DOI: 10.1590/1413-81232021263.00602019

Determining factors in children's screen time in early childhood

Juliana Nogueira Pontes Nobre (https://orcid.org/0000-0002-9876-1136) [1]
Juliana Nunes Santos (https://orcid.org/0000-0002-1101-5270) [2]
Lívia Rodrigues Santos (https://orcid.org/0000-0003-3318-1592) [3]
Sabrina da Conceição Guedes (https://orcid.org/0000-0002-9738-2302) [2]
Leiziane Pereira (https://orcid.org/0000-0002-8290-960X) [2]
Josiane Martins Costa (https://orcid.org/0000-0002-4266-4070) [2]
Rosane Luzia de Souza Morais (https://orcid.org/0000-0002-8236-4531) [1,2]

Abstract *The use of media by children in early childhood is increasingly common, and it is necessary to investigate the determinants of screen time, which is understood as the total child screen exposure time, including television and interactive media. This is a descriptive, exploratory, and cross-sectional study conducted with 180 children between 24 and 42 months of age, allocated in Group 1, less than two hours daily screen exposure time; Group 2, daily screen exposure time equal to or more than two hours. Bivariate and binary logistic regression analyses were performed. Screen time determining factors studied were family environment, evaluated with the Family Environment Resource Inventory; socioeconomic factors; nutritional status and child development status, evaluated with the Bayley III test. As a result, 63% of children had daily screen time exceeding two hours, and television still is the main culprit for children screen exposure. We observed that screen time exposure was positively associated with family resources, economic level, and language development. However, only the last two factors explained the longer screen time.*

Key words *Audiovisual media, Mobile applications, Television, Exposure time, Child development*

[1] Programa de Pós-Graduação Saúde, Sociedade & Ambiente, Universidade Federal dos Vales do Jequitinhonha e Mucuri (UFVJM). Rodovia MGT 367 Km 583, 5000, Alto da Jacuba. 39100-000 Diamantina MG Brasil. junobre2007@yahoo.com.br
[2] Departamento de Fisioterapia, UFVJM. Diamantina MG Brasil.
[3] Programa de Pós-Graduação em Ciências Fonoaudiólogas, Universidade Federal de Minas Gerais (UFMG). Belo Horizonte MG Brasil.

Introduction

In the context of the modern world, once restricted to television[1,2], screens have evolved into pocket, mobile, and portable devices. Therefore, due to their portability, mobile phones, tablets, and smartphones have been incorporated into the routine of people from different social backgrounds and age groups, including children[3-7].

Childhood is characterized by biological and psychosocial modifications, which allow essential acquisitions in the motor, affective-social, and cognitive realms of development[8]. At this moment, the central nervous system (CNS) experiences constant transformation, myelination and synaptic organization, whose apex is reached at 24 months, favoring learning. Thus, the environment has a significant influence by continuously and dynamically interrelating with the factors intrinsic to the child[8,9]. Therefore, especially in early childhood, from 0 to 6 years of age as per Brazilian documents[10], children should be provided with healthy affective bonds, adequate space for freedom of movement, free play, and availability of toys or learning materials, among other factors[8,9].

Screen time, which is understood as the total time for which the child remains exposed to all screens, has increased[2,11]. Studies indicate that the mean exposure is longer than the recommended time since the American Academy of Pediatrics (AAP)[12] recommends that the children screen exposure time should not exceed 2 hours daily, with educational content suitable for the age group. Living in a multi-screen environment, such as television, tablets, computers, smartphones, can encourage early screen use[13,14].

Screen exposure time is considered a risk factor for sedentary behavior, for cardiovascular and metabolic diseases in adults. In children, it can cause obesity, higher blood pressure, and mental health-related problems[15,16], besides reducing the time for social and family interaction[5] and favoring exposure to improper content[3]. Some authors associate high screen exposure with language[1,17] and fine motor skills[18] development delays.

However, television screen time is widely addressed in the literature[17,19,20], while studies on interactive media (e.g., smartphones, tablets, video games) have emerged[5,21-23], depending on the widespread increase in children's access and use of mobile devices[24]. Interactive media can be defined by technological means that respond with content to users' actions, facilitating dialogue and participation, which differs from television[25].

Thus, considering the relevance and contemporaneity of the theme, this study aimed to investigate the determinants of total screen time, including television and interactive media in children in early childhood.

Methods

This is a cross-sectional, descriptive, and exploratory study investigating screen time in children aged 24 to 42 months, and was conducted from September 2016 to February 2017. The research was approved by the Research Ethics Committee of the Federal University of Vales do Jequitinhonha and Mucuri.

