CIÊNCIAS DA VIDA E DA SAÚDE
LIFE AND HEALTH SCIENCES
CIENCIAS DE LA VIDA Y LA SALUD

millenium

Millenium, 2(Edição Especial Nº17)

en

O USO DE DISPOSITIVOS ELETRÓNICOS PELOS TODDLERS
USE OF ELECTRONIC DEVICES BY TODDLERS
USO DE DISPOSITIVOS ELECTRÓNICOS POR LOS NIÑOS PEQUEÑOS

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RECEIVED: 21st November, 2024
REVIEWED: 16th December, 2024
ACCEPTED: 02nd January, 2025
PUBLISHED: 30th January, 2025

DOI: https://doi.org/10.29352/mill0217e.39110

RESUMO

Introdução: Atualmente, as crianças são expostas, a uma vasta gama de dispositivos eletrónicos, verificando-se um aumento desta prática pelo mundo, substituindo-se o lazer ativo por comportamentos sedentários.
Objetivo: Analisar a associação entre o uso de tecnologia pelos *toddlers* com variáveis demográficas e de saúde.
Métodos: Estudo quantitativo, descritivo e relacional realizado em 62 Instituições Particulares de Solidariedade Social e 6 creches privadas do centro de Portugal. Colheita de dados por questionário aplicado aos pais, das crianças, sobre as caraterísticas sociodemográficas e os hábitos de utilização de dispositivos eletrónicos. Amostra de 808 crianças, entre 12 e 36 meses de idade.
Resultados: Durante o fim de semana o tempo de exposição à televisão (M=1h17min; DP=±1h02min) e aos dispositivos eletrónicos (M=1h10min; DP=±57min) era superior ao da semana (M=56min; DP=±46min; M=56min; DP=±49min, respetivamente). Em média, os rapazes (M=3h37min) e as crianças com 36 meses (M=4h26min) eram os que passavam mais tempo expostos aos ecrãs. As crianças com excesso de peso passavam mais tempo a ver televisão e as que tinham um percentil de peso normal ou obesidade ocupavam mais tempo a brincar com dispositivos eletrónicos. Eram as crianças que dormiam abaixo do recomendado as mais expostas aos ecrãs.
Conclusão: Os resultados reforçam a excessiva exposição das crianças aos ecrãs, orientando para a necessidade de promoção do empoderamento parental face aos fatores de risco.

Palavras-chave: comportamento sedentário; criança, pré-escolar; enfermagem; estilos de vida

ABSTRACT

Introduction: Currently, children are exposed to a wide range of electronic devices, and this practice is increasing worldwide, replacing active leisure with sedentary behavior.
Objective: To analyze the association between the use of technology by toddlers and demographic and health variables.
Methods: Quantitative, descriptive, and relational study was carried out in 62 private social solidarity institutions and 6 private daycares in central Portugal. Data on sociodemographic characteristics and habits of using electronic devices was collected using a questionnaire administered to the children's parents. Sample of 808 children aged between 12 and 36 months.
Results: During the weekend, exposure to television (M=1h17min; SD=±1h02min) and electronic devices (M=1h10min; SD=±57min) was higher than during the week (M=56min; SD=±46min; M=56min; SD=±49min, respectively). On average, boys (M=3h37min) and children aged 36 months (M=4h26min) spent the most time exposed to screens. Overweight children spent more time watching television, and those with a normal or obese weight percentile spent more time playing with electronic devices. Children who slept less than recommended were the most exposed to screens.
Conclusion: The results reinforce the excessive exposure of children to screens, pointing to the need to promote parental empowerment in the face of risk factors.

Keywords: sedentary behavior; child, preschool; nursing; lifestyles

RESUMEN

Introducción: En la actualidad, los niños están expuestos a una amplia gama de dispositivos electrónicos, y esta práctica va en aumento en todo el mundo, sustituyendo el ocio activo por conductas sedentarias.
Objetivo: Analizar la asociación entre el uso de tecnología por parte de los niños pequeños y variables demográficas y de salud.
Métodos: Estudio cuantitativo, descriptivo y relacional realizado en 62 Instituciones Privadas de Solidaridad Social y 6 guarderías privadas del centro de Portugal. Los datos se recogieron mediante un cuestionario administrado a los padres de los niños sobre características sociodemográficas y hábitos de uso de dispositivos electrónicos. Muestra de 808 niños de entre 12 y 36 meses.
Resultados:Durante el fin de semana, la exposición a la televisión (M=1h17min; SD=±1h02min) y a los dispositivos electrónicos (M=1h10min; SD=±57min) fue mayor que durante la semana (M=56min; SD=±46min; M=56min; SD=±49min, respectivamente). Por término medio, los varones (M=3h37min) y los niños de 36 meses (M=4h26min) fueron los que más tiempo pasaron expuestos a pantallas. Los niños con sobrepeso pasaban más tiempo viendo la televisión y los que tenían un percentil de peso normal u obeso pasaban más tiempo jugando con dispositivos electrónicos. Los niños que durmieron menos de lo recomendado fueron los más expuestos a las pantallas.
Conclusión: Los resultados refuerzan la excesiva exposición de los niños a las pantallas, señalando la necesidad de promover el empoderamiento parental frente a los factores de riesgo.

