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Early childhood screen time and psychopathology in a Portuguese Sample

Tempo de tela na Primeira Infância e psicopatologia numa amostra portuguesa

Tiempo de pantalla en la primera infancia y psicopatologia en una muestra portuguesa

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ABSTRACT

Objective: To characterize the habits of screen exposure time in a sample of infants and preschoolers and to assess if there is a relationship between the proportion of early childhood excessive screen exposure time and the presence of psychopathology and parental concerns. **Methods:** A cross-sectional cohort study was conducted with 38 infants and preschoolers in a Child and Adolescent Psychiatric outpatient unit and children followed exclusively in Primary Health Care in the same geographic area (Vila Nova de Gaia/ Espinho Hospital Center). Information was collected from a self-report questionnaire filled by the caregiver between October 1st, 2018, and June 30th, 2019. **Results:** Screen time was analyzed and organized in two groups: the H group (screen time higher than recommended) and R group (within the recommended), according to the American Academy of Pediatrics. The need for referral to a Child and Adolescent Psychiatry appointment and the presence of parental behavior concerns related to behavior changes during early childhood are significantly associated with screen time, with a greater proportion within the H group (71.8% (n=15) vs. 31.3% (n=6), p=0.006 for the appointment and 61.1% (n=13) vs. 25% (n=4), p=0.032 for behavior concerns). There is also a tendency towards a higher percentage of overweight/obesity, sleep and food-related concerns in the H group. Only 45% of the total sample fulfilled the recommendations regarding screen exposure (p value ≤0.05). **Conclusion:** The study found an association between screen exposure time above the recommended and presence of psychopathology and parental concern for behavioral changes. These findings were statistically significant.

Descriptors: Television; Attitude to Computers; Cell Phone; Infant; Child, Preschool.

RESUMO

Objetivo: *Pretende-se caracterizar os hábitos de exposição e tempo de tela numa amostra de crianças da primeira infância para avaliar a relação entre a exposição excessiva e a presença de psicopatologia e preocupações parentais.* ***Métodos:*** *Trata-se de um estudo de coorte transversal realizado com 38 crianças da primeira infância da Consulta Externa de Psiquiatria da Infância e Adolescência e crianças acompanhadas exclusivamente em consulta de Cuidados de Saúde Primários da área de referência do Centro Hospitalar de Vila Nova de Gaia/Espinho, Portugal. Recolheu-se a informação através do preenchimento de um questionário pelo cuidador, entre 1 de Outubro de 2018 e 30 de Junho de 2019.* ***Resultados:*** *Analisou-se o tempo de tela, definindo-se dois grupos: H – tempo de tela superior ao recomendado; R – tempo de tela dentro do recomendado pela Academia Americana de Pediatria. A necessidade de acompanhamento em consulta de Pedopsiquiatria e as preocupações parentais relativas a alterações de comportamento estão significativamente associadas com o tempo de tela, com maior proporção no*

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grupo H (71,8%(n=15) vs. 31.3%(n=6), p=0.006 para a consulta de Pedopsiquiatria e 61.1%(n=13) vs. 25%(n=4), p=0.032 para preocupações parentais). Existe ainda uma tendência a uma percentagem mais significativa de excesso de peso/obesidade, problemas de sono e alimentares no grupo H. Apenas 45% do total cumpriu as recomendações relativas ao tempo de tela (valor de p≤0,05). ***Conclusão:*** *Este estudo demonstrou associação entre o tempo de tela superior ao recomendado e presença de psicopatologia, assim como preocupações parentais com alterações de comportamento. Estes resultados apresentam significância estatística.*

Descritores: *Televisão; Atitude com o Computador; Telemóvel; Bebé; Criança; Pré-escolar.*

RESUMEN

Objetivo: *Se pretende caracterizar los hábitos de exposición y tiempo de pantalla en una muestra de niños en la primera infancia para evaluar la relación entre la exposición excesiva y la presencia de psicopatología y preocupaciones parentales.* ***Métodos:*** *Se trata de un estudio de coorte transversal realizado con 38 niños en la primera infancia de la Consulta Externa de Psiquiatría de la Niñez y Adolescencia y niños acompañados exclusivamente en consulta de Cuidados de Salud Primarios del área de referencia del Centro Hospitalario de Vila Nova de Gaia/ Espinho, Portugal. Las informaciones fueron recogidas por medio de cuestionario, rellenado por el cuidador, entre 1 de Octubre de 2018 y 30 de Junio de 2019.* ***Resultados:*** *El tiempo de pantalla fue analizado definiéndose dos grupos: H – tiempo de pantalla superior al recomendado; R – tiempo de pantalla dentro del recomendado por la Academia Americana de Pediatría. La necesidad de acompañamiento en consulta de psiquiatría infantil y las preocupaciones parentales relativas a alteraciones de comportamiento están significativamente asociadas con tiempo de pantalla, con mayor proporción en el grupo H (71,8%(n=15) vs. 31.3%(n=6), p=0.006 para la consulta de psiquiatría infantil y 61.1%(n=13) vs. 25%(n=4), p=0.032 para preocupaciones parentales). Existe aún una tendencia a un porcentaje más significativo de exceso de peso/obesidad, problemas de sueño y alimentarios en el grupo H. Solo 45% del total cumplió las recomendaciones relativas al tiempo de pantalla (valor de p≤0.05).* ***Conclusión:*** *Este trabajo demostró asociación entre el tiempo de pantalla superior al recomendado y presencia de psicopatología, como también preocupaciones parentales con alteraciones de comportamiento. Estos resultados presentan significancia estadística.*