The study included children aged 24 to 42 months and 15 days, regularly enrolled in public and private day-care centers in the headquarters of a small-sized Brazilian municipality with a high Human Development Index (HDI), whose parents signed the Informed Consent Form. Exclusion criteria were children who had congenital or acquired diseases that could affect cognitive and motor development or children.

The sample was calculated with OpenEpi software. The prevalence of electronic media use was estimated at 34%[26], with the desired accuracy of 5%, 90% confidence interval, 80% study power, resulting in 172 children after adjustment for finite populations.

Each child's daily screen exposure time was considered to allocate it to the groups: Group 1 (G1) children with daily screen exposure time of fewer than two hours; Group 2 (G2): children with daily screen exposure time equal to or greater than two hours[12].

A literature-based questionnaire was prepared by the authors[27] to assess interactive media habits. The instrument addressed questions related to parents' knowledge of mobile interactive media, their frequency of use, children exposure time to media (in months), and their age when they started accessing the media.

The economic classification was assessed using the Brazil 2015 Economic Classification Criteria (CCEB), of the Brazilian Association of Research Companies. This criterion is assigned a score as per the assets and educational level of the head of the household. The economic level of the family group is classified based on the score on an increasing ordinal scale ranging from E to A1[28].

Child development was measured using the Bayley III test, which is the third edition of the

Ciência & Saúde Coletiva, 26(3):1127-1136, 2021

Bayley scale, used in scientific research to assess child development, including in Brazil[29,30]. The instrument aims to identify children with developmental delays in the 1-42 months' age group, in the cognitive, (receptive and expressive) language, (fine and gross) motor, socio-emotional, and adaptive behavior realms. The cognitive, expressive language, fine, and gross motor scales were applied for this study. According to the manual[31], each scale is scored based on the sum of tasks performed by the child, generating gross scores, and from there, norm-based scores for age. The balanced score of each scale was used for this study, considering "10"as the mean score, with a standard deviation of ±3 points. The team conducted training for Bayley application and inter-examiner reliability before the study, achieving an Intraclass Correlation Index (ICC) of 95%.

The quality of the child's living environment was assessed using the Family Environment Resource Inventory (FERI) with adaptations, i.e., question 8 was intended for children outside the study age[32] and was removed from the instrument. The questionnaire aims to evaluate family environment resources in three realms: 1) *resources that promote proximal processes*: it involves participation in stimulating experiences for development, such as walks and trips, opportunities for interaction with parents; availability of toys and materials with features that challenge thinking; availability of books, newspapers, and magazines, adequate use of free time; 2) *activities that signal stability in family life*: such as regular family routines and meetings and the child's cooperation in household chores; 3) *parenting practices that promote the family-school bond*: direct involvement of parents in school life, such as attendance at meetings[33]. The sum of points, that is, gross values, were considered for the analysis.

Assessment of the nutritional status required anthropometric data collected using weight and height measurements for further treatment and to obtain the child's nutritional status classification through Anthro Who version 3.2.2, a software developed by the World Health Organization[34].

The collected data were transferred to Statistical Package for the Social Sciences (SPSS) version 19.0 for exploratory analysis of the database. The chi-square test was used for the bivariate analysis, with a significance level of 5% ($p<0.05$). The dependent variable was "screen time", a variable consisting of total daily child's time of exposure to electronic (TV) and interactive (Tablets and Smartphones) media, as reported by parents or guardians. Independent variables were age (2 and 3 years), maternal and paternal education, economic level, family resource inventory (full-scale FERI and separate realms), language development, cognitive development, gross and fine motor development, and Body Mass (BMI).

All independent variables were categorized for comparison purposes between groups G1 and G2. The median was used as the cutoff point for FERI's underlying variables, and in the total score of the "Inventory of family resources", the score of "50" was considered for the establishment of the categories below and above the median. In the FERI realms titled "resources that promote proximal processes", "activities that signal stability in family life" and "parenting practices that promote family-day care", the values considered for categorization of the variables were, respectively, 26, 16 and 8. For the Bayley result, the variables were categorized by a score of "10" on the balanced score of the evaluated scales, as this is the mean test score, whose standard deviation is ±3 points. The variables paternal and maternal schooling were categorized into up to complete primary school and secondary school or higher. Concerning the economic level, the categories created were "A, B, C1" and "C2, D, E", respectively, and for BMI, the criterion of leanness and eutrophy were observed for one category and individuals at risk of overweight to obese in another category.

