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Evaluating screen exposure in very young children: insights from the Italian Surveillance System of children aged 0-2 years

Enrica Pizzi[1], Anna Ewa Kaminska[2], Michele Antonio Salvatore[3], Mauro Bucciarelli[1], Margherita Tommasella[1,4], Giorgio Tamburlini[5], Serena Donati[1] on behalf of the 2022 Surveillance of children aged 0-2 years Group*

[1]Centro Nazionale per la Prevenzione delle Malattie e la Promozione della Salute, Istituto Superiore di Sanità, Rome, Italy
[2]Dipartimento di Sanità Pubblica e Malattie Infettive, Sapienza Università di Roma, Rome, Italy
[3]Servizio Censimento della Popolazione e Integrazione delle Indagini Sociali, Istituto Nazionale di Statistica, Rome, Italy
[4]Dipartimento di Biomedicina e Prevenzione, Università di Roma "Tor Vergata", Rome, Italy
[5]Centro per la Salute delle Bambine e dei Bambini, Trieste, Italy
**The members of the 2022 Surveillance of children aged 0-2 years Group are listed before the References*

Abstract

Objective. To describe screen exposure and its association with socio-economic characteristics in a large representative sample of children aged 0-2 years in Italy.

Materials and methods. Data from the 2022 Italian Surveillance of children aged 0-2 years, collected on 35,550 mothers, were analysed to estimate the prevalence of screen exposure. Logistic regression was used to investigate the association between exposure and potential predictors.

Results. Overall, 39.2% of children aged 2-15 months were exposed to digital screens. The exposure prevalence increased with age, ranging from 13.9% at 2-3 months to 61.9% at 13-15 months. Screen exposure was significantly more frequent among children of mothers with non-Italian citizenship, having lower levels of education, reporting economic difficulties, non-participating in antenatal classes (ACs), and residing in the center-south.

Conclusions. Most babies, particularly from low socio-economic status (SES) families, were exposed to screens in a period when this may interfere with responsive caregiving and thus with early child development. It is imperative to inform parents and caregivers about the risks of early exposure since the first months of life.

Key words

- surveillance
- screen exposure
- young children
- parental responsiveness

INTRODUCTION

The use of screen technologies (smartphones, tablets, personal computers, television and video games) has become widespread in recent years [1]. The onset of the COVID-19 pandemic has exacerbated this trend, leading to a reduction in the age in which individuals access digital technologies [2-4].

Recently, the Convention on the Rights of the Child addressed the issue of digital technologies, emphasizing the need to ensure the potential benefits while mitigating associated harms, especially for children in vulnerable situations [5].

Research on the effects of exposure to screens continues to evolve, highlighting the complexity of the issue and underscoring the public health importance of addressing screen exposure from early childhood, as it can significantly impact the psychophysical development of children because the foundations of later development are posed during these crucial early years of life [6]. In recent years, many studies have addressed digital addiction, which has become a significant public health priority [7]. To effectively research and promote interventions in this area, it is crucial to consider the life course approach [8].

Address for correspondence: Enrica Pizzi, Centro Nazionale per la Prevenzione delle Malattie e la Promozione della Salute, Istituto Superiore di Sanità, Viale Regina Elena 299, 00161 Rome, Italy. E-mail: enrica.pizzi@iss.it.

International health organizations issued guidelines around age-appropriate screentime. The World Health Organisation (WHO) recommends that children under the age of 2 should not be exposed to any screens, while screentime in children between 2 and 5 years of age should be limited to 1 hour per day, the less is better [9]. The American Academy of Pediatrics (AAP) recommends "minimizing or eliminating media exposure, other than video chatting, for children under the age of 18 months" [10]. Screentime in older children should possibly involve interactive and educational content, supervised by an adult. Children need exploration and relational exchanges with caregivers for their cognitive and emotional development, and this crucial learning can't be mediated by screen devices [1, 11, 12]. Thus, providing alternatives to passive screen consumption is strongly encouraged.

Despite these recommendations, children are being exposed to screen technologies from a very young age [1, 13]. Screens are used to distract, calm, or entertain the child, as an educational tool or simply being present in the background during other activities [1, 14].