Descriptores: *Televisión; Actitud con el ordenador; Teléfono móvil; Bebé; Niño; Preescolar.*

INTRODUCTION

In recent years we have seen a fast technological evolution, with changes in family habits and the increasing presence of screen time (time of exposure to some type of screen such as computer, television, tablet, or cell phone) in family and children's daily lives. The benefits of technology are undeniable. Technology is present in work, social and cultural areas, making long-distance relationships and interactions possible[1].

Early childhood is a period of life in which development in different areas occurs at an accelerated pace, being particularly susceptible to the influence of environmental factors and the quality of the relationships established between the child and their caregivers[1].

The American Academy of Pediatrics (AAP) guidelines discourage the use of digital media in the first 18 months of life and limit the maximum exposure time to one hour daily between 24 months and 5 years of age, while controlling the quality of the interactive activities. This exposure must always be accompanied by an adult and must avoid passive virtual stimulation. Caregivers must interact with the child and give meaning to what is visualized, establishing connections between the virtual world and reality. They carefully recommend the choice of programs appropriate to the child's development: in which the characters speak directly to the children or call for their active participation (e.g. words repetition) and with strong and structured stories[2]. The Zero to Three National Center for Infants, Toddlers and Families Association shared guidelines not only for choosing programs for children under 3 years of age but also for interacting while viewing programs[3].

Studies have been linking early exposure to digital media to increased externalizing behaviors, attention problems at older ages, worse cognitive performance, worse language development, obesity and qualitative and quantitative decrease in sleep[4,5,6,7,8].

This study aims to clarify and characterize the habits of screen exposure time in a sample of infants and preschoolers, to assess the proportion of early childhood excessive exposure to screen time and to determine if there is a relationship between the presence of psychopathology, parental concerns for behavior changes (sleep, food habits, obesity) and exposure habits. The present study highlights the importance and the need to understand healthy boundaries between children and screen media in order to avoid negative consequences (physical, psychological and psychoneurological) and to promote biopsychosocial and holistic health patterns[6,8].

Thus, this study intends to characterize the habits of screen exposure time in a sample of infants and preschoolers and to assess if there is a relationship between the proportion of early childhood excessive screen exposure time and the presence of psychopathology and parental concerns.

METHODS

A cross-sectional cohort study was carried out. The method used to collect information was a self-report questionnaire filled by the caregiver from October 1st, 2018 to June 30th, 2019.

The study population consisted of patients attending a Child and Adolescent Psychiatric (CAP) outpatient unit at Vila Nova de Gaia e Espinho Hospital Center, Portugal, and children followed exclusively in Primary Health Care in the same geographic area. The inclusion criterion was children aged 0-5 years. Questionnaires were filled in by their parents. The exclusion criterion was the parents' incapacity to fill in the questionnaire.

Questionnaires were printed and parents filled them while they were waiting for the doctor's appointment. No fulfillment time limit was imposed. The sample was a convenience sample - all parents (from the community and CAP unit) were asked to participate and all of the questionnaires were included in the study (between October, 2018 and June, 2019).

A sample of 38 children was obtained: 21 from the Child and Adolescent Psychiatry (CAP) hospital outpatient unit and 17 from the community. The present study included children with psychopathology with follow-up in a CAP unit and children from the community, without psychopathology (excluding children from the community with psychopathology). The main purpose of this division was to be able to compare and associate screen time and psychopathology and explore if there is any difference between screen time in a healthy child from the community and screen time in child from a CAP unit. In this unit, children who are followed are diagnosed according to the Diagnostic Classification of Mental health and developmental disorders of infancy and early childhood (DC-05)[1]. According to DC:0-5's definition, infants and preschoolers are children aged between zero to five years, hence the definition of the age of inclusion in this study[1].

The following data were collected: sex, age, family structure, number of siblings, frequency of kindergarten (infants and preschoolers) or leisure structured activities, age and parental psychopathology, parents' educational qualifications, average daily time of exposure, clarification of the type of devices the child was exposed to (tablet, computer, television, mobile phone), age of onset of exposure, exposure during typical (screen time during weekdays) and atypical (screen time during weekends) days, type of TV program's content (children's, educational, adult programs), screen time together with parents, exposure during meals, at bedtime, background TV, existence of children's own devices (TV in the room, mobile phone, tablet, computer), number of rooms in the house and number of TV sets and caregivers exposure time.

After 18 months of age, the screen time should be less than 1 hour, time counted in every day. On weekends, it is expected that screen time tends to be higher – this fact influenced the division in typical and atypical days, as listed above.