The association between the independent variables and the dependent variable "screen time greater than two hours" was verified in the bivariate analysis by the chi-square test with a 5% significance level. Binary logistic regression was performed for multivariate analysis, using data whose independent variables obtained p-value$\leq$0.20 in the univariate analysis, and only those with $p<0.05$ remained in the model.

The quality of the model was evaluated by the Hosmer-Lemeshow method and by the measure of fit -2 log likelihood (-2LL). Residual analysis in the final model was performed to detect significant outliers.

Results

Figure 1 shows the flow of study participants, in which 180 children participated, of which 84 were male (46.7%), and 96 were female (53.3%). The mean age of the children was 35.0 (±4.5) months. Of the children evaluated, 36 (20%)

studied in private institutions and 144 (80%) in public institutions; 48 (26.8%) belong to strata A and B of the economic classification, 90 (50%) to strata C, and 42 (23.3%) to classes D and E.

Concerning maternal schooling, 26.3% have up to eighth grade, 45% have completed secondary school or have incomplete higher education, and 28.7% have higher education or postgraduate education. Regarding paternal schooling, 43.1% of respondents have up to eighth grade, 36.9% secondary school, and 20.0% have higher education or postgraduate education.

From the sample of 180 participants, 10 children (5.5%) were not exposed to any media. Figure 2 shows the distribution of children by daily screen time exposure, where 63.3% of children are exposed to a time equal to or greater than two daily hours.

Table 1 describes the interactive media used by children, indicating that the most used device was TV, followed by smartphones and tablets. Few children in this range make use of video games (4% of the sample).

The results of the association of screen time with independent variables are shown in Table 2.

Table 2 shows that groups G1 and G2 were similar regarding gender and age distribution, maternal and paternal schooling, family resource inventory, parenting practices that promote family-day care, cognitive development, gross/fine motor, and BMI. However, they are different regarding the other variables studied. Thus, we can state that the economic level and the FERI resources that promote proximal processes and language development showed a statistically significant association with longer screen time.

Residual analysis was performed when binary logistic regression was carried out, and two outliers were excluded. Also, the interactions between the variables of the final model were examined, and "maternal schooling" and "family environment resource inventory - total FERI" were removed. Table 3 shows the variables that remained in the binary logistic regression model.

The independent variable "economic level" was considered a significant predictor for distinguishing between children with screen time of two hours or more and screen time of fewer than two hours. Children from the upper strata of the economic classification were 3.5 times more likely to have greater exposure to the screens.

The independent variable "language development" was also considered a significant predictor for distinguishing between children with a screen time of two hours or more. Children with better expressive language performance were 3.57 times more likely to have greater exposure to the screens.

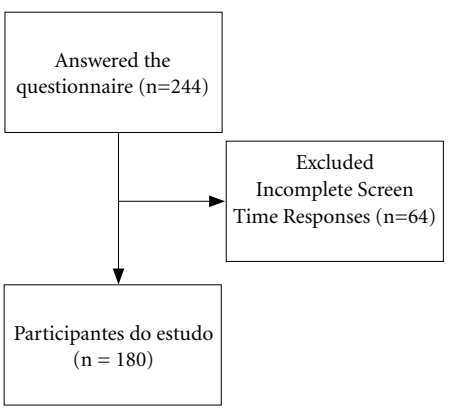

Figure 1. Flowchart describing the composition of the sample. Diamantina, Minas Gerais, Brazil, 2019.

n: absolute number of children

Discussion

This study investigated the determinant factors for the screen time of children aged 24-42 months, considering that this is a crucial period for child development. In the survey, 63.3% of children had a daily screen time higher than two hours, in agreement with the Common Sense Media[35] reports, and the Read Aloud Survey Report[36], which were also developed in the United States, which also found a child exposure time value higher than two daily hours. Studies in Singapore[2,11] also found a prevalence of more than two daily hours of exposure in children in early childhood.

