ORIGINAL ARTICLE

Remote screening of children and speech therapy guidance for caregivers during the pandemic

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ABSTRACT

Child language development arises from the interaction between their biological characteristics and the experiences offered by the environment. Adverse factors in these two major areas can alter their developmental pace, resulting in significant impairments. The aim of this study was to conduct remote screening of children aged 1–4 attended by different Family Health Units in Ribeirão Preto, São Paulo, and to guide caregivers on positive behaviors for language enhancement while waiting for these children to be referred for early intervention. Due to the pandemic scenario, an online screening questionnaire based on the Language Development Protocol was developed, and screening of 285 children was conducted through active participant search. The results showed statistical significance in the items "impacts caused by the pandemic" and "interaction with other children." Children who do not attend school also have a higher prevalence of delay compared to those who do. A delay rate of 18.95% was found in the total sample studied. Parents/caregivers were guided and equipped with the language stimulation guide developed by the executing researcher, and the units were flagged for children with delays. The information in this study highlights the significant challenge in defining public policies that can reduce the discrepancies and gaps caused by this pandemic period.

Keywords: Primary health care, Child development, Risk factors, Speech, Language and hearing sciences, Health promotion.

INTRODUCTION

Language development should be understood from the ecobiodevelopmental model, which extends beyond biology and the environment, towards a broader concept that encompasses epigenetics and neuroscience[1].

Understanding child development as the result of interaction between their biological characteristics and experiences provided by the environment, it's essential to bear in mind that adverse factors in these two major areas can affect the typical developmental pace. The probability of negative interference in this process is commonly referred to as "developmental risk[2]."

Based on the previous premises, it is crucial to emphasize the importance of carefully and cautiously monitoring child development. In this sense, it is considered one of the roles of health and/or education professionals working with children in different stages of their development[3].

In the specific context of speech therapy (with a focus on professional practices), delays in language development and speech disorders are the most common difficulties in childhood. Data from the

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American Speech-Language and Hearing Association suggest that about 10% of children have some type of alteration in these skills[4].

It is known that both neuronal plasticity and learning potential are immense in children in early childhood (0-6 years old), given the increased connectivity and communication between neurons, which is highest in these early years of life[5]. As language is a higher and complex neurological function, early intervention is understood to be the best strategy for a good prognosis for children suspected of language alteration.

A family-centered early intervention service delivery model focused on their strengths, resources, and concerns is a fundamental component of early intervention services in the contemporary world[6]. Additionally, it can be observed in the literature that the cost of assessment and early intervention in child development can be a hundred times lower compared to the cost of treating a child with a late diagnosis[7].

Understanding the delays in development is best achieved by understanding typical child development. Specifically concerning language, a greater understanding of the milestones and linguistic functions to be developed in early childhood is necessary, as well as knowledge of verbal and non-verbal communication forms, and risk factors associated with language impairments, in order to identify early if such children need special attention in the field of communication[8].

In a study conducted in the western region of São Paulo[9], risk factors were identified in children with language acquisition alterations. The results showed that male babies, only children, with a history of speech therapy impairments in the family, as well as those who have gestational complications, prematurity, prolonged oral habits, and long periods of postnatal hospitalization, are those who are at higher risk of impairments.

The Language Development Protocol (LDP) [10] was developed as a screening tool for use in Primary Health Care and includes milestones for oral language and hearing development, in the age group from 0 to 5 years. It is a useful and dynamic tool that facilitates the rapid identification of milestones for each stage, provides practcal tips, and encourages early detection and referral of cases of delays in language acquisition and/or development.

The LDP has been validated as a screening test with high sensitivity and specificity, demonstrating high diagnostic efficiency in determining the risk of language disorders in children aged 0 to 5 years[11].

For language development to be adequate, both direct and indirect actions of intrinsic and extrinsic factors are required. The influences of the environment in which the child is immersed are of great importance for lexical and phonological development. A literature review[12] highlighted the relevance of stimulation within the family environment. It was found that the higher the parents' level of education, the better the stimulation and the greater the degree of language development in children.

Given the risks and consequent delays and language disorders present in our society, we highlight the speech therapist as a fundamental professional to address these demands, both in the individual clinical context and in group activities[13], within the scope of health promotion and injury prevention.

Intersectoriality is understood as one of the main forms of articulation between different sectors, especially when referring to health complexity. It is from this that sectors can - and should - share responsibility for guaranteeing health as a human right and implementing actions for joint interventions. Thus, programs of Permanent Health Education (PHE) are stimulated and enhanced.