Two groups (Group H and Group R) were defined according to the American Academy of Pediatrics (AAP) screen time recommendations[2] in a typical day. Group R concerning the "within the Recommended" and Group H concerning the "Higher than the recommended". From 0 to 18 months, there is no recommended screen time and after 18 months screen time should be less than one hour per day[2].

A descriptive analysis of the variables was performed to summarize the data. The normality of continuous variables (median of child, mother and father age) was investigated using the Shapiro-Wilk or asymmetry and flattening tests. The Mann-Whitney test was used to compare continuous variables between groups, considering the normality test. Chi-square or Fisher's exact tests were used in univariate analyzes to compare categorical variables (the rest of them/all variables that are not continuous).

The variables were considered significant when $p \leq 0.05$. Statistical analysis was performed using the Statistical Package for the Social Sciences (SPSS®) version 26.

The study protocol was approved by the hospital ethics committee (Approval No. 135/2018). Throughout the process, the Rules of Ethical Conduct and Good Practices were respected in order to comply with the precepts of the Declaration of Helsinki.

RESULTS

Of a total sample of 38 children, 21 were included in group H (Higher than the recommended) and 17 were included in group R (within the Recommended).

The characterization of the sample and groups is described in Table I. The median age of the sample was three years and participants were mostly male (66.6%; n=25). The predominant family structure was nuclear (70.1%; (n=26)), trending towards a greater proportion of mononuclear families in the H group compared to the R group (16.7%; n=3) vs 11.8%; n=1). Kindergarten attendance (including children from 0 to 5 years of age - infants and preschoolers) w more prevalent and, interestingly, the H group tended towards a higher attendance frequency (83.3%; n=18 vs 64.3%; n=11). However, the R group tended towards a higher frequency of leisure structured activities (75%; n=13 vs 25%; n=6). As for the presence of parental psychopathology, it was rare but more frequent in the H group (in the case of maternal psychopathology 9.6% (n=1) vs 0% (n=0)). R group parents tended towards a higher level of education. The groups were relatively homogeneous, with no variables with a significance index. In this case, the Mann-Whitney test was used to compare continuous variables according to the normality test result. Chi-square or Fisher's testes were used to compare categorical variables according to SPSS® values.

Table I - Sample characterization: sociodemographic data. Vila Nova de Gaia e Espinho Hospital Center, Portugal, October 1st, 2018 to June 30th, 2019.

Sample characterization	Total	H	R
Male (%)	66.6 (n=25)	70.6 (n=15)	62.5(n=10)
Age (median [maximum, minimum]) in years	3 [0.5]	3 [0.5]	3 [0.5]
Family structure (%)			
Nuclear	70.1 (n=26)	66.7(n=14)	75 (n=12)
Mononuclear	11.8 (n=4)	16.7 (n=3)	11.8 (n=1)
Institutionalization	17.6 (n=8)	17.6 (n=4)	17.6 (n=4)
Number of siblings (%)			
Zero	34.1 (n=13)	35.3 (n=7)	33.3 (n=6)
One	47 (n=18)	47.1 (n=10)	46.7 (n=8)
Two or more	18.9 (n=7)	17.7 (n=4)	20 (n=3)
Kindergarten attendance (%)	75 (n=29)	83.3 (n=18)	64.3 (n=11)
Leisure structured activities (%)	50 (n=19)	25 (n=6)	75 (n=13)
Mother's age (median [minimum, maximum])	33[20.46]	33[24.46]	31[20.43]
Father's age (median [minimum, maximum])	36[22.50]	35[25.48]	36[22.50]
Maternal psychopathology (%)	2.9 (n=1)	9.6 (n=1)	0 (n=0)
Paternal psychopathology (%)	0 (n=0)	0 (n=0)	0 (n=0)
Maternal education (%)			
Primary	32.4 (n=12)	38.9 (n=8)	25 (n=4)
Secondary	41.2 (n=16)	38.9 (n=8)	43.8 (n=8)
University	26.4 (n=10)	22.2 (n=6)	31.2 (n=5)
Paternal education (%)			
Primary	48.7 (n=19)	58.8 (n=12)	38.1 (n=7)
Secondary	36.4 (n=13)	29.4 (n=6)	43.8 (n=8)
Superior	15.2 (n=6)	11.8 (n=3)	18.1 (n=3)

R - Within AAP's recommended .screen exposure time H – Higher than AAP's recommended .screen exposure time. The valid percentage was used for all categorical variables. The groups were relatively homogeneous, with no variables with a significance index

Only 45% (n=17) of the total sample fulfilled the recommendations regarding screen exposure. Screen time superior to one hour distribution by types of devices and the differences between a typical day (weekday) and an atypical day (weekend) are shown in the descriptive Table II. The most used device was the TV, with an average daily use above one hour in 33.6% (n=13) of the sample on a typical day and 58.6% (n=22) on a weekend day. The use of tablet and mobile phone above the recommended total time was also not negligible. On the contrary, there is no exposure to a computer for more than one hour. This table does not show the variation since it corresponds to the characterization of the exposure time of the total sample (n=38) considering that only 45% (n=17) of the total complied with the recommendations for screen exposure time.