The results of the research, as mentioned above, as well as those evidenced in this study, contradict the AAP's guidelines[12], which recommend daily exposure of up to two hours for children aged 2-5 years, including the use of all media. However, in a new guidance document for parents and pediatricians[37], the AAP recommendation has become more conservative, i.e., screen time is up to 1 hour/day for 2-5-year-olds. The Brazilian Association of Pediatrics[38] also advocates this last recommendation; however, the literature points to studies that state that parents

Ciência & Saúde Coletiva, 26(3):1127-1136, 2021

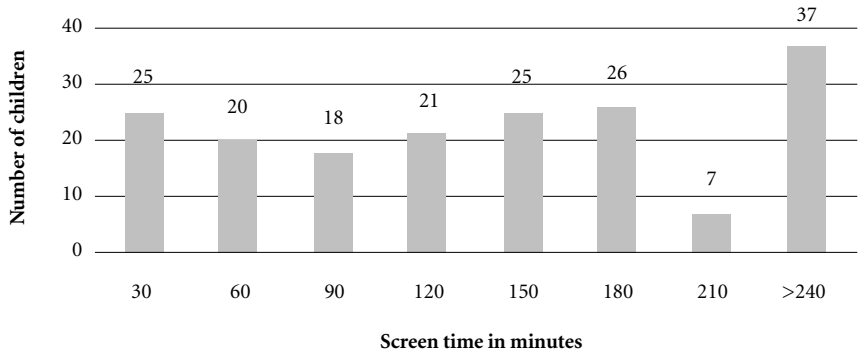

Figure 2. Screen time distribution in minutes by exposure to television or interactive media. Diamantina, Minas Gerais, Brazil, 2019.

Table 1. Screen time specified by media type (n=180). Diamantina, Minas Gerais, Brazil, 2019.

Media	Do not use		Use up to 2 hours/day		Use more than 2 hours/day	
	n	%	n	%	n	%
Smartphone	76	38.8	34	20.0	70	41.2
Tablet	147	80.6	4	2.3	39	23.0
Videogame	171	94.7	2	1.2	7	4.1
TV	16	3.5	50	29.4	114	67.0

n: absolute number of children; %: proportion of children.

have difficulty incorporating the recommendation of screen time limitation into their children's routine since adult screen time is also high[39,40].

In this study, 94.5% of children were exposed to screens, especially television (61%), followed by portable interactive media, smartphones (41%), and tablets (22%). Few children in this age group were found to use video games (4% of the sample), a popular media among older children[35]. As for TV, the literature associates its intense exposure to language delay, difficulty in social interaction, sedentary lifestyle formation, and low stimulus to creativity[1,16,17,20,41]. Although television is still the most popular media among children, it is relevant to consider the trend and increasingly prominent role of mobile interactive media[2,11,42]. Since it is considered a recent technology, studies on interactive media and its impact on health and child development are beginning to emerge in the literature[5]. While still controversial, studies indicate that the thrifty use of these media, unlike television, because they allow a child's touch screen and interaction with their content, can contribute positively to children's cognitive, linguistic, and fine motor development[5,27,37,43-45].

The independent variables associated with screen exposure time in the bivariate analysis were economic level, resources in the family environment that develop proximal processes and language development. Paternal and maternal schooling, while not showing statistical significance of 95%, obtained values $p<0.20$, and proceeded to logistic regression.

Paternal schooling is associated with better opportunities for home stimulation[46]. This stimulation can be understood, for example, as providing an environment that contains learning resources in which interactive media are also present. It is also suggested that parents with higher schooling make more use of media in their routine, which may directly influence the child's screen time[39,40].

Maternal education has been pointed out as an essential predictor for growth, health, and child development[47,48]. Mothers with higher maternal education may facilitate resources for child development, using interactive media as a resource for learning promotion. Vectore et al.[49] reflect on the child in contemporary times and affirm that life in highly competitive societies has intensified the concern and desire of the modern

Table 2. Screen time and associated factors. Diamantina, Minas Gerais, Brazil, 2019.

Variable		Screen time				X^2 Test	p
		Less than two hours (n=66)		Two hours and over (n=114)			
		n	%	n	%		
Gender	Female	35	47.0	61	53.5	0.04	0.95
	Male	31	53.0	53	46.5		
Age	2 years	35	53.0	55	48.2	0.20	0.53
	3 years	31	47.0	59	51.8		
Maternal schooling	Up to complete primary school	21	34.4	24	21.8	3.21	0.07
	Secondary school or Higher Education	40	65.6	86	78.2		
Paternal schooling	Up to complete primary school	32	52.5	37	37.4	3.50	0.06
	Secondary school or Higher Education	29	47.5	62	62.6		
Socioeconomic level	A, B and C1	23	34.8	65	58.0	8.93	<0.01*
	C2, D and E	43	65.2	47	42.0		
Family Resource Inventory (RAF) - total	Score up to 50	39	59.1	54	47.4	2.30	0.12
	Score above 50	27	40.9	60	52.6		
Resources that promote proximal processes (FERI)	Score up to 26	38	65.5	47	44.8	6.45	0.01*
	Score above 26	20	34.5	58	55.2		
Activities that signal family life stability (FERI)	Score up to 16	28	48.3	54	51.4	0.14	0.70
	Score above 16	30	51.7	51	48.6		
Parenting Practices that Promote Family-Day Care (FERI)	Score up to 8	47	71.2	81	71.1	0.01	0.98
	Score above 8	19	28.8	33	28.9		
Language Development	Score up to 9.9	16	45.7	14	22.6	5.60	0.01*
	Score above 10	19	54.3	48	77.4		
Cognitive development	Score up to 9.9	18	48.6	29	43.3	0.27	0.59
	Score above 10	19	51.4	38	56.7		
Gross Motor Development	Score up to 9.9	42	77.8	63	69.2	1.23	0.26
	Score above 10	12	22.2	28	30.8		
Fine Motor Development	Score up to 9.9	12	27.9	26	33.3	0.37	0.58
	Score above 10	31	72.1	52	66.7		
BMI	Leanness and eutrophy	37	66.1	66	71.7	0.52	0.46
	Risk of overweight, overweight and obesity	19	33.9	26	28.3		

