bedroom			Yes 107 (40.23%)	No 159 (59.77%)		
Own smartphone or tablet			83 (31.20%)	183 (68.80%)		
Programs or apps used						
	Cartoon	Music videos	Other videos (tutorials, YouTubers)	Entertainment games	Educative games	Other
	254 (95.49%)	151 (56.77%)	99 (37.22%)	96 (36.09%)	140 (52.63%)	3 (1.13%)
Circumstances of use						
	Whenever he/she asks	While parents are busy	Feed him/her	Put him/her to sleep	Keep him/her calm	None of the situations
	29 (10.90%)	159 (59.77%)	42 (15.79%)	14 (5.26%)	27 (10.15%)	65 (24.44%)

Most of the parents revealed that their children use vocabulary in other languages than European Portuguese at home ($n = 162$; 60.90%). English ($n = 111$; 41.73%) and Brazilian Portuguese ($n = 110$; 41.35%) are the most used languages. Main sources for the contact with these languages includes TV or videos ($n = 120$; 45.11%) and YouTubers ($n = 56$; 21.05%) (see Table 4).

Table 4. Descriptive statistics about children language development.

Using Vocabulary in Another Language				
		Yes	No	
		162	104	
		(60.90%)	(39.10%)	
Second languages used				
Brazilian Portuguese	English	French	Spanish	Other
110	111	8	12	0
(41.35%)	(41.73%)	(3.01%)	(4.51%)	(0%)
Circumstances of contact with other languages				
Family	TV or videos	Youtubers	School	Other
59	120	56	34	7
(22.18%)	(45.11%)	(21.05%)	(12.78%)	(2.63%)

3.3. Content Analysis

In this section, the results from the interviews are presented according to the six main categories based on the topics included in the interview guide: Changes in children's play habits/patterns; Changes in children's attitudes and behaviors; Pedagogic strategies/methodologies used by educators; Use of technologies in the school context; Specific training in educational technology; Children's learning and language development; and Additional information. Throughout the analysis, a new category, related to changes in children's play patterns emerged, denominated changes in children's behaviors, as all teachers mentioned changes in children's attitudes along the years. Several subcategories emerged from data analysis and are presented in each of the categories.

3.3.1. Changes in Children's Play Habits/Patterns

Most of the preschool teachers (seven out of nine teachers) believe there were changes in the way children play nowadays when compared with children 10 years ago. They refer that in the past, playing activities were more creative and diversified, and based on symbolic or pretend play, reflecting their experiences at home.

"When I started working, children played more in pretend play, in the doll's house, building things, they were more creative and loved to play, playing the role of mother and father..." (Ed05)

"They used to play more symbolic games, in the playhouse, taking into account the experiences they saw at home and with friends..." (Ed08)

Preschool teachers emphasize that nowadays children frequently bounce from activity to activity, showing greater difficulties in exploring the materials and toys, and their ways of playing are less creative and more aggressive. They believe that their play patterns are influenced by the use of new technologies.

"I noticed from year to year, literally, I noticed more difficulties knowing how to play! (...) picks up and drops the toy without that ability to explore and understand what to do with it or not..." (Ed03)

"... playing, by itself, involves a certain violence, in quotes, that they see in movies, that they see on television or on the computer..." (Ed04)

"They are very aggressive when playing. (...) Influenced by the cartoons that they watch at home, movies that they have an increasing habit of clinging to the tablet, watching these movies ... " (Ed05)

However, one participant reported that she felt no existing changes in the playing patterns along the years, referred that, children still have the same interests, however differently.

"In terms of playing, I think that the interests are still the same, they play in the same areas... (...) they continue to look for the same, perhaps in a different way, I think." (Ed06)

3.3.2. Changes in Children's Attitudes and Behaviors

When asked about changes in children's playing habits, all participants mentioned changes in children's attitudes and behaviors. About seven of the interviewed teachers reported that nowadays, children show less motivation and interest for the activities or objects. Their attention ability is weaker, and they are more agitated, bouncing from one activity to another.