With regard to the type of TV program, 21.9%(n=8) of the sample on a typical day and 50% (n=19) on a weekend day watched (for more than one hour) children targeted programs. 8 children were exposed for more than one hour to adult programs both on weekdays and weekends.

Table II - Screen time superior to one hour distribution by types of devices, type of programs and variation from a typical day/weekday to an atypical day/weekend (total sample). Vila Nova de Gaia e Espinho Hospital Center, Portugal, October 1st, 2018 to June 30th, 2019.

Typical day/weekday	**Total of children* % (n)**
TV > 1h (%)	33.6 (n=13)
Children's programs > 1h (%)	21.9 (n=8)
Educational programs > 1h (%)	0 (n=0)
Adult Programs > 1h (%)	21.7 (n=8)
Tablet > 1h (%)	16.7 (n=6)
Mobile phone > 1h (%)	16.7 (n=6)
Computer > 1h (%)	0 (n=0)
Atypical day/weekend day	
TV > 1h (%)	58.6 (n=22)
Children's programs > 1h (%)	50 (n=19)
Educational programs > 1h (%)	8.7 (n=3)
Adult Programs > 1h (%)	20.8 (n=8)
Tablet > 1h (%)	8.7 (n=3)
Mobile phone > 1h (%)	22.7 (n=9)
Computer > 1h (%)	0 (n=0)

*the values represent the total number of children (total n) who, on a typical or atypical day, spent more than 1 hour on each device

The comparison of the exposure between the groups is shown in Table III. Chi-square or Fisher's exact tests were used according to SPSS® values. Interestingly, the R group tended to start exposure earlier (before 18 months) (92.3% (n=15) vs 66.7% (n=14)) and the first exposure device was mainly the TV (73.3% (n=12)). On the contrary, in the H group there was not a prevailing type of device. In the R group, on a weekend day, only 25% (n=4) of the children were able to follow the recommendations, while in the H group no child did. In both groups, screens were used in the presence of the caregivers (53.1% of the sample (n=20)), with less time together in the R group (42.9% (n=7) vs 61.1% (n=13)). The use of screens during meals and at bedtime was high (72.7% (n=28) and 40.6% (n=15) of the sample, respectively), being significantly higher in the H group (p=0.029 and p=0.05, respectively). Also, the use of background TV was quite high (87.1% of the sample (n=33)), reaching 94.1% (n=20) of those who belonged to the H group.

Children belonging to the H group had more devices of their own: TV in the bedroom (61.1% (n=13) vs 33.3% (n=6)) and their own tablet (22.2% (n=5) vs 13.3% (n=2)). Interestingly, the trend was reversed for cell phones (0% (n=0) vs 6.3% (n=1)). There was a tendency for the number of televisions to exceed the number of rooms in the house (47.1% (n=18) of the total sample), with an even higher number in the H group (55.6% (n=12)). As for the average daily exposure of the caregiver, in 77.3% (n=29) of the total sample it was more than two hours (according to the AAP guidelines, for ages over 5 years, the recommended time is 2 hours maximum). As for the presence of rules regarding screens, there was a total of 70% (n=27) of affirmative answers.

Table III - Characterization of exposure. Vila Nova de Gaia e Espinho Hospital Center, Portugal, October 1st, 2018 to June 30th, 2019. Chi-square or Fisher's exact tests were used according to SPSS® values.

Characterization	Total	H	R	Significance
Onset of exposure below 18 months (%)	77.4 (n=29)	66.7 (n=14)	92.3 (n=15)	p=0.104
TV was the first screen (%)	60.6 (n=23)	50 (n=11)	73.3 (n=12)	p=0.172
Exposure time on atypical day/weekend longer than recommended (%)	89 (n=34)	100 (n=21)	75 (n=13)	p=0.096
Screen together with parents (%)	53.1 (n=20)	61.1 (n=13)	42.9 (n=7)	p=0.305
Use during meals (%)	72.7 (n=28)	88.9 (n=19)	53.3 (n=9)	**p=0.029**
Use at bedtime (%)	40.6 (n=15)	55.6 (n=12)	21.2 (n=3)	**p=0.05**
Background TV (%)	87.1 (n=33)	94.1 (n=20)	78.6 (n=13)	p=0.228
TV in the child's room (%)	48.5 (n=19)	61.1 (n=13)	33.3 (n=6)	p=0.112
Child's own mobile phone (%)	2.9 (n=1)	0 (n=0)	6.3 (n=1)	p=0.4710
Child's own tablet (%)	18.2 (n=7)	22.2 (n=5)	13.3 (n=2)	p=0.423
Child's own computer (%)	0 (n=0)	0 (n=0)	0 (n=0)	
Number of rooms/television ratio (%)				p=0.322
Higher	32.4 (n=12)	33.3 (n=7)	31.3 (n=5)	
Equal	20.6 (n=8)	11.1 (n=2)	31.3 (n=5)	
Lower	47.1 (n=18)	55.6 (n=12)	37.5 (n=6)	
Caregiver exposure over 2h (%)	77.3 (n=29)	81.8 (n=17)	72.7 (n=12)	p=0.5
Presence of rules regarding screens (%)	70 (n=27)	68.8 (n=15)	71.4 (n=12)	p=0.596

R - Within AAP's recommended .screen exposure time H – above AAP's recommended .screen exposure time. The valid percentage was used for all categorical variables.