A recent systematic review and meta-analysis found that only a minority of young children adhere to the recommended screentime limits, with a large variability worldwide. In total, 75.3% of children under 2 years of age were found to be not adhering to the guideline of no screen time [15]. Many studies have also found that the time children spend watching screens is influenced by socio-economic determinants: higher mother's level of education and higher household income correlate with less screentime [13, 15, 16].

Since screens have become such a pervasive part of children's lives, researchers have started to investigate the potential consequences [17-21]. Excessive or inappropriate screentime has been associated with delays in learning, language and self-regulation [14, 19-21].

Some argue that most of the evidence regarding screentime and developmental problems is correlational, not allowing to prove causality, as children with developmental difficulties may be more prone to engage in excessive screen time [22].

Other studies have emphasized the importance of context, beyond sheer screen time. In a narrative review Guellai and colleagues have underlined four aspects that may modulate the effect of screens on young children's cognition: the quality and age-appropriateness of media content, the caregiver's participation, the interactivity of the program and the presence of a screen in the background [1].

It is also of note that the time spent in front of a screen is subtracted from other occupations, including outdoor physical activities, exploring the environment, relational and bonding time [11, 14]. Finally, excessive sedentary screen watching may put children at a higher risk of obesity, sleep disturbances and relational problems [9, 23-26]. In the first years of life, a child's brain is extremely plastic, new competences are acquired and the capacity for future learning develops [27, 28]. It is a crucial time of opportunity for health promotion, therefore international organisations such as WHO and UNICEF have encouraged the development of national policies aimed at interventions in infancy and young childhood for a fair start in life [29, 30]. However, effective policies need data in order to plan targeted interventions, as recommended by the WHO [30].

Since 2019 the "Surveillance System for the main determinants of health in children aged 0-2 years" (Surveillance of children aged 0-2 years), promoted by the Italian Ministry of Health and coordinated by the Italian National Institute of Health (Istituto Superiore di Sanità, ISS), has been collecting information on behaviours recognized as risk or protective factors for the children's health, including screen exposure.

The main objective of this paper is to describe the daily frequency of screen exposure in children under 2 years in Italy, and to assess associated factors using data from the 2022 Surveillance of children aged 0-2 years.

MATERIALS AND METHODS

The Surveillance of children aged 0-2 years was based on cross-sectional sample surveys repeated at regular intervals among mothers of children up to 2 years of age taken to vaccination centers (VCs) to receive immunizations in the Italian regions. Mothers were enrolled in all the VCs of the regions when one of the following vaccine doses was administered to their children: first, second, third dose of mandatory vaccine against diphteria, tetanus and pertussis (DTP) or hexavalent vaccine (against diphtheria, tetanus, pertussis, poliomyelitis, haemophilus influenzae type B, and hepatitis B), and first dose of the vaccine against measles, mumps, rubella, varicella (MMRV). Four independent samples in each region were selected in correspondence with the four doses corresponding approximately to the ages 2-3 months, 4-5 months, 11-12 months and 13-15 months, according to the Italian vaccination schedule.

Mothers self-completed an anonymous questionnaire online or on paper with the support of trained health professionals during the waiting periods before or after the vaccination session.

The Surveillance collects information on several important children health determinants including exposure of children to screens (tablet, mobile phone, TV, computer). Demographic and socio-economic characteristics of participants were also collected. For further methodological details see Appendix 1 in the paper by Pizzi *et al*. previously published on Annali dell'Istituto Superiore di Sanità [31].

The present study used data of the second round of the Surveillance, conducted between June and October 2022 in the Italian regions, except for the Region of Molise and the autonomous province of Bolzano, who did not participate in the Surveillance (the Molise Region had difficulty starting the data collection while the autonomous province of Bolzano was unable to complete it), and Region of Tuscany who shared results of its ongoing maternity care survey.

Outcome

Exposure to screens (yes/no) was included in the analysis as outcome variable. Mothers were asked if their children spend time in front of a screen (TV, com-

puter, tablet and/or mobile phone) and how long per day. Children who spend time in front of a screen were considered exposed.

Covariates

The following socio-economic characteristics were included as potential risk factors: mother's age (<30, 30-34, ≥35 years), citizenship (Italian, not Italian), educational level (low, middle school or lower; medium, high school; high, bachelor's degree or higher), perceived economic difficulties (no, some/many), parity (primiparous, multiparous), attendance of an antenatal class (AC) (yes, never), geographical area of residence (North, Centre, and South Italy), and family type (mother permanently cohabiting in couple, single parent).