"It's hard to keep children's attention these days." (Ed01)

"Their interest in things is a very fortuitous, very fleeting interest..." (Ed02)

"Today they explore a bit and get tired quickly, they have to change activities and playing areas constantly because they can't..." (Ed06)

"I think kids don't really have that, that interest and it's harder to get their attention. . . ." (Ed07)

Some participants mentioned that it seems notorious that children face self-regulation difficulties and frustration more frequently, as interaction issues and motor skills delay. But despite this, some teachers recognize that currently, children have a higher level of knowledge on some specific content.

"The threshold of tolerance, frustration, is very low so they easily get frustrated, get upset" (Ed01)

"I start to notice children at an early age, with unusual areas of interest for their age, eg science, dinosaurs, speaking in other languages. . . ." (Ed01)

"A big lack of self-regulation is also another thing we see a lot" (Ed02)

"They are much more insightful today, earlier." (Ed06)

3.3.3. Pedagogic Strategies/Methodologies Used by Educators

When asked about the need to change their own pedagogic strategies in the classroom, all the preschool teachers (100%) answered favorably, however, the strategies and methodologies adopted varied from teacher to teacher. The use of new technologies in the classroom appeared to be the most common strategy adopted by most of them.

" . . . the use of technologies too . . . I started to introduce PowerPoint stories, I have the computer in the classroom. . . ." (Ed01)

"So I use a lot the CD players or the pen drive because it is one of the things that still attracts them a lot, everything that is for listening" (Ed03)

"The use of the computer, the use of the projector . . . because it is something that fascinates them" (Ed09)

Using different games and materials, and the analogy to games and competitions to make activities more attractive are strategies also used, as well as meditation processes, to calm children down and improve concentration.

3.3.4. Use of Technologies in the School Context

Relatively to the children's motivation when using new technologies at school, teachers' opinions differ, with some (66.67%) of them agreeing that children get more motivated and focused when new technologies are used, and others disagreeing. Those who do not agree, mention that it depends on the technology and on the content that is presented to children.

"It is much harder to keep them calm if the television is not turned on" (Ed03)

"New technologies are much more exciting for them!" (Ed06)

"I don't think it is a direct relationship, technologies means more attention... or more... not!" (Ed01)

When asked about the available devices in their classrooms or institutions, six teachers, all of them from public education services, mentioned having a computer. The other three referred that, when needed, they use their personal computers in the classroom. Computers are used mainly to visualize stories, do some search tasks, listen to music, and watch videos. All the teachers (100%) answered to have internet access in their schools, despite it being limited and weak most of the time. Other digital resources available at schools are music players (6/9), projector and video or DVD players, and interactive whiteboards (on public schools).

The frequency of the use of digital devices in the classroom depends on the preschool teacher and on the children's needs. Some of the teachers use the computer now and then, only for research work or to present stories and others use it almost every day to play videos and music. The music player is used almost daily by half of the educators. Two of the educators reported having access to the interactive whiteboard monthly when visiting the library.

"When we are doing search tasks, we almost use the computer on a daily basis. . ." (Ed01)

"What I really use the most is the music recorder... I really use it a lot, I think I can even say daily" (Ed02)

"Not the computer! Just occasionally, for searches, for a story." (Ed03)

"The computer and the projector are used daily. . ." (Ed09)

3.3.5. Specific Training in Educational Technology

As mentioned before, two of the interviewed preschool teachers did not provide an answer for this topic, but all the remaining teachers mentioned that they felt it was important and necessary to acquire more training to keep up with the technological evolution and implement its use in their pedagogical practices, despite not having already undergone specialized training. Some mention that it is important for their practice with the children in the classroom but others state that it is important for them to be able to comply with the bureaucracies that are expected from them. One of the teachers highlighted that during and after the COVID-19 lockdown period, due to the need to use digital devices to communicate and share activities with children, the demand for specific training on new technologies was emphasized.