The outcome is described in Table IV. The need for referral to a Child and Adolescent Psychiatry (CAP) appointment and the presence of behavior concerns during early childhood were significantly associated with screen time, with a greater proportion within the H group (71.8% (n=15) vs 31.3% (n=6), p=0.006 for the appointment and 61.1% (n=13) and 25% (n=4), p=0.032 for behavior concerns). There was also a tendency towards a higher percentage of overweight/obesity, sleep concerns and food-related concerns in the H group.

Table IV - Outcome: Proportion of patients who needed Child and Adolescent Psychiatry follow–up and parental concerns. Vila Nova de Gaia e Espinho Hospital Center, Portugal, October 1st, 2018 to June 30th, 2019. Chi-square or Fisher's exact tests were used according to SPSS® values.

Variables	Total	H	R	Significance
Child and Adolescent Psychiatry appointment (%)	55.9 (n=21)	71.8% (n=15)	31.3% (n=6)	**p=0.006**
Overweight or Obesity (%)	27.8 (n=11)	42.9 (n=9)	18.2 (n=2)	p=0.272
Behavior concerns (%)	44.1 (n=17)	61.1 (n=13)	25 (n=4)	**p=0.032**
Sleep concerns (%)	41.2 (n=16)	50 (n=11)	31.3 (n=5)	p=0.218
Food concerns (%)	9.1 (n=3)	11.8 (n=2)	6.3 (n=1)	p=0.523

R - Within AAP's recommended screen exposure time H – above AAP's recommended screen exposure time. The valid percentage was used for all categorical variables

DISCUSSION

The results of the present study are in line with previous studies that show that exposure to screen is related to social and family characteristics. Studies show an inverse association between parental education, particularly maternal education, and the time of exposure in children, particularly at earlier ages. Low socioeconomic status, single-parent families and high parental exposure habits are also associated with an increase in children's exposure time[9,10,11].

The presence of maternal anxious or depressive symptoms has been associated with increased screen time exposure in young children[12]. Adding to poorer interactions between children and their depressed mothers, when there is background TV, verbal mother-child interaction is reduced[12]. Current literature shows that caregivers tend not to consider background TV as exposure and to consider it as stimulation. Some caregivers consider background TV as pleasant exposure when they have to spend time with a child without verbal language[13,14,15].

The greater the exposure (active and background TV), the less the verbal interaction between the caregiver and the child, contributing to deficits in emotional and social interaction and language[16]. Children's social interaction decreases when the TV is on, particularly among younger children, and parents' responsiveness is also decreased[17]. Children focus their attention more on TV than on parents, which becomes relevant when there is a TV constantly on[16]. Accompanied exposure is higher in not age-appropriate content and verbal interaction during exposure is lower in programs with inappropriate content[18].

The literature shows that children being cared for by nannies or grandparents have higher average exposure time[19]. In the present study, those who attended kindergarten were less likely to respect the recommendations regarding screen time. This is an interesting fact and leads us to a reflection on the capacity to report the screen time when children are not in kindergarten. Parents may not be aware of the time that children spend in front of a screen when they are with grandparents or babysitters (vs kindergarten). When there is a structured leisure activity out of the kindergarten, there is less probability to belong to the H group ("Higher than the recommended" for screen exposure time).

Exposure was high and started before 18 months of age in 77.4% of the total of children, results that are compatible with previous studies[20,21]. It is curious to note that in the present study, the R ("within the Recommended" for screen exposure time) group presented a more premature exposure time. The latter can be associated with a higher parent sensitivity to monitor screen exposure time and consequently report exposure in early ages.

A systematic review of sedentary behaviors in children under two years old states that the proportion of children in this age range without exposure varies between 2.3 and 83%, with screen time varying between 36 and 330 minutes per day[22].

The study found a significant statistical association between children who do not follow the recommendations regarding screen time and the ones with behavior concerns, as well as the need for treatment in a Child and Adolescence Psychiatry (CAP) unit. There are some questions regarding this result that we were unable to substantiate satisfactorily: - Are children perceived as more active and with difficulties in self-regulation more exposed to screen time as a form of calming down or will they be more agitated as a result of excessive exposure to screen time? - Do children experience difficulties as a result of overexposure or deficit in other experiences and stimuli? The literature suggests a positive association between exposure to screens in the first years of life and the increase in externalizing behaviors in early childhood[7], as well as attention problems in preschool and school ages[14,23,24]. Exposure to TV was associated with problems of hyperactivity and attention deficit at early age and a decrease in prosocial behaviors[23,24]. Children with higher exposures have shorter play episodes and moments of initiation of joint attention, having difficulty maintaining attention in a game, often switching between toys[25].Content inappropriate for their age in the first 4 years of life had an adverse effect on cognitive development both at an early age and at school age, with an absence of benefit of exposure even through educational content[8,13]. Development is best achieved if the content is presented through social interaction, particularly at the level of language. The total duration of exposure before 2 years old is associated with a decrease in language scale scores[8,26].