Considering the possibilities of

speech therapy work in the collective sphere, attention must be drawn to the impact of the Covid-19 Pandemic on child development[14], especially in language[15], due to the period of fear and intense social isolation through which we went, especially between March 2020 and January 2021. However, studies showing the impact of the pandemic on the development and improvement of children's language who experienced early childhood within the pandemic scenario are still scarce[15].

Given the above, this study aimed to conduct remote screening of children aged 1-4 years attending by different Family Health Units in Ribeirão Preto, São Paulo, and to guide caregivers on positive behaviors for language enhancement while waiting for these children to be referred for early intervention.

METHODS

Design and Ethical Considerations

This study was submitted to the Research Ethics Committee of the Faculty of Medicine of the University of São Paulo (FMUSP) and received approval under protocol number CAEE 15177119.3.0000.0065 (report 3.631.331). The caregivers of children from the catchment areas of the Family Health Units involved in the research provided their consent through an online screening instrument.

Eligibility Criteria

Parents or legal guardians of children in early childhood (aged 1 to 4 years) who agreed to participate in the research and were interested in learning and applying strategies with children identified as at risk for language impairments were included in the study.

Methodological Approach

An e-book titled "Guia para estimulação da fala e linguagem infantil" (Guide for Stimulating Child Speech and Language) was developed and sent to participating families after the online screening. Developed by the researchers, this guide was based on literature sources covering language-enhancing strategies, as well as the clinical experiences of those involved. Practical tips were divided into six parts, including: 1. how to speak to stimulate better; 2. how to respond to stimulate better; 3. how to create speech opportunities; 4. communication and routine; 5. games and activities for better stimulation; and 6. care and extra tips.

For this phase of the study, an active search for target subjects was conducted. The Department of Informatics of the Ribeirão Preto Municipality was requested to provide a list of all children aged 1 to 4 years from the involved units. With the data in hand, contacts were made via a communication app (WhatsApp) with all subjects from the provided list.

Some numbers had changed or were not available. Several subjects did not respond to the initial welcome message. However, with those who did respond, it was possible to complete the entire planned process: greeting and introduction of the researcher conducting the work; gathering of the interest list; sending of the online screening via Google Forms; feedback on the questionnaire and comments on parents' responses; clarification to parents if children were within expected language milestones for their age (when altered, an indication was made of the path to follow within the public or private network); sending of the informative guide and reinforcement of strategies for speech and language stimulation in daily life (regardless of the absence of alteration in the LPD score). It is noteworthy that all units were alerted via email about children flagged as "delayed."

It is emphasized that the sample was constituted by convenience sampling, based on the number of people who responded to the phone contact. The goal was to reach at least 200 children. Since 285 children had agreed to participate during the initial contact attempts, it was determined to include all of these participants.

It is worth noting that the initial messages were typed while the instructions were sent through the audio tool of the app, clearly and personalized. It is also emphasized that the researcher conducting the screening made herself available to clarify doubts. Through videos, activities such as feedback and strategic guidance to assist in the development of the children in question were conducted. In the end, the educational material was provided via PDF.

The main guidelines provided included the following: a. create communicative demand for children through problem situations and leave space for them to communicate; b. provide communication situations in everyday situations (e.g., outings or routine and care moments); c. provide "floor time" with shared play, legitimizing turn-taking and symmetrical interaction; d. recognize the importance of collaborative games and pretend play; e. recognize the importance of activities involving gestural, vocal, and verbal imitation subsequently; f. encourage the use of directive, concise, and affectionate phrases, with little use of terms in diminutive for children under 1-2 years; g. encourage abstract communication and the use of more complex phrases, always repeating mispronounced words as necessary (however, without harshly correcting the child) for children aged 3-4 years; h. highlight the importance of songs, nursery rhymes, physical and affectionate games; i. present the harms of abusive screen use and prolonged oral habits (pacifier, thumb, and bottle); and j. present basic behavioral guidelines, such as the importance of replacing "yes" with "no," directing the child to desired activities without creating friction all the time and thereby promoting pleasant coexistence and affectionate and respectful communication.

Online Questionnaire: "How Your Child Speaks and Listens"

The questionnaire (Table 1) was developed by the researchers based on the Language Development Protocol (LPD) by Molini-Avejonas and Fernandes. It was adapted for the online format due to the pandemic context, as home visits were suspended and elective consultations decreased due to the low frequency of children in the units.