n: absolute number of children; %: proportion of children; BMI=Body Mass Index; p: level of significance adopted (<0.05).

Table 3. Hierarchical binary logistic regression for dependent variable "Screen Time". Diamantina, Minas Gerais, Brazil, 2019.

Independent variables	Screen time			
	b±S.E	OR	95%CI	p
Economic level	1.26±0.59	3.538	1.11- 1.25	0.03*
Language development	1.27±0.59	3.570	1.12-11.34	0.03*
Resources that promote proximal processes				0.13
Paternal schooling				0.75

Quality of model per Hosmer and Lemeshow=0.92. *p=level of significance <0.05. b=coefficient of regression. S.E=Standard Error. OR=Odds Ratio, CI=Confidence Interval.

mother in search of overqualification of children, with diversified activities and early exposure to the highly technological adult world, aiming at a distant future of success in adulthood, but built from the earliest years of life.

Resources that promote proximal processes were positively associated with longer screen time. The more availability of toys and materials than home learning, the higher the possibility of technological resources such as interactive media, computers, and television, and therefore, more prolonged exposure to screens[35,37].

In this research, the independent variables that were associated with screen time and remained in the multivariate analysis were, respectively, economic level and language, considered significant predictors for distinguishing between groups with screen time equal to or greater than two hours and screen time lower than two hours. Each increases the likelihood of longer screen time by 3.5 and 3.57, respectively.

The higher the economic level, the greater the possibility of acquiring different media; consequently, the longer the screen time[35,37]. Although TV has become more popular at more affordable prices, smartphones, and especially tablets, are of higher purchasing value. Studies state that in the United States[35,37], the availability of smartphones, and particularly tablets, is lower in low-income families, a trend also observed in Brazil.

In this regard, in a survey conducted in Portugal, Simões et al.[50] state that the possession of tablets is more evident in homes of middle socioeconomic strata compared to the lower strata on the European continent; therefore, the upper classes have both tablets and portable computers, among other media, while those with lower socioeconomic backgrounds have less equipment for their individual use. The literature states that the digital divide between economic levels is apparent in the program content of mobile devices, and, according to Common Sense Media[35], higher-income families install more apps, specifically for their children, including games and educational apps.

Regarding language, an association is found between TV use and language delays in children[1,17,19,20,41]. However, this study investigated screen time, including interactive media. In a review of children's screen-related learning research, Reich et al.[51] say that well-designed eBooks provide children with learning equally well, and sometimes more than printed books. However, the authors point out that eBooks enhanced with sounds, animations, and games can distract children and reduce learning.

There is evidence in the literature that educational applications contribute to a lexical increase in children[26] and can teach reading and literacy skills[7,43]. Consistent with this understanding, Russo-Johnson et al.[44] positively associated tablet use in word learning with probable transfer of learning to the real object in their study on interactivity, touch screen and child learning, corroborating Huber et al.[52], who identified in their research with children aged 4-6 years the ability to learn and transfer learning from a touch screen device, applying this knowledge to their interactions.

However, the literature[5,12,27,37,38] emphasizes the importance of taking into account some factors for the use of interactive media by children in early childhood: the restriction of time and its content; interactive versus passive activities; use for fun or learning as opposed to use to "keep the child quiet" and especially the importance of adult presence as a mediator. The presence of an adult sharing with the child the reading experience to interpret, dialogue, and discuss provides a better interpretation and stimulates language development, which differs from the fact that children interact with interactive media themselves[5,27,51,53].