In the present study, the R group ("within the Recommended" for screen exposure time) had less screen time together with parents. Even though statistically not significant, it is a curious fact and we suppose that there is a tendency to report less screen exposure time when parents share less time with children in front of screens. We also found it interesting that children in the R group ("within the Recommended" for screen exposure time) had more mobile phones of their own, while children that spent a lot of time in front of a screen, had more bedroom TVs and their own tablets. There was no explanation for these isolated results.

Many parents incorporate screen time in their children's sleeping routines and the time of exposure to television is inversely associated with the total sleep time, with side effects on the induction, quality and quantity of sleep in younger children[4,27]. An increase of one hour daily exposure to TV is associated with a decrease of 7 minutes of sleep per night[27].

Longer screen exposure time is positively associated with obesity[5]. The risk of childhood obesity increases by 13% for each additional daily hour of exposure to TV. This came as the result of a sedentary lifestyle, intake of highly energetic foods and the effect of advertising (ads are focusing on high-sugar foods), as well as the repercussions of the negative effect on quantity and quality of sleep as a contribution to obesity[28].

Children's characteristics can also influence exposure. Children perceived by their parents as more active are exposed to higher levels of TV daily, with a greater likelihood of being exposed to TV during meals[29]. Children with socio-emotional difficulties are more likely to be given a mobile phone or tablet as a mean of calming down at home[30]. More daily crying time is associated with increased exposure to TV[29]. Children with moderate to severe self-regulation problems at 9 months of age are more exposed to screen time at 2 years of age and are at greater risk of exceeding 2 hours/day. If regulatory problems remain at 24 months of age, the risk of more than 2h/day exposure increases by 40%, while with regulatory problems improving, this risk decreases[30]. The increase in the exposure time of these children might represent a limitation in the remaining experiences. This does not promote development or regulatory improvement, which leads, on the other hand, to an increase in exposure, thus causing a self-reinforced problem[30].

On the one hand, the scientific evidence has shown deleterious effects of screen exposure time both in terms of cognitive and language development and the appearance of externalizing behaviors at school and preschool ages. On the other hand, children with socio-emotional difficulties are also more likely to excessively use screens, being limited in the access to other experiences, thereby aggravating baseline difficulties[29,30]. Further studies are needed in order to better understand the association between presence of psychopathology and screen exposure time.

Hence the importance of discontinuing early habits and consequent risk reduction. It is important to educate families about the recommended screen time limits and appropriate content, as well as the importance of interaction and other experiences for children's development. Several intervention programs reveal the potential effect of basic psychoeducational measures: explaining to parents the adverse effects of exposure time on children's health and development, offering alternative activities. Counseling to parents, working with parental beliefs and using parents as a model, as well as awareness programs in preschools are associated with decreased total screen time and decreased aggression, obesity and sleep difficulties[28].

Overexposure to digital media is an increasingly present reality, making it important to set limits early. Its negative impact is evident in every developmental age[6,8]. The present study supports the idea that exposure to screens is related to modifiable variables (social and family/caregiver characteristics) that in part depend on knowledge and information about healthy recommendations and boundaries. Thus, it is crucial to promote community literacy in this area so that screen use is informed, balanced and that there is discussion and communication about the associated risks. These results lead us to the importance of adapting scientific evidence to the reality of everyday life and to promote awareness-raising actions in the community and primary health care for this topic with an educational aspect in order to support health professionals and parents.

The main limitation of the present study is related to the small sample size obtained. One of the limitations of this work is also the measurement of the exposure perceived by the caregiver rather than by objective assessment. Self-report questionnaires filled in by caregivers allowed an exhaustive information collection but absence of validation limits its interpretation and comparison with other studies. "Screen time" is still a subjective measure, affected by parents' knowledge and memory biases concerning the way that children and adolescents spend time. Undervalued exposure time is presented in a study showing that 120 minutes/day average exposure is perceived as 60 minutes/day[18]. Screen time categorization according to the recommendations did not allow to quantify the excessive screen use (whether the overexposure relates to one hour too much or ten hours too much, for example).

During this study, attendance to a Child Psychiatry appointment and the presence of parental complaints in the domains of behavior, sleep and food were evaluated. The questionnaire did not enable to discriminate the follow-up reason (in the Child and Adolescent outpatient clinic), neither the diagnosis. Further studies should assess this possible cause-effect association through multivariate analysis considering the diagnosis and developmental scales scores (Griffiths Mental Development Scales, for example) in order to better understand the association and the impact of screen time on psycho-affective and cognitive development in early childhood.

CONCLUSION

The present study showed a large number (75%) of infants and preschoolers with screen exposure time higher than the recommended. Of the total 25% who complied with the recommendations, only 25% complied with them if weekends were analyzed separately, thus representing a large exposure to screens.