Palabras Clave: conducta sedentaria; niños; preescolar; enfermeira; estilos de vida

DOI: https://doi.org/10.29352/mill0217e.39110

INTRODUCTION

We live in a globalised world where children are exposed to technology at increasingly younger ages (Canaan et al., 2017). Touchscreen devices associated with electronic equipment have become seamlessy integrated into our daily lives, with most children using them regularly (Ramalho, 2021). The widespread adoption of these devices is a growing concern for health professionals due to the consequences for children's health and development (Rocha & Nunes, 2022).
Toddlers - children aged 12 to 36 months – spend a significant amount of time using electronic devices, contributing to increased sedentary behaviour. This behaviour is characterised by a low-calorie expenditure activity, measured through indicators such as "sitting time" and "screen exposure time" (Tremblay et al., 2017; Thivel et al., 2018).

1. THEORETICAL FRAMEWORK

For 'digital native' children, who have grown up surrounded by digital entertainment, screen time characterises contemporary life. In developed countries, many children are surrounded by digital technology, and activities involving electronic devices consume a substantial portion of their waking hours, increasing sedentary time (Canadian Paediatric Society, 2017).
Research into the health effects of sedentary behavior in toddlers remains limited, but scientific evidence highlights the non-negligible risks that incorrect use of electronic devices can bring (Santos & Sampaio, 2024), noting that although there may be some benefits, there are more harms (WHO, 2019).
The early years of life are critical for nervous system development, and interaction with the environment is essential for neurodevelopment to occur (Santos & Sampaio, 2024).
Recognising this, several health organisations and professional bodies have issued guidelines for some of the behaviors related to children's health, namely sedentary behaviors - exposure to screens (Bull et al., 2020), advising against screen use before the age of two and limiting it to no more than an hour a day for children aged two and five (WHO, 2019; American Academy of Pediatrics, 2020), because despite some benefits, there are more harms (Rocha & Nunes, 2022). More recently, the Portuguese Society of Neuropediatrics (SPN) advised avoiding screens until the age of three, except for video calls and using TV for up to 30 minutes a day (Santos & Sampaio, 2024).
Screen exposure in children under the age of four has been linked to reduced psychosocial health and cognitive development, irregular sleep patterns, increased adiposity (Bruijns et al., 2020; Soepnel et al., 2021) and poor socialisation (Mineshita et al., 2021).
When considering the effects of digital technologies on child development, some researchers argue that if children are protected from the most harmful aspects of digital media, they can benefit from its positive potential (Ramalho, 2021).
Others stress that the content should be educational, age-appropriate, and non-violent (Rocha & Nunes, 2020), with parental controls in place to regulate usage (Santos & Sampaio, 2024). Video calls appear to be the only widely accepted screen exposure, even among parents who otherwise restrict the use of electronic devices (Santos & Sampaio, 2024).
Despite the aforementioned recommendations, screen use among children is common, with television being the most frequently used device (Ponte et al., 2017; Adisak et al., 2018). Other electronic devices are primarily for watching videos (Ponte et al., 2017).
The use of electronic devices due to increased sedentary behaviour have become significant public health concern, particularly as early exposure to screens has been identified as a health risk factor (Hoffmann et al., 2019), and a focus of attention for child health nursing, as childhood plays a vital role in development and health and can have an impact on adulthood (Marinho, 2023).
Given the limited research on sedentary behaviour in toddlers, namely related to screen exposure, and recognising the importance of establishing healthy active behaviours in early childhood, this study aims to analyse the relashionship between toddlers' use of technology and demographic and health variables.

2. METHODS

Quantitative, descriptive and relational cross-sectional cohort study.