Studies on screen time and associated factors are still incipient in Brazil, but one can observe that there is a current demand in the care of the pediatric population, regarding the construction of parameters for the use of screens by children in early childhood, since time, means and quality of exposure to screens influence development[12,27,38]. Thus, this pioneering study sought to understand the screen time-associated factors in a representative sample of Brazilian children in order to contribute to the construction of evidence for applicability in future interventions beneficial to child development.

The limitations of the research are the use of a questionnaire completed by parents, which favors memory bias and social desirability; however, this is still the most used form in other studies[2,11,19,21,23]. We suggest, as future prospects, to investigate the screen time of parents, in order to verify a possible association with the use of media by children[3,39,40], given the need to increase studies of this nature for the public health area, whether quantitative as this study, or qualitative, in order to understand in depth the phenomena associated with children screen time.

Conclusion

The children in this study evidenced screen time above the recommended for their age. Television was still primarily responsible for children's screen exposure, contributing substantially to this contact. We observed that the screen exposure time was positively associated with family resources, economic level, language development. However, only the last two explained the longer screen time.

Collaborations

JNP Nobre data collection and interpretation; drafting and critical review of the manuscript. JM Costa, LR Santos, SC Guedes and L Pereira data collection and critical review of the manuscript. JN Santos and RLS Morais conception and orientation of work; data interpretation; drafting and critical review of the manuscript.

Acknowledgments

We are grateful to the Diamantina Municipal Education Secretariat, the coordinators, the parents, and the participating children, as well as to the Health, Society & Environment Graduate Program (PPGSaSA) of the Federal University of Jequitinhonha and Mucuri Valleys (UFVJM).