This study intended to clarify if there is a relationship between excessive screen time and the presence of psychopathology (Child and Adolescent Psychiatry follow-up and diagnosis according to DC 0-5). The study found a

statistically significant association between screen exposure time and follow-up in Child and Adolescence Psychiatry appointment as well as screen exposure time and parental concerns for behavior changes. This demonstrates the impact that excessive screen time may have and the importance of developing preventive awareness-raising actions in the community and in primary health care. Furthermore, it elucidates the importance of future studies in order to better characterize the association and impact that were found in this study.

CONFLICTS OF INTEREST

We have no conflicts of interest to disclose.

CONTRIBUTIONS

Susana Santos, **Sofia Pires** and **Ana Vera Costa** contributed to the review of the literature on the subject. **Ana Vera Costa**, **Mariana Pessoa** and **Ana Sofia Pires** contributed to data collection and analysis. All authors contributed to the study design and preparation of the manuscript and are publicly responsible for its content.

REFERENCES

1. Klaehn RLP. DC:0-5: Diagnostic Classification of Mental health and developmental disorders of infancy and early childhood. Infant Mental Health Journal [Internet]. 2018 [accessed on 2022 Nov 07];39. Available from: https://doi.org/10.1002/imhj.21714.
2. American Academy of Pediatrics. Media and Young Minds: Council on communications and media. Pediatrics [Internet]. 2016 [accessed on 2022 Nov 07];138(5):e20162591. Available from: https://doi.org/10.1542/peds.2016-2591.
3. Zero to three. Making Good Decisions About “Screen Time” for Young Children [Internet]. [Unknown local]: [Unknown editor]; 2009 [accessed on 2022 Nov 07]. Available from: https://www.zerotothree.org/resource/making-good-decisions-about-television-and-screen-time-for-young-children/.
4. Kahn M, Schnabel O, Gradisar M, Rozen GS, Slone M, Atzaba-Poria N, et al. Sleep, screen time and behaviour problems in preschool children: an actigraphy study. Eur Child Adolesc Psychiatry [Internet]. 2021 [accessed on 2022 Nov 07];30(11):1793-1802. Doi: 10.1007/s00787-020-01654-w.
5. Wu Y, Amirfakhraei A, Ebrahimzadeh F, Jahangiry L, Abbasalizad-Farhangi M. Screen Time and Body Mass Index Among Children and Adolescents: A Systematic Review and Meta-Analysis. Front Pediatr. [Internet]. 2022 [accessed on 2022 Nov 07];10(10):822108. doi: 10.3389/fped.2022.822108.
6. Lissak G. Adverse physiological and psychological effects of screen time on children and adolescents: Literature review and case study. Environ Res. [Intenet]. 2018 [accessed on 2022 Nov 07];164:149-157. doi: 10.1016/j.envres.2018.01.015.
7. Kahn M, Schnabel O, Gradisar M, Rozen GS, Slone M, Atzaba-Poria N, et al. Sleep, screen time and behaviour problems in preschool children: an actigraphy study. Eur Child Adolesc Psychiatry [Internet]. 2021 [accessed on 2022 Nov 07];30(11):1793-1802. doi: 10.1007/s00787-020-01654-w.
8. Axelsson EL, Purcell K, Asis A, Paech G, Metse A, Murphy D, et al. Preschoolers’ engagement with screen content and associations with sleep and cognitive development. Acta Psychol (Amst). [Internet]. 2022 [accessed on 2022 Nov 07];230:103762. Doi: 10.1016/j.actpsy.2022.103762.
9. Shah PE, Hirsh-Pasek K, Kashdan TB, Harrison K, Rosenblum K, Weeks HM, et al. Daily television exposure, parent conversation during shared television viewing and socioeconomic status: Associations with curiosity at kindergarten. PLoS One [Internet]. 2021 [accessed on 2022 Nov 07]28;16(10):e0258572. Doi: 10.1371/journal.pone.0258572.
10. Pons M, Bennasar-Veny M, Yañez AM. Maternal Education Level and Excessive Recreational Screen Time in Children: A Mediation Analysis. Int J Environ Res Public Health [Internet]. 2020 [accessed on 2022 Nov 07];17(23):8930. Doi: 10.3390/ijerph17238930.
11. Langøy A, Smith ORF, Wold B, Samdal O, Haug EM. Associations between family structure and young

people's physical activity and screen time behaviors. BMC Public Health [Internet]. 2019 [accessed on 2022 Apr 25];19(1):433. doi: 10.1186/s12889-019-6740-2.