Table 1: Online Questionnaire "How Your Child Speaks and Listens"

Sample Characterization Child's Name and Guardian's Name: Child's Date of Birth: Age: Current Date: Family: (code for identification): Unit: Professional:
Check (X) the things your child does: (1-2 years) - Points to some body parts when asked ( ) - Follows simple commands and understands simple questions ("throw the ball", " kiss the baby", "where is the shoe") ( ) - Pays attention to simple stories, songs, and rhymes ( ) - Points to pictures in a book when they are named ( ) - Says more words each month ( ) - Asks questions with one or two words ("where's daddy?", "finished?", "what's that?") ( ) - Puts two words together ("more candy", "no juice", "ball baby") ( ) - Uses different consonant sounds at the beginning of words ( )
Check (X) the things your child does: (2-3 years) - Understands differences in meaning ("stop-go", "in-out", "big-small", "up-down") ( ) - Follows sequential requests ("pick up the book and put it on the table") ( ) - Has a word (name) for almost everything ( ) - Uses 2-3-word phrases to talk and ask about things ( ) - Speech is understood by family members most of the time ( ) - Often draws attention to objects by naming them ( )
Check (X) the things your child does: (3-4 years) - Comes when you call from another room ( ) - Listens to the television or radio at the same volume as other family members ( ) - Answers simple questions: "what?", "where?", "why?" ( ) - Talks about activities at school or at friends' houses ( ) - Is generally understood by people outside the family ( ) - Uses phrases with four or more words ( ) - Speaks easily, without repeating syllables or words ( ) - Produces the sounds: p, b, t, k, g, f, v, s, z, ch, j, l, m, n, nh ( )
Check (X) the things your child does: (4-5 years) - Pays attention to short stories and answers simple questions about them ( ) - Listens to and understands what is said at home and at school ( ) - Only does not say the consonant groups with L and R (e.g., "globo" and "prato") and R and S at the end of syllables (e.g., "poRta" and "paSta") ( ) - Communicates easily with other children and adults ( ) - The voice sounds as clear as other children's voices ( ) - Uses detailed phrases with plural, verbs (actions), and adjectives (qualities/description of objects and people) ( ) - Tells stories while maintaining the theme ( ) - Names some letters and numbers ( )
Analysis and Conduct for Each Age Group Cutoff Score: more than half of negative responses Conduct Referral ( ) to: Date: No referral needed ( ) Guidance ( ) Follow-up Response: Date:

Source: the authors (based on the LPD protocol by Molini-Avejonas and Fernandes[10])

This adaptation included questions from the LPD and collected the following data: agreement to participate in the study; child's and respondent's names; date of birth, gender, and reference health unit; family composition (including the presence of parents, siblings, and grandparents); current school attendance; interaction with other children; impact of the pandemic; and space for other observations.

Statistical Analysis

Following the conclusion of data collection, the data underwent statistical treatment and qualitative and quantitative description.

Initially, the absolute and percentage frequency of delay was described according to each variable of interest. To estimate the prevalence ratios (PR) of delay, a simple and multiple log-binomial regression model was used.

The analyses, on the other hand, were obtained using SAS 9.4. We emphasize that a significance level of 5% was adopted for the analyses.

RESULTS

Sample Characterization

The data were obtained through the electronic questionnaire "How Your Child Speaks and Listens." Thus, the aim was to understand whether the studied variables had any association with developmental delay. The sample, described in Table 2, consisted of 285 participants.

Table 2: Composition of the children's sample

Variables	Developmental Delay	
	No	**Yes**
Child's Age Range		
1-2 (n=58)	40 (68,97%)	18 (31,03%)
2-3 (n=99)	82 (82,83%)	17 (17,17%)
3-4 (n=128)	109 (85,16%)	19 (14,84%)
Total: 285		
Reference Basic Care Health Unit		
UFS I (n=58)	47 (81,03%)	11 (18,97%)
UFS II (n=9)	6 (66,67%)	3 (33,33%)
USF III (n=55)	44 (80%)	11 (20%)
USF IV (n=163)	134 (82,21%)	29 (17,79%)
Total: 285		
Child's gender		
Female (n=113)	95 (84,07%)	18 (15,93%)
Male (n=172)	136 (79,07%)	36 (20,93%)
Total: 285		
Family Composition (Residing with the child)		
Presence of father and mother living in the same household		
No (n=40)	32 (80%)	8 (20%)
Yes (n=245)	199 (81,22%)	46 (18,78%)
Total: 285		
The child has siblings		
Não (n=170)	136 (80%)	34 (20%)
Sim (n=115)	95 (82,61%)	20 (17,39%)
Total: 285		
Presence of grandparents living in the same household		
No (n=266)	217 (81,58%)	49 (18,42%)
Yes (n=19)	14 (73,68%)	5 (26,32%)
Total: 285		

Source: the authors

As observed in Table 1, a rate of 18.95% (n=54) of delay was recorded in the total sample studied.