References

1. Valdivia AI, Gárate SE, Regal CN, Castillo IG, Sáez ZM. Exposición a televisión y retardo primario del lenguaje en menores de 5 años. *Rev Cubana Pediatr* 2014; 86(1):18-25.
2. Bernard JY, Padmapriya N, Chen B, Cai S, Tan KH, Yap F, Shek L, Chong YS, Gluckman PD, Godfrey KM, Kramer MS, Saw SM. Predictors of screen viewing time in young Singaporean children: the GUSTO cohort. *IJBNPA* 2017; 14(1):112.
3. Straker L, Pollock C. Optimizing the interaction of children with information and communication technologies. *Ergonomics* 2005; 48(5):506-521.
4. Carson V, Janssen I. Associations between factors within the home setting and screen time among children aged 0–5 years: a cross-sectional study. *BMC Public Health* 2012; 12(1):539.
5. Radesky JS, Schumacher J, Zuckerman B. Mobile and Interactive Media Use by Young Children: The Good, the Bad, and the Unknown. *Pediatrics* 2015; 135(1):1-3.
6. Kirkorian HL, Pempek TA, Murphy LA, Schmidt ME, Anderson DR. The Impact of Background Television on Parent–Child Interaction. *Child Dev* 2009; 80(5):1350-1359.
7. Radesky JS, Dimitri A. Christakis DA. Increased Screen Time: implications for early childhood development and behavior. *Pediatr Clin N Am* 2016; 63:827-839.
8. Black MM, Walker SP, Fernald LCH, Andersen CT, DiGirolamo AM, Lu C, McCoy DC, Fink G, Shawar YR, Shiffman J, Devercelli AE, Wodon QT, Vargas-Barón E, Grantham-McGregor S. Early childhood development coming of age: science through the life course. *Lancet* 2016; 389(10064):77-90.
9. Daelmans B, Darmstadt GL, Lombard J, Black MM, Britto PR, Lye S, Bhutta TDZA, Richter LM. Early childhood development: the foundation of sustainable Development. *Lancet* 2016; 389(10064):9-11.
10. Brasil. Ministério da Saúde (MS). Secretaria de Atenção à Saúde. Departamento de Ações Programáticas e Estratégicas em Saúde. *O futuro hoje: estratégia brasileirinhas e brasileirinhos saudáveis: primeiros passos para o desenvolvimento nacional*. Brasília: MS; 2010.
11. Goh SN, Teh LH, Tay WR, Anantharaman S, Van Dam RM, Tan CS. Sociodemographic, home environment and parental influences on total and device-specific screen viewing in children aged 2 years and below: an observational study. *BMJ Open* 2016; 6:e009113.
12. American Academy of Pediatrics. Children, Adolescents, and the Media. *Pediatrics* 2013; 132(5):958-961.
13. Cristakis CA. Interactive Media Use at Younger Than the Age of 2 Years Time to Rethink the American Academy of Pediatrics Guideline. *JAMA Pediatr* 2014; 168(5):399-400.
14. Ferrari GLM, Araújo TL, Oliveira LC, Matsudo V, Fisberg M. Association between electronic equipment in the bedroom and sedentary lifestyle, physical activity, and body mass index of children. *J Pediatr* 2015; 91(6):574-582.
15. Bento GG, Silva FC, Gonçalves E, Santos PD, Silva R. Revisão sistemática sobre nível de atividade física e estado nutricional de crianças brasileiras. *Revista Salud Pública* 2016; 18(4):630-642.
16. Dutra GF, Kaufmann CC, Pretto ADB, Albernaz EP. Television viewing habits and their influence on physical activity and childhood overweight. *J Pediatr* 2015; 91(4):346-351.
17. Lin LY, Cherng RJ, Chen YJ, Chen YJ, Yang HM. Effects of television exposure on developmental skills among young children. *Infant Behav Dev* 2015; 38:20-26.
18. Lin LY, Cherng RJ, Chen YJ. Effect of Touch Screen Tablet Use on Fine Motor Development of Young Children. *Phys Occup Ther Pediatr* 2017; 37(5):457-467.
19. Duch H, Fisher EM, Ensari I, Font M, Harrington A, Taromino C, Yip J, Rodriguez C. Association of screen time use and language development in Hispanic toddlers: a cross-sectional and longitudinal study. *Clin Pediatr (Phila)* 2013; 52(9):857-865.
20. Okuma K, Tanimura M. A preliminary study on the relationship between characteristics of TV content and delayed speech development in young children. *Infant Behav Dev* 2009; 32(3):312-321.
21. Cristia A, Seidl A. Parental Reports on Touch Screen Use in Early Childhood. *PloS One* 2015; 10(6):e0128338.
22. Karaagac, AT. Undesirable Effects of Media on Children: Why Limitation is Necessary? *Indian Pediatr* 2015; 52(6):469-471.
23. Kabali HM, Nunez-Davis R, Budacki JM, Mohanty JH, Leister KP, Bonner RL. Exposure and use of mobile media devices by young children. *Pediatrics* 2015; 136(6):1044-1050.
24. Paudel S, Leavy J, Jancey J. Correlates of mobile screen media use among children aged 0–8: protocol for a systematic review. *Syst Rev* 2016; 5(1):91.
25. Nicolau M. Fluxo, conexão, relacionamento: um modelo comunicacional para as mídias interativas. *Culturas Midiáticas* 2008; 1(1):1-10.
26. Rideout V. *Learning at home: Families educational media use in America* [Internet]. The Joan Ganz Cooney Center; 2014. [acessado 2018 Dez 10] Disponível em: http://www.academia.edu/6444806/The_Learning_at_home_families_educational_media_use_in_america
27. Nobre JNP, Vinolas Prat B, Santos JN, Santos, LR, Pereira L, Ribeiro RF, Guedes SC, Morais, RLS. Qualidade de uso de mídias interativas na primeira infância e desenvolvimento infantil: uma análise multicritério. *J Pediatr* 2020; 96(3):310-317.
28. Associações Brasileiras de Empresas de Pesquisa (ABEP). *Critério de classificação econômica Brasil* [Internet]. 2015 [acessado 2016 Jan 26]. Disponível em: http://www.abep.org/criterio-brasil
29. Madaschi V, Mecca TP, Macedo EC, Paula CS. Bayley -III Scales of Infant and Toddler Development: Transcultural Adaptation and Psychometric Properties. *Paidéia* 2016; 26(64):189-197.
30. Souza CT, Santos DC, Tolocka RE, Baltieri L, Gibim NC, Habechian FAP. Avaliação do desempenho motor global e em habilidades motoras axiais e apendiculares de lactentes frequentadores de creche. *Rev Bras Fisioter* 2010; 14(4):309-315.
31. Bayley N. *Bayley scales of infant and toddler development: technical manual*. San Antonio: Pearson; 2006.