12. Cowderoy G, Power J, Lewis A, Watson S, Galbally M. The impact of maternal perinatal depression on exposure to reading and screen time for their infants: pilot findings from the MPEWS Study. Australas Psychiatry [Internet]. 2020 [accessed on 2022 Nov 07];28(5):559-562. Doi: 10.1177/1039856220928869.
13. Nichols DL. The context of background TV exposure and children's executive functioning. Pediatr Res. [Internet]. 2022 [accessed on 2022 Nov 07]; 12:1–7. Doi: 10.1038/s41390-021-01916-6.
14. Guellai B, Somogyi E, Esseily R, Chopin A. Effects of screen exposure on young children's cognitive development: A review. Front Psychol. [Internet]. 2022 [accessed on 2022 Nov 07];13:923370. Doi: 10.3389/fpsyg.2022.923370.
15. Stiller A, Weber J, Strube F, Mößle T. Caregiver Reports of Screen Time Use of Children with Autism Spectrum Disorder: A Qualitative Study. Behav Sci (Basel) [Internet]. 2019 [accessed on 2022 Nov 07];9(5):56. Doi: 10.3390/bs9050056.
16. Ribner AD, Barr RF, Nichols DL. Background media use is negatively related to language and literacy skills: indirect effects of self-regulation. Pediatr Res. [Internet]. 2021 [accessed on 2022 Nov 07];89(6):1523-1529. Doi: 10.1038/s41390-020-1004-5.
17. Schwarzer C, Grafe N, Hiemisch A, Kiess W, Poulain T. Associations of media use and early childhood development: cross-sectional findings from the LIFE Child study. Pediatr Res. [Internet]. 2022 [accessed on 2022 Nov 07];91(1):247-253. Doi: 10.1038/s41390-021-01433-6.
18. Mendelsohn AL, Berkule SB, Tomopoulos S, Tamis-LeMonda CS, Huberman HS, Alvir J, et al. Infant television and video exposure associated with limited parent-child verbal interactions in low socioeconomic status households. Arch Pediatr Adolesc Med. [Internet]. 2008 [accessed on 2022 Nov 07];162(5):411-7. Doi: 10.1001/archpedi.162.5.411.
19. Lin LY, Cherng RJ, Chen YJ, Chen YJ, Yang HM. Effects of television exposure on developmental skills among young children. Infant Behav Dev. [Internet]. 2015 [accessed on 2022 Nov 07];38:20-6. Doi: 10.1016/j.infbeh.2014.12.005.
20. Dias A, Almeida C, Lobo A, Veiga G. Os média e as crianças lá de casa. Rev. Saú. Inf. 2013;35(2): 55–60.
21. Figueiredo M, Sousa C, Teixeira C, Pinto F. Hábitos de Exposição ao Ecrã de uma População Pediátrica de uma Área Urbana Margarida. Nasc. e Cres. 2008;17(4):224–227.
22. Downing KL, Hnatiuk J, Hesketh KD. Prevalence of sedentary behavior in children under 2 years: A systematic review. Prev Med. [Internet]. 2015 [accessed on 2022 Nov 07];78:105-14. Doi: 10.1016/j.ypmed.2015.07.019.
23. Vaidyanathan S, Manohar H, Chandrasekaran V, Kandasamy P. Screen Time Exposure in Preschool Children with ADHD: A Cross-Sectional Exploratory Study from South India. Indian J Psychol Med. [Internet]. 2021 [accessed on 2022 Nov 07];43(2):125-129. Doi: 10.1177/0253717620939782.
24. Tamana SK, Ezeugwu V, Chikuma J, Lefebvre DL, Azad MB, Moraes TJ, et al. Screen-time is associated with inattention problems in preschoolers: Results from the CHILD birth cohort study. PLoS One [Internet]. 2019 [accessed on 2022 Nov 07];14(4):e0213995. Doi: 10.1371/journal.pone.0213995.
25. Gueron-Sela N, Gordon-Hacker A. Longitudinal Links Between Media Use and Focused Attention Through Toddlerhood: A Cumulative Risk Approach. Front Psychol. [Internet]. 2020 [accessed on 2022 Nov 07];11:569222. Doi: 10.3389/fpsyg.2020.569222.
26. Martinot P, Bernard JY, Peyre H, Agostini M, Forhan A, Charles MA, et al. Exposure to screens and children's language development in the EDEN mother-child cohort. Sci Rep. [Internet]. 2021 [accessed on 2022 Nov 07];11(1):11863. Doi: 10.1038/s41598-021-90867-3.
27. Cespedes EM, Gillman MW, Kleinman K, Rifas-Shiman SL, Redline S, Taveras EM. Television viewing, bedroom television, and sleep duration from infancy to mid-childhood. Pediatrics [Internet]. 2014 [accessed on 2022 Nov 07];133(5):e1163-71. Doi: 10.1542/peds.2013-3998.
28. Zimmerman FJ, Ortiz SE, Christakis DA, Elkun D. The value of social-cognitive theory to reducing preschool

TV viewing: a pilot randomized trial. Prev Med. [Internet]. 2012 [accessed on 2022 Nov 07];54(3-4):212-8. Doi: 10.1016/j.ypmed.2012.02.004.

29. Sarı BA, Taner HA, Kaya ZT. Screen media exposure in pre-school children in Turkey: the relation with temperament and the role of parental attitudes. Turk J Pediatr. [Internet]. 2021 [accessed on 2022 Nov 07];63(5):818-831. Doi: 10.24953/turkjped.2021.05.010.

30. Radesky JS, Peacock-Chambers E, Zuckerman B, Silverstein M. Use of Mobile Technology to Calm Upset Children: Associations With Social-Emotional Development. JAMA Pediatr. [Internet]. 2016 [accessed on 2022 Nov 07];170(4):397-9. Doi: 10.1001/jamapediatrics.2015.4260.

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