2.1 Sample

Non-probabilistic convenience sample was used. We contacted 94 Private Social Solidarity Institutions (IPSS) and private nurseries in the central region of Portugal. 68 (62 IPSS and six private nurseries) agreed to take part in the study. A total of 2036 questionnaires were distributed, corresponding to the entire population of toddlers enrolled in the participating institutions. After collecting and validating the questionnaires, a sample of 808 toddlers was obtained. The sample has a confidence level of 95% and a margin of error of 3% (Confidence Interval).

2.2 Data collection instruments

Data were collected between November 2018 and September 2019 through a questionnaire completed by the parents of the participating children, consisting of two parts: one relating to sociodemographic and health data (age, gender, weight, height,

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hours of sleep) and the other to the use of electronic devices (type of device, time of use during the week and at the weekend) by toddlers.

2.3 Statistical analysis

The data was processed using IBM Statistical Package for the Social Sciences (SPSS) 25. Descriptive statistics were used to determine absolute and percentage frequencies, measures of central tendency, namely averages, and measures of dispersion such as range of variation, coefficient of variation and standard deviation. Univariate and bivariate analyses was used for the variables under study. Taking into account the recommendations of the World Health Organization (WHO, 2019) regarding 24-hour sedentary behaviour, total screen time was calculated for the entireweek (weekdays and weekend) and then divided by the seven days to obtain the daily average.

2.4. Formal and ethical

The study recieved a positive opinion from the Ethics Committee of the University of Porto, Portugal, (opinion no. 263/2018/CETI), was authorised by the heads of the nurseries and all the parents signed an informed consent form.

3. RESULTS

Of the 808 toddlers, 46.5% (n=376) were aged between 12 and <24 months, 44.1% (n=356) were between ≥24-<36months and 9.4% (n=76) 36 months old. The majority (50.4%) were male. The weight of the sample ranged from a minimum of 6.800 kg and a maximum of 21.00 kg (M=11.798 kg; SD=1.917). The average height was 83.65cm (SD=7.16) with a range between 47cm and 104cm. With regard to Body Mass Index (BMI), values ranged from a minimum of 11.56 and a maximum of 38.21.

As for watching TV during the weekdays, across the entire sample, there was a minimum and a maximum of between 5min and 5h, corresponding to an average time of 56min (SD=±46min). Boys watched more TV (M=59min; SD=±48min) than girls (M=53min; SD=±44min). At the weekend, the average time was longer than during the weekdays (M=1h17min; SD=±1h02min), ranging from 5 minutes to 6 hours, with boys again watching TV for longer (Table 1).

With regard to electronic devices (Table 1), they were primarily for playing games, listening to music and watching movies/cartoons. It was found that the total time spent using electronic devices was greater at the weekend (5min to 6h; M=1h10min; SD=±57min) than during the weekdays (10min to 5h; M=56min; SD=±49min).

Table 1 - Time spent watching TV and playing with electronic devices during the week and weekend according to gender

Gender	n	Min.	Máx.	$\overline{X}$	SD	CV%	$\frac{Sk}{Std.\ Error}$	$\frac{K}{Std.\ Error}$
Hours watching TV - weekdays								
Boys	282	5min	5h	59min	48min	81.36	15.34	23.67
Girls	284	5min	4h	53min	44min	83.02	12.39	12.78
Total	566	5min	5h	56min	46min	82.14	19.82	27.31
Hours watching TV - weekend								
Boys	292	5min	6h	1h23min	1h06min	86.18	10.22	8.80
Girls	288	5min	6h	1h11min	57min	51.35	11.02	10.63
Total	580	5min	6h	1h17min	1h02min	87.18	15.24	13.94
Hours with electronic devices – weekdays								
Boys	265	10min	5h	57min	49min	85.96	12.85	14.19
Girls	260	10min	5h	55min	49min	87.50	14.88	20.23
Total	525	10min	5h	56min	49min	87.50	19.43	24.25
Hours with electronic devices – weekend								
Boys	276	5min	6h	1h13min	1h	88.50	12.41	15.41
Girls	275	5min	5h	1h08min	54min	50.0	10.83	9.92
Total	551	5min	6h	1h10min	57min	51.82	16.64	18.73

Abbreviations: - Mean; SD - Standard Deviation; CV% - Coefficient of Variation; SK - Asymmetry; K – Kurtosis

Total screen time was calculated by adding up the time spent watching TV and playing with electronic devices. It was found that the time the children were exposed to the screen throughout the entireweek (weekdays and weekend) varied between a minimum of 10min and a maximum of 18h (M=3h29min; SD=± 2h33min) (Table 2), with boys being the most exposed (M=3h37min; SD=±2h37min boys vs. M=3h21min; SD=±2h30min girls).