Statistical analysis

Frequency distributions, prevalence rates and odds ratios (ORs) with 95% confidence intervals (CIs) were used to describe data. Percentages were calculated based on cases with available information excluding missing values. From the overall sample, specific age groups were selected for the analysis of exposure to screens, irrespective of the administered vaccine dose (*Table S1 available online as Supplementary Materials*).

Frequency distributions were used to describe both socio-economic characteristics of mothers participating in the study and daily exposure to screens of children at different ages within the 0-2 years class.

Prevalence rates of exposure stratified by socio-economic characteristics were calculated. Adjusted ORs and their 95% CIs were estimated through a multiple logistic regression model in order to explore factors associated with the exposure to screens.

Statistical analyses were performed using STATA/SE version 18.0 statistical software.

RESULTS

The present study involved 35,550 mothers with a response rate of 95.7% (ranging between 89.2% and 98.6% at the regional level). The socio-economic characteristics of women participating in the study are shown in *Table 1*. More than 4 out of 10 mothers were aged ≥35 years, 12.2% were foreigners. Four out of 10 obtained a bachelor's degree and about one third reported economic difficulties. Women who never attended an AC were 38.8%, and 2.9% were single parents.

Table 2 presents the daily frequency of exposure to TV, computers, tablets, and/or mobile phones among children of different age groups. Among children aged 2-3 months, 13.9% were exposed to screens, with the majority (10.5%) spending less than one hour per day in front of a screen. The percentage of exposure increased with the age of children, affecting over 6 out of 10 children in the 13-15 months age group, with 2 out of 10 (20.1%) exposed for more than one hour per day, and 3.0% spending more than three hours per day. Three-quarters of the children (75.9%) were exposed to screens in the presence of an adult, either parent or another caregiver, 13.7% were alone or with other children during screen time, and 10.4% were exposed indiscriminately, either with adults, alone, or with other children (data not reported in *Tables*).

Table 3 shows prevalence rates stratified by socio-economic characteristics and adjusted ORs of exposure to screens among children aged 2-15 months. Children significantly more likely exposed included those with mothers who had foreign citizenship (OR=1.27; 95% CI: 1.15-1.42), lower educational level (medium: OR=1.29; 95% CI: 1.20-1.39; low: OR=1.46; 95% CI: 1.32-1.63),

Table 1
Women's socio-demographic characteristics (n=35,550)

Variables	(%)
Age	
≤29 years	21.5
30-34 years	35.0
≥35 years	43.5
Missing	*5.5*
Citizenship	
Italian	87.8
Not Italian	12.2
Missing	*5.1*
Educational level	
Low	14.8
Medium	45.4
High	39.9
Missing	*4.9*
Economic difficulties	
None	65.5
Some/many	34.5
Missing	*4.6*
Parity	
Primiparus	54.2
Multiparous	45.8
Missing	*7.8*
Geographical area	
North	45.9
Center	16.4
South	37.7
Missing	*0.0*
Attendance of an antenatal class	
Never	38.8
Yes	61.2
Missing	4.2
Family type	
Cohabiting in couple	97.1
Singol parent	2.9
Missing	*4.7*

Table 2
Children at different ages by daily frequency of exposure to screens

Exposition hours/day	Children aged 2-3 months		Children aged 4-5 months		Children aged 11-12 months		Children aged 13-15 months		Children aged 2-15 months	
	n	(%)	n	(%)	n	(%)	n	(%)	n	(%)
Never	7,271	86.1	6,210	69.0	3,204	45.1	2,086	38.1	18,771	60.8
Yes	1,116	13.9	2,572	31.1	3,695	54.9	3,231	61.9	10,614	39.2
Less than one hour a day	*804*	*10.5*	*2,035*	*24.7*	*2,670*	*39.3*	*2,153*	*41.8*	*7,662*	*28.2*
1-2 hours a day	*256*	*2.9*	*465*	*5.3*	*857*	*12.9*	*913*	*17.1*	*2,491*	*9.2*
3 hours or more a day	*56*	*0.6*	*72*	*1.1*	*168*	*2.7*	*165*	*3.0*	*461*	*1.8*
Total	8,387	100.0	8,782	100.0	6,899	100.0	5,317	100.0	29,385	100.0