Regarding the number of children attending school environments, 55.4% (n=158) attend school.

Of the children attending school (n=158), delays were not found in 84.81% of cases (n=134). On the other hand, among the children who do not attend school (n=127), there was a delay in 23.62% of cases (n=30).

Regarding interaction with other children, it was found that about 86% of the investigated children (n=245) had contact with other children.

Finally, concerning the impact of the pandemic on children's development, parents or guardians reported an impact in 56.4% of cases (n=161).

Crossing investigation data

In Table 3, data regarding the cross between the variables investigated in the study, collected from the questionnaire developed by the author, can be visualized. It is emphasized that to estimate the Prevalence Ratios (PR) of delay, the simple and multiple log-binomial regression model was adopted.

Table 3: Relationship of variables of interest with delay

Comparison	Gross				Adjusted1*				Adjusted2**			
	PR	Confidence Interval (95%)		Value p	PR	Confidence Interval (95%)		Valor p	RP	Confidence Interval (95%)		Value p
Age range												
1-2 vs 2-3	1,81	1,01	3,22	**0,04**	1,56	0,89	2,73	0,12	1,47	0,91	2,35	0,11
1-2 vs 3-4	2,09	1,19	3,68	**0,01**	1,69	0,90	3,18	0,10	1,58	0,91	2,76	0,10
2-3 vs 3-4	1,16	0,64	2,11	0,63	1,08	0,61	1,91	0,78	1,08	0,63	1,86	0,78
Reference Basic Care Health Unit												
USF I vs USF II	0,57	0,20	1,65	0,30	0,65	0,35	1,21	0,18	-	-	-	-
USF I vs USF III	0,95	0,45	2,01	0,89	0,93	0,49	1,74	0,82	-	-	-	-
USF I vs USF IV	1,07	0,57	1,99	0,84	0,84	0,45	1,55	0,57	-	-	-	-
USF II vs USF III	1,67	0,57	4,83	0,35	1,42	0,78	2,59	0,25	-	-	-	-
USF II vs USF IV	1,87	0,70	5,00	0,21	1,29	0,64	2,60	0,48	-	-	-	-
USF III vs USF IV	1,12	0,60	2,10	0,71	0,90	0,50	1,65	0,74	-	-	-	-
Gender												
F vs M	0,76	0,46	1,27	0,30	-	-	-	-	0,70	0,44	1,10	0,12
Parents Presence												
No vs Yes	1,07	0,54	2,09	0,85	-	-	-	-	1,17	0,66	2,08	0,58
With Siblings												
No vs Yes	1,15	0,70	1,89	0,58	-	-	-	-	1,19	0,70	2,03	0,52
Grandparents' presence												
No vs Yes	0,70	0,32	1,55	0,38	-	-	-	-	1,04	0,59	1,82	0,89
Pandemics Impact												
No vs Yes	0,55	0,32	0,93	0,03	0,53	0,31	0,89	0,02	**0,52**	0,31	0,88	**0,01**
Interacts with other children												
No vs Yes	2,14	1,29	3,57	<0,01	1,91	1,16	3,14	0,01	**2,01**	1,32	3,07	**<0,01**
Goes to school												
No vs Yes	1,56	0,96	2,52	0,07	1,48	0,92	2,36	0,10	**1,60**	1,01	2,53	**0,04**

*Legend: PR - Prevalence Ratios / *The adjusted model did not converge in the presence of sex, father and mother, siblings, grandparents / **The adjustment of the second model only excludes the reference Basic care health unit.*

Source: the authors

The results found indicate that there was statistical significance in the items "impacts caused by the pandemic" and "interaction with other children". The data indicate, for example, that children who do not interact with other children have about 2 times higher prevalence of delay. Additionally, children who do not attend school have a higher prevalence of delay (60%).

DISCUSSION

The pandemic context brought a sense of insecurity to everyone. It changed work methods and dynamics, forcing a redefinition of priorities. Social isolation was necessary, especially in the first year of the pandemic when there was no vaccine. This isolation significantly impacted work and social life, especially health units, which found themselves extremely overloaded with a dense routine and the lack of professionals who were absent due to illness or precautionary measures.

A review conducted by Chiesa et al[14]., which studied the impact of the pandemic and social isolation, revealed high mental overload in the population, especially in the elderly and healthcare professionals. Depression and post-traumatic stress disorder frequently appear in these studies[17].

As mentioned earlier, 285 children participated in the study, of which 54 presented language delay (18.95%). This value is higher than that verified by the American Speech-Language and Hearing Association[4], which shows that speech delays and language disorders, which are the most common developmental difficulties in childhood, represented 10% of children.