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Table 2 - Screen exposure time depending on gender

Total screen hours Gender	n	Min.	Máx.	$\overline{X}$	SD	CV%	$\frac{Sk}{Std.\ Error}$	$\frac{K}{Std.\ Error}$
Boys	345	10min	18h	3h37min	2h37min	70.33	11.68	14.20
Girls	333	10min	16h	3h21min	2h30min	71.65	11.36	11.23
Total	678	10min	18h	3h29min	2h33min	70.82	16.22	18.05

Abbreviations: - mean; SD - Standard Deviation; CV% - Coefficient of Variation; SK - asymmetry; K - Kurtosis.

A one-factor analysis of variance showed that the older children (36 months) had higher averages and those aged 12-<24 months had lower averages in all the variables studied, with statistically significant differences in all cases (p=<0.001 TV; p=0.041 electronic devices; p=<0.001 total screen exposure time) (Table 3).

Table 3 - Time watching TV, playing with electronic devices and screen exposure according to age

Age	12-<24 meses		≥24-<36 meses		36 meses		f	p
Variables	Mean	SD	Mean	SD	Mean	SD		
Tempo TV	1h33min	1h26min	2h07min	1h42min	2h44min	1h58min	18.406	**(***)**
Electronic devices time	1h25min	1h41min	1h38min	1h36min	1h54min	1h44min	3.199	**(*)**
Total screen time	2h47min	2h29min	3h36min	2h34min	4h26min	2h45min	15.664	**(***)**

Analysis of Variance: ***p<0,001; *p<0,05

Regarding the relationship between the use of electronic devices and the child's BMI percentile, although no statistically significant association was found, it was observed that overweight children spent more time watching TV, and normal weight or obese children spent more time playing with electronic devices. Notably, although normal-weight children had the highest overall screen time, overweight and obese children also exhibited high average screen exposure scores (Table 4).

Table 4 - Association between time watching TV, playing with electronic devices and screen exposure and BMI percentile

Percentil de IMC Variáveis	Underweight OM	Normal weight OM	Overweight OM	Obesity OM	KW	(p)
Tempo TV	243.63	334.27	335.99	317.47	1.341	(n. s.)
Tempo dispositivos eletrónicos	305.50	370.57	350.42	370.57	1.455	(n. s.)
Tempo total de ecrã	257.25	372.54	351.99	342.49	3.116	(n. s.)

Abbreviations: OM - Mean Ordination; KW - Kruskal-Wallis Test; n. s. - not significant

Regarding the relationship between technology use and 24-hour sleep duration during the weekdays and weekend, it was found that children who slept less than recommended spent more time watching TV, playing with electronic devices and, consequently, had higher overall screen exposure, with statistically significant differences were found between the groups, with the exception being the time spent with electronic devices during the weekdays (Table 5).

Table 5 - Association between time spent watching TV, playing with electronic devices and screen exposure and 24-hour sleep duration during the weekdays and weekend

24-hour sleep duration	Below recommended OM	Recommended OM	Above recommended OM	KW	(p)
24-hour sleep duration - weekdays					
Time watching TV	409.96	331.53	257.60	7.843	**(*)**
Time on electronic devices	439.11	363.31	345.54	4.262	(n. s.)
Total screen time	466.03	362.13	302.88	9.164	**(**)**
24-hour sleep duration – weekend					
Time watching TV	397.74	334.13	290.30	5.931	**(*)**
Time on electronic devices	459.60	363.42	347.79	6.822	**(*)**
Total screen time	440.08	366.88	309.74	8.858	**(*)**

Abbreviations: OM - Ordination Mean; KW - Kruskal-Wallis Test; **p<0.01; *p<0.05; n. s. - not significant

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4. DISCUSSION

The WHO recommends that parents avoid exposing their children under the age of two to screens (WHO, 2019), however the advent of easy-to-use and affordable miniature multimedia products is leading to excessive exposure among toddlers, with adverse effects such as poor sleep hygiene and an increased risk of overweight/obesity due to prolonged sedentary behaviour (Akbayin et al., 2023).

There was a high level of screen exposure (watching TV or playing with electronic devices) were observed among toddlers, both during the weekdays and at the weekend, with higher exposure at the weekend. Boys and 36-month-olds were the most exposed. These findings align with the existing evidence, which shows that excessive screen time is a habit for many toddlers and that screen exposure time exceeds the WHO's recommended limits.