Table 3
Prevalence rates of exposure to screens and mutually adjusted odds ratios for the reported variables. Logistic regression model. Children aged 2-15 months

Variables	(%)	OR	95% CI	
Age				
≤29 years	44.1	1		
30-34 years	38.1	0.93	0.85	1.02
≥35 years	37.6	0.99	0.91	1.08
Citizenship				
Italian	38.4	1		
Not Italian	45.3	1.27	1.15	1.42
Educational level				
Low	47.4	1.46	1.32	1.63
Medium	42.0	1.29	1.20	1.39
High	33.0	1		
Economic difficulties				
None	36.1	1		
Some/many	45.6	1.33	1.24	1.43
Parity				
Multiparous	37.4	1		
Primiparus	40.3	1.21	1.13	1.29
Geographical area				
North	34.2	1		
Center	38.9	1.20	1.10	1.30
South	46.3	1.51	1.41	1.62
Attendance of an antenatal class				
Yes	34.8	1		
Never	46.0	1.26	1.17	1.35
Family type				
Cohabiting in couple	39.0	1		
Single parent	43.2	0.97	0.79	1.18

CI: confidence interval.

reported economic difficulties (OR=1.33; 95% CI: 1.24-1.43), were primiparous women (OR=1.21; 95% CI: 1.13-1.29), mothers who never attended an AC (OR=1.26; 95% CI: 1.17-1.35), and those residing in the Centre (OR=1.20; 95% CI: 1.10-1.30) and South Italy (OR=1.51; 95% CI: 1.41-1.62). No statistically significant associations were found with either maternal age or family type.

DISCUSSION AND CONCLUSIONS

Despite the international guidelines discouraging to expose children in the age range that we surveyed to any type of screen [9-13], our findings highlighted how exposure to digital technologies occurs at a very early age and increases as children grow older, in line with a growing body of literature [1, 13, 32]. The 2020 USA common sense census survey found that children under the age of 2 were exposed daily to an average of 49 minutes of screen time, compared to 2 hours 30' in children of 2-4 years and 3 hours 5' in children of 5-8 years [13]. Furthermore, during the pandemic emergency an increase in screen time has been observed in children and adults, including young children [33]. In 2016, Balbinot and colleagues published a study on parents' attitudes to screen exposure in Italian children, where more than 1/3 of parents reported the use of screen devices to keep calm their children under 12 months of age, while parents of toddlers reported an even higher use of screens for this purpose [6].

Our data showed that adult caregivers are mostly present (75.9%) during screen time, however, it is of note that the recommendation to be present during exposure only applies to children older than those we focused on in this study.

Research has shown that such young children can learn little to nothing from a screen device because they learn through interaction and social modelling that are crucial in the first years of life [1, 14].

A noticeable gradient in the association between socio-economic characteristics and screen exposure was found, indeed, mothers with a medium or low level of education as well as those reporting economic difficulties were more likely to expose their children to screens compared to less disadvantaged mothers. A US study on young children's screen time using data from 1997 and 2014, before and after the widespread availability of mobile devices, highlighted that in both years, the lower screen time group was associated with higher income and educational level of the family [16]. Also, the Common Sense Census survey concluded that the general increase in children's screen time seems to be led by the lower income group [13].

A higher occurrence of exposure was found in children of non-Italian mothers, confirming the greater vulnerability of foreign women who often live in conditions of social deprivation and suffer from the lack of a supportive family network. Similarly, women residing in the southern regions of the country exhibited a higher tendency to expose their children to screens compared to those in northern Italy, confirming the challenge of adhering to best practices aimed at protecting health during the first years of life in this area of the country [34].

Finally, screen exposure was significantly more common among mothers who did not attend an AC compared to those who did. ACs offer support to mothers and parents, particularly during pregnancy and the postnatal period [35, 36], contributing to higher rates of exclusive breastfeeding among participating mothers [37].

The main strengths of this study were the standardized and validated data collection procedures, the representative sample of the population studied, and the training provided to all professionals involved in the Surveillance.

The study limits included the lack of detailed information on exposure content/context and the device used. However, considering that screen time is universally discouraged within the age range investigated by the surveillance, inquiring about the context seemed unnecessary for the purposes of this study.

Understanding the screen time limits recommended by health organisations and being aware of the implications of digital content and context are fundamental for both parents and for all caregivers. In this regard, several initiatives are being developed in Italy [38].