32. Guimarães AF, Carvalho DV, Machado NAA, Baptista R AN, Lemos SMA. Risk of developmental delay of children aged between two and 24 months and its association with the quality of family stimulus. *Rev Paul Pediatr* 2013; 31(4):452-458.
33. Marturano EM. O inventário de recursos do ambiente familiar. *Psicol Reflexão Crítica* 2006; 19(3):498-506.
34. WHO Anthro for Mobile Devices. *Manual Software for assessing growth and development of the world's children*. Genebra: WHO; 2011.
35. Common Sense Media. *Zero to eight: Children's media use in America* [Internet]. 2011 [acessado 2018 Jan 26] Disponível em: https://www.commonsensemedia.org/research/zero-to-eight-childrens-media-use-in-america
36. Read Aloud Survey Report. *Yougov. Report: How America reads aloud to its children* [Internet]. 2016[acessado 2019 Jan 04] Disponível em: http://www.readaloud.org/documents/ReadAloudSurveyReport.pdf
37. Council on Communications Media. Media and young minds. *Pediatrics* 2016; 138(5):e20162591.
38. Sociedade Brasileira de Pediatria (SBP). *Saúde da Criança e Adolescentes na Era Digital. Manual de Orientação*. Departamento de Adolescência: SBP; 2016.
39. Schoeppe S, Rebar AL, Short CE, Alley S, Lippevelde WV, Vandelanotte C. How is adults' screen time behaviour influencing their views on screen time restrictions for children? A cross-sectional study. *BMC Public Health* 2016; 16:201.
40. Assathiany R, Guery E, Caron FM, Cheymol J, Picherot G, Foucaud P, Gelbert N, Association française de pédiatrie ambulatoire, Groupe de pédiatrie générale. Children and screens: A survey by French pediatricians. *Arch Pediatr* 2018; 25(2):84-88.
41. Chonchaiya W, Pruksananonda C. Television viewing associates with delayed language development. *Acta Paediatrica* 2008; 97(7):977-982.
42. Solomon-Moore E, Sebire SJ, Macdonald-Wallis C, Thompson J, Lawlor D, Jago R. Exploring parents' screen-viewing behaviours and sedentary time in association with their attitudes toward their young child's screen-viewing. *Prev Med Rep* 2017; 7:198-205.
43. Anderson D, Subrahmanyam K. Digital Screen Media and Cognitive Development. *Pediatrics* 2017; 40(2):57-62.
44. Russo-Johnson C, Troseth G, Duncan C, Mesghina A. Tapped Out: Touchscreen Interactivity and Young Children's Word Learning. *Front Psychol* 2017; 8:578.
45. Skaug S, Englund KT, Saksvik-Lehouillier I, Lydersen S, Wichstrøm L. Parent–child interactions during traditional and interactive media settings: A pilot randomized control study. Scand *J Psychol* 2018; 59:135-145.
46. Defilipo EC, Frônio JC, Teixeira MT, Leite ICB, Bastos RR, Vieira MT, Ribeiro LC. Oportunidades do ambiente domiciliar para o desenvolvimento motor. *Rev Saude Publica* 2012; 46(4):633-641.
47. Morais RLS, Carvalho AM, Magalhães LC. O contexto ambiental e o desenvolvimento na primeira infância: estudos brasileiros. *J Phys Educ* 2016; 27(1):2714.
48. Klein CJ, Madi JM, Araújo BF, Zatti H, Bosco DS, Henke CN, Rombaldi RL, Madi SRC. Fatores de risco relacionados à mortalidade fetal. *Rev AMRIGS* 2012; 56(1):11-16.
49. Vectore C, Rebello SMP, Vectore PT, Dias SAC. (2018). "Ele foi orçado, mas não planejado!": a infância na contemporaneidade. *Rev CES Psic* 2018; 11(2):37-52.
50. Simões JA, Ponte C, Ferreira E, Doretto J, Azevedo C. *Crianças e Meios Digitais Móveis em Portugal: Resultados Nacionais do Projeto Net Children Go Mobile*. Lisboa: CESNOVA; 2014.
51. Reich SM, Yau JC, Warschauer M. Tablet-Based eBooks for Young Children: What Does the Research Say? *J Dev Behav Pediatr*2016; 37(7):585-591.
52. Huber B, Tarasuik J, Antoniou M N, Garret C, Bowe SJ. Young children's transfer of learning from a touchscreen device. *Comput Human Behav* 2016; 56:56-64.
53. Hiniker A, Sobel K, Ray Hong S, Suh H, Irish I, Kim D, Kientz JA. Touchscreen Prompts for Preschoolers: Designing Developmentally Appropriate Techniques for Teaching Young Children to Perform Gestures. *Human Centered Design and Engineering University of Washington., Medford, MA, USA* 2015; 21(25):109-118.

Article submitted 11/09/2018
Approved 10/06/2019
Final version submitted 12/06/2019

Chief editors: Romeu Gomes, Antônio Augusto Moura da Silva