Several representative worldwide surveys have concluded that 68% of children under the age of two use electronic devices daily, with an average screen exposure time of 2.05 hours per day (Prioreschi & Micklesfield, 2016). Chang and colleagues (2018), in a study of 400 children aged two to five, concluded that 39.3% watched TV almost every day and 12.0% used their smartphone daily. A study of 547 Portuguese children between the ages of zero and five found that 82.0% watched TV for an average of 85 minutes a day and 57.0% used a tablet or smartphone for 51 minutes a day, resulting in an excessive amount of sedentary time (Rocha & Nunes, 2022).

Regarding screen exposure patterns during the week and at the weekend, Chang et al. concluded that children had hiher screen time at the weekend, observing that 48.0% watched TV for more than an hour during weekdays and 63.1% at the weekend, and that it was also at the weekend that children used smartphones for more than an hour, with 31.3% being under 24 months old. Akbayin et al, (2023) reported that children under two had an average daily screen exposure timeof 26min (SD=±44min) on weekdays and 30min (SD=±46min) on weekends, while those over two years old had an average of 66min (SD=±82min) on weekdays and 103min (SD=±91min) on weekends. Other authors report that older children (35.9 months old) spend the most time exposed to screens throughout the day (Bruijns et al.,2020; Rocha & Nunes, 2022), as seen in the present study.

It was found that overweight toddlers spent the most time watching TV, while normal weight and obese children spent the most time playing with electronic devices. Children who slept less than recommended spent the most time watching TV and playing with electronic devices.

Some authors report that excessive screen time has been associated with an increased risk of overweight and obesity, either by reducing the time available for physical activity or by directly impacting metabolism and dietary habits (Stiglic & Viner, 2019; Rodrigues et al., 2020). Another potential adverse effect of excessive exposure to screens is poor sleep hygiene (Mineshita et al., 2021).

Considering the excessive exposure time, the importance of parental guidance on the need to intervene in reducing screen exposure time is recognised, with high-quality, interactive programmes (Jeong et al., 2021; Akbayin et al., 2023). It is essential that electronic devices provide educational content adapted to the age group of children and that their use is supervised by parents. Primary health care professionals, including nurses, should pass on this information because parents' knowledge is a determining factor in modifying their own and their children's behaviours, and interventions focused on the parent/child dynamic promote the development of a healthier early childhood.

Therefore, urgent measures are needed reduce toddlers' screen time to the recommended limits or closer to the recommended limits, to mitigate the associated effects.

One of the limitations of the study was that it was only carried out in one district of the country, meaning the results could not be extrapolated to the Portuguese toddler population. However, we believe that the study can help reinforce the need for nurses to intervene in toddlers' health surveillance consultations to warn them of the importance of avoiding exposure to screens for children up to the age of three.

CONCLUSION

The amount of time children spend exposed to screens, smartphones, computers and tablets is increasing and is a growing concern due to the implications for their development and overall health. The effects of excessive screen exposure during a critical period of brain development are causing increasing concern among health professionals. Spending extended periods in front of screens, especially at home, promotes sedentary behaviours that are detrimental to cardiometabolic and psychological health, and it is possible that these behaviours will lead to worse health outcomes in the long term. Lifestyle changes are at least partially attributable to changes in the sociocultural and physical environments in which toddlers find themselves. Therefore, the phenomenon should be analysed based on a contextualised analysis in a socio-ecological model, since changing behaviour recognises the person in the context of their environment and is useful for contextualising strategies in health education, both for children and for parents and educators. Health professionals, particularly nurses, should educate toodlers' parents about the harmful effects of exposure to screens on their children's health.

DOI: https://doi.org/10.29352/mill0217e.39110

ACKNOWLEDGEMENTS

The authors would like to thank all the parents, children and schools who agreed to take part in the study. Special thanks to Professor João Duarte for his support in the statistical analysis.

AUTHORS' CONTRIBUTION

Conceptualization, C.M., C.K. and M.R.S.; data curation, C.M.; formal analysis, C.M., C.K. and M.R.S.; investigation, C.M.; methodology, C.M., C.K. and M.R.S.; project administration, C.M., C.K. and M.R.S.; supervision, C.K. and M.R.S.; validation, C.M., C.K., I.B., F.J.B. and M.R.S.; writing-original draft, C.M.; writing-review and editing, C.M., C.K., I.B., F.J.B. and M.R.S.

CONFLICT OF INTEREST

The authors declare no conflict of interest.

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