Among interventions on children's screen time, restrictions and limitations may not be effective [39], therefore parents and caregivers should strive to offer children quality time alternatives to passive screen viewing, exposing them from a young age to music, reading books, interactive play and physical exploration in nature [40]. All professionals working in health and education could have a key role in informing and supporting parents and caregivers about this topic since the family environment is the first place of learning for the child [41, 42]. A critical aspect to consider is the excessive use of screen devices by parents, that has been negatively associated with parental responsiveness [43]. This aspect entails the ability to pay attention, understand, and respond to the child's needs, which are fundamental for developmental outcomes [44, 45]. Some studies suggest that screen devices themselves are not the sole cause of a lower quality parent-child interaction but rather may reflect underlying issues in the relationship [46], Increased technology use among parents was found to be associated with less parent-child interactions, increased media use by children, and child psychosocial difficulties [45], suggesting that parents should reflect upon their own media usage habits.

Since children imitate their parents' behaviour and routines, families' habits are generally transferred to the next generation, including parental media use [45].

In this regard, the ONU [5] has recently expressed itself, stressing that states should develop guidelines directed to parents, health and education service providers to promote a healthy balance between digital and non-digital activities and adequate rest periods taking into account the child's developmental needs.

In conclusion, the surveillance data highlights the widespread use of devices among children under the age of 2 in Italy. The findings also outline associated factors that could be improved, presenting intervention opportunities whose effectiveness will be measured through the data collected in future rounds of the national surveillance.

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Ethical approval

The Surveillance of children aged 0-2 years study protocol and questionnaire were formally approved by the National Ethics Committee for clinical trials of public research bodies of the Italian National Institute of Health (Istituto Superiore di Sanità, ISS) (Prot. n. PRE-4255 – 20/10/2014; Prot. n. PRE-BIOCE 10939 – 06/04/2018; Prot. n. 0015067 PRE BIO – 19/04/2022).

Authors' contributions

EP, MAS conceptualized and designed the study; MAS, analysed the data; EP, MAS, AEK wrote the first draft; SD, GT, MT, MB, EP critically reviewed the manuscript. All Authors have revised the manuscript and approved its final version.

Conflict of interest statement

None of the Authors declare competing financial interests.

Members of the 2022 Surveillance System of children aged 0-2 years Group

Enrica Pizzi, Serena Donati, Michele Antonio Salvatore, Laura Lauria, Mauro Bucciarelli, Silvia Andreozzi, Claudia Ferraro, Monica Pirri (Istituto Superiore di Sanità, Rome, Italy), Maria Grazia Privitera, Renata Bortolus (Ministero della Salute, Rome, Italy), Manuela Di Giacomo (Regione Abruzzo), Maria Angela Mininni (Regione Basilicata), Anna Domenica Mignuoli, Dario Macchioni (Regione Calabria), Gianfranco Mazzarella (Regione Campania), Simona Di Mario (Regione Emilia Romagna), Luca Ronfani, Luisella Giglio, Claudia Carletti, Federica Concina, Alessandra Knowles, Paola Pani (Regione Friuli Venezia Giulia), Lilia Biscaglia, Maria Gabriella Calenda, Patrizia Proietti, Daniela Porta (Regione Lazio), Camilla Sticchi, Laura Pozzo (Regione Liguria), Corrado Celata, Fabio Mosca, Edda Pellegrini (Regione Lombardia), Marco Morbidoni, Annalisa Cardone, Antonella Guidi, Cristina Mancini (Regione Marche), Michele Colitti (Regione Molise), Marcello Caputo, Vittorina Buttafuoco (Regione Piemonte), Anna Pedrotti, Maria Grazia Zuccali, Laura Battisti (Provincia Autonoma di Trento), Sabine Weiss (Provincia Autonoma di Bolzano), Maria Teresa Balducci, Nehludoff Albano, Mariangela Dafne Vincenti (Regione Puglia), Maria Antonietta Palmas, Noemi Mereu (Regione Sardegna), Maria Paola Ferro, Patrizia Miceli (Regione Sicilia), Anna Ajello (Regione Toscana), Manila Bonciani (Scuola S. Anna, Pisa), Anna Maria Covarino, Enrico Ventrella (Regione Valle d'Aosta), Federica Michieletto, Anna Sabbadin, Diana Gazzani (Regione Veneto).

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