"...the computer, the interactive whiteboard... especially these, in an informatic's level, and then, certain programs that also help us to do work with the children, right?" (Ed04)

"We were forced to update ourselves about software . . . for example, Excel was needed to interpret and register the assessments and statistics, that's it, more on the bureaucratic part. . ." (Ed05)

(about the pandemic period) "...the need for learning has increased because the need of using this kind of methods has increased." (Ed08)

3.3.6. Children's Learning and Language Development

When asked if they feel that over the last years children show more language problems, all (100%) of the preschool teachers answered yes, but when asked about the difficulties themselves, opinions differ from teacher to teacher. Articulation and speech problems are reported by most of the teachers (88.89%). Delay in language acquisition, poorer vocabulary, and difficulties in creating sentences are referred by two to four of the interviewed teachers, respectively. Three of the interviewed teachers answered that children show more difficulties in interaction and socialization.

"Playing is poor and socialization is compromised" (Ed01)

"The biggest difficulty at this moment, I think, is about articulation and fluency" (Ed02)

"More childlike... They use a language with more childlike terms and deficits in sentence construction." (Ed05)

“I feel that there are more and more children with language problems. . .” (Ed09)

On the other hand, six reported that, nowadays, some children appear to have a more developed and rich vocabulary in certain themes.

“I think that the vocabulary for some kids has increased.” (Ed01)

“There are children able to show a language development superior to their age level.” (Ed06)

All the preschool teachers responded that, nowadays, children tend to use words in other languages, being Brazilian, English, and Spanish the most common ones. They are all in agreement that this and other reported language difficulties are related and influenced by the time children spend using screens, adding that it is notorious that children use vocabulary and expressions, removed to the content they have access to on television, games, and applications on tablets and mobile phones. Little coexistence and lack of time of the parents are also pointed out as possible causes for the language difficulties presented by children.

“Through YouTubers, games... it’s like that, above all on YouTube, YouTube videos, on smartphone games, and, at school, they talk a lot on mobile phones.” (Ed01)

“I don’t know if I’m being fair or unfair, but I can see more negative than positive aspects in the use of technologies. . .” (Ed02)

“Many Brazilian videos distort children’s language. . .” (Ed08)

“I think parents don’t spend much time playing with them. . .” (Ed09)

3.3.7. Additional Information

In general, most of the preschool teachers see benefits in the use of new technologies with children, mainly, as a source of knowledge, although they consider that it should be moderated and supervised. The major problem, nowadays, is the lack of time parents spend with children which leads them to resort to technology to calm them down, feed and entertain them. They recognize that the correct use of technologies can improve children’s learning and development, but it is important for parents to be aware that technology, when wrongly used, can cause fear and anxiety experiences to children. One of the preschool teachers states that parents are more alert nowadays and that the use of technological toys may be going through a recessive phase. Some teachers pointed out that children show a natural trend to learn and use technologies, using them more easily than adults. Others criticize the lack of accessibility and inconsistencies that are observed in schools regarding new technologies, as having internet, but not a computer to use it, or vice-versa.

4. Discussion

In the last years, children have been increasingly exposed to screens and many studies have been developed to understand its impact on children’s development. We started with a quantitative study to understand children’s patterns of exposure to screens and their language development, nowadays, but we also found it important to complement this view with preschool teachers’ perceptions about children’s screen-time and its relationship with play patterns and language development. Based on evidence that there is a relationship between screen-time and speech and language delays [5,6] we hypothesized that preschool teachers would report changes in children’s play patterns and language skills over the years.

In regard to exposure to screens, our results are in line with previous studies in Portugal [12,14] which reported that children between 3 and 6 years of age were exposed to screens more than 1 h per day, with the TV being the most predominantly used device, followed by portable devices, like smartphones and tablets. Compared to these studies, the number of children with a TV in their bedroom or with their own smartphone or tablet, has apparently, increased. This is a significant finding since there is evidence that children who spend more time using screens are more likely to display poor emotion regulation,

inability to finish tasks, lower curiosity, worse inattention problems, and more aggressive behaviors [26–29]. Our interviewees reported changes not only on children's patterns of playing but, above all, on children's attitudes and behaviors, describing playing as less creative and more violent, and reporting children as being more agitated, showing difficulties on concentrating and less interest on the activities. Similarly, in a study carried out in Greece, preschool teachers and parents asserted that children prefer playing individually, are more aggressive, competitive, and unable to concentrate [19]. Screen time is pointed to be the main influencer of these changes toward a passive, sedentary, indoor, solitary and less imaginative play, with the increase of the use of technology [30].