The study conducted by Cardilli-Dias, Molini-Avejonas, and Rondon[18], which proposed the rapid and low-cost screening test used in this research for the detection of language delay, with high sensitivity and specificity, found a prevalence of 12.47% of language alterations in early childhood. Such value, as can be seen, is also lower than that found in this study, reaffirming the impact of the pandemic scenario at the time of its realization.

In another recent study by Leal[19], 86 caregivers responded to questionnaires referring to the pre-pandemic and pandemic periods, while the period referring to the relaxation of social isolation presented 52 respondents. It was possible to verify that the interruption of social interaction, especially in early childhood education institutions, led to changes in children's development, mainly in aspects such as "problem-solving," "gross motor coordination," and "communication." In this study, 56.4% (n=161) of parents reported feeling the impact of the pandemic on children's development.

In the cross-analysis of the data presented in this research, where variables and their possible association with developmental delay and/or language improvement were analyzed, it was noticed that the younger the child, the greater the perceived delay. It is believed that this is related to the degree of overprotection and the child's lower exposure to the environment, as well as reduced communicative opportunities, so that over time, many delays are naturally compensated.

There was no significant difference between the evaluated family health units, which allows us to exclude the influence of the territory on children's delay. Other variables, such as the child's gender or the presence of parents, siblings, or grandparents living in the same house also did not present significant differences associated with language delay.

Statistical significance ($p<0.05$) was found in the items "impacts caused by the pandemic" and "interaction with other children". There is evidence that social isolation measures, school closures, and increased unemployment, can have extremely negative repercussions on

children's behavior and development[20].

It is known that school is a fundamental space for development and social interaction. In the school context, the joint action of the teacher, classmates, and staff plays a neuroprotective role in stimulating conversation, storytelling, reading, playing, adherence to rules, problem-solving, which tends to promote the consolidation of relationships and affective memories. These and other activities increasingly provide stimulation of functions such as language, communication, abstraction, and executive functions[21].

While their children are stimulated in the school environment, parents fulfill their personal, social, and work roles. However, in the face of school closures, students were deprived of the opportunity to learn, socialize, and play, while parents were forced to deal with prolonged school and childcare demands, in addition to their occupational obligations, which generated greater parental overload and stress[22].

According to a literature review by Fonseca et al.[23]., the closure of schools due to Covid-19 pandemic restrictions has had considerable individual and social impacts. Children showed higher levels of anxiety, hyperactivity, and inattention, impairments in general cognition, motor development, and significant declines in readiness and school performance.

Finally, it is reiterated that social isolation brings a decrease in opportunities for shared interaction and play, fundamental for child development as a whole, especially regarding language development.

Play allows children to explore the world and find their place in it. It helps them learn, win, and lose, as they influence self-control. While playing, children acquire concepts of values, limits, and responsibilities, receiving information about what they can and cannot do. Play is, for children, more than just fun: it is experimentation that leads to learning and understanding of the world. In addition to school, community spaces are important elements for child development[24].

In light of the above, the importance of attentive and careful attention to early childhood is evident, especially now in the post-pandemic period dealing with the aftermath of this scenario. Public policies are needed to favor early screening of children with language difficulties, taking into account the benefits of this type of intervention in the child's overall development.

CONCLUSION

This study clearly showed the impact of the pandemic on the development of children's language, as 18.95% of the sample children were classified as "delayed," a value that represents almost twice that found in other studies mentioned here. There was a direct correlation with the variables "impacts caused by the pandemic," "interaction with other children," and "school attendance."

Thus, the information found in this study highlights an important challenge regarding the definition of public policies that can reduce the discrepancies and gaps caused by this pandemic period.

Finally, the importance of the role of speech therapists in primary health care, especially in Family Health, became clear and evident. It is understood, therefore, that the presence of speech therapists in primary care is a relevant investment in public health, both in the field of education and health promotion, as well as in participation in unique therapeutic projects, in health promotion and education activities, in the matrixing of speech therapy knowledge in the core of knowledge, and finally, in the necessary referrals.

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In terms of the authors' roles, we adopt the following:

CBVS contributed to the study conception, data collection, assisted in organizing the results, contributed to the discussion of findings, and manuscript writing.
DCD assisted in organizing the results, contributed to the discussion of findings, and manuscript writing.
GCL assisted in organizing the results, contributed to the discussion of findings, manuscript writing, and reviewed the study.
DRMA conceived the proposal, guided data collection, contributed to the discussion of findings, manuscript writing, and study guidance.

All authors declare themselves responsible for all aspects of the work, ensuring its accuracy and integrity. The authors have no conflicts of interest to declare.

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