The Egyptian Journal of Hospital Medicine (October 2025) Vol. 101, Page 4877-4884

Screen Exposure and Developmental Outcomes among Children Aged 2-24 Months Old in Ismailia, Egypt: A Cross-Sectional Study

Afnan Mohamed Ahmed Kamal, Haidi Choukri Elias,
Khadiga Mohamed Fathy Dandash, Bassma Abdelhadi Ibrahim*
Department of Public Health, Community Medicine, Environmental Medicine, and Occupational Medicine, Faculty of Medicine, Suez Canal University, Ismailia, Egypt
***Correspondence author:** Bassma Abdelhadi Ibrahim, **Email:** basma_ibraheem@med.suez.edu.eg, **Mobile number:** +201226277842

ABSTRACT

Background: Prolonged screen exposure negatively impacts early childhood development. Risks associated with screen exposure in children are classified into developmental, psychosocial, and physical categories.

Aim: This study aimed to estimate the extent of screen exposure among children aged 2-24 months, identify the possible risk factors of screen exposure, and examine the health effect of screen exposure on their development.

Subjects and Methods: A cross-sectional study was carried out in Ismailia city's Primary Health Care Units (PHCUs) using a multistage random sample to gather data from mothers of children aged 2-24 months (n=310). Interview questionnaire collected family and child socio-demographic information, screen exposure assessment, and child developmental milestones using the Arabic Ages and Stages version.

Results: The study showed that only 9.7% of the studied children were meeting the American Academy of Pediatrics (AAP) and World Health Organization (WHO) guidelines of zero screens before two years old. Television (TV) viewing was the most popular (96.4%) among children, followed by smartphones (52.1%). A significant negative association was found between children's screen exposure time and their development in communication (r= -0.493, p <0.001), fine motor (r= -0.223, p <0.001), problem-solving (r= -0.226, p <0.001), and social domains (r= -0.146, p <0.001).

Conclusions: Screen exposure was highly prevalent and negatively linked to developmental outcomes among children under two years of age in Egypt. Establishing healthy screen time limits and encouraging diverse activities are crucial for balanced development.

Keywords: Screen exposure, Screen time, Developmental outcome.

INTRODUCTION

Screen exposure refers to any interaction with devices that possess the capability to present video content, including but not limited to televisions, computers, video gaming systems, and more recently, smartphones and tablets. Given the significant rise in the utilization of screen-based devices, the prevalence and detrimental effects of excessive screen exposure on children have emerged as a worldwide concern and a critical public health issue [(1)].

"Screen-time" is a dynamic concept that denotes the amount of time individuals engage with screen-based devices [(2)]. The American Academy of Pediatrics (AAP) recommends that children younger than 2 years should avoid screen time entirely, except for video calls, while those between 2 and 5 years should be limited to less than one hour daily [(3)].

In Egypt**, Ibrahem *et al.*** [(4)] pointed that the prevalence of smartphones usage among children aged 6-12 years old was extensive. Even though children from diverse socioeconomic backgrounds have the same access to media, their media consumption patterns differ. Children from low-income households, along with those raised by single mothers or mothers with only a high school education, consistently spend more time in front of screens [(5,6)]. It's necessary to keep in mind that children below the age of two have underdeveloped and rapidly evolving brains. Early childhood (0-5 years old) plays a vital role in children's development and health [(7)]. Also, increased screen usage may have both early and late long-term impacts [(8–10)]. A study conducted in Thailand indicated that children under 2 years old experienced delays in reaching cognitive milestones in relation to their exposure to digital media [(11)].

In Egypt, information on the extent and pattern of children screen exposure in the age group of (2-24 months), the related socio-demographic risk factors, parents' perception on children screen exposure as well as the association between screen exposure and developmental defects are all important knowledge gaps that need to be filled.

AIM OF WORK

This study aims at promoting children's health through assessing screen exposure and its relationship with the developmental outcomes among children aged 2-24 months in Ismailia City.

SUBJECTS AND METHODS

Study Design: It was a cross-sectional study.

Place and duration of the study: The study was conducted among children aged 2-24 months in Ismailia City; from August 2021 to September 2024.

Received: 07/05/2025
Accepted: 09/07/2025

Study sample:

A sample size of 310 children was calculated using Epi Info Stat Calc software, version 7.2.4.0, with prevalence of mobile devices exposure in children aged 1-60 months = 75.6% [12], a 5 % margin of error, and a 95% confidence level. A multistage random sampling technique was used in this