All the interviewed preschool teachers consider that currently, children have greater language difficulties, both in acquisition (e.g., later onset) and development (e.g., delays in sentence construction and speech problems). They also reported that the number of children with speech therapy intervention is increasing year after year. The perception of developmentally related problems is not affected by the length of the teacher's experience [31]. Once again, preschool teachers point out the use of technologies as the main influencer of these changes, which may be justified by several recent findings that link excessive screen-time with expressive speech delays and lower language skills in young children [6,32,33]. Not only the time of exposure might influence the language development [3,8,9] but also the content of the programs or applications used.

The preschool teachers reported that the other significant consequence of the exposure to videos and online games is the use of words and expressions in foreign languages, like Brazilian, English, or Spanish. This goes in line with the data collected in the parents' survey, which reported that most of the children tend to use vocabulary in other languages, mainly English and Brazilian Portuguese, influenced by TV programs or videos, which should be further examined in future research.

Despite the reported disadvantages, many preschool teachers reported some benefits of the children's exposure to screens, namely the ease of access to information, which promotes knowledge on specific contents and enhances learning, which has also been reported in a previous study [34]. Some argue that new technologies might be useful for children's development, but it depends on the content presented and on parent-child or teacher-child interaction, as demonstrated by previous studies [8,35,36].

All the preschool teachers are feeling the need to adjust their digital strategies in the classroom to motivate children for learning, although the strategies adopted vary from teacher to teacher. Using ICT as a resource is mentioned as one of the strategies adopted by some teachers, as a resource to support their own teaching practices [21]. According to some studies [36,37], the use of computers in kindergartens seems to promote language and social skills development, but this is dependent on the assistance of the teachers and the proficiency level of the children in their use.

As it was reported by one of the interviewees, children appear to be naturally competent technology users who can easily and independently learn how to use technological devices [34], which, in turn, challenges teachers to deepen their knowledge and seek for training, in order to develop their teaching skills. However, although they recognize the need for specialized training on ICT to implement it in classrooms, most had not had it. Teachers with higher ICT professional development tend to integrate ICT in the classroom more frequently [20,22]. Furthermore, preschool teachers, report some barriers to the integration of digital technologies in the classrooms, as lack of equipment and class conditions, similar to what was reported in Greece [38].

Limitations of this study include the size and sample recruitment process. The study should be extended to more children and preschool teachers from other geographical areas of the country. The data is based on self-reported data (both quantitative and qualitative) which can be affected by recall bias. Furthermore, the interviewed preschool teachers had already had previous contact with the interviewer and knew the theme of the study, which may have some influence on their answers. However, this study has its strengths, insofar as there seems to exist an agreement between the perceptions of preschool teachers

about the impact of technologies on children's development on a longitudinal perspective, and parents' reports about their children's screen-time habits. It can lead to considering children's exposure to screens at home and questioning about the use of digital technologies in early childhood education. If so, it is important to provide a deeper analysis of whether schools are sufficiently equipped, and educators properly trained for this new and challenging scenario.

5. Conclusions

Both parents and preschool teachers, are concerned that exposure to screens might be changing children's patterns of playing and development. Despite the benefits it might provide, like promoting children's knowledge and motivating them to learn, the increase of exposure to screens also seems to be negatively influencing children playing patterns, and language development. It is reflected in an increase in the number of children with needs of a speech therapist intervention and the number of children who use vocabulary in other languages, as English and Brazilian Portuguese. This is a recent phenomenon that is raising concerns among parents, preschool teachers, and pediatricians and should be a focus of further research. Preschool teachers consider that it might be important to use digital devices in preschool classrooms but are worried about the lack of specialized training and resources in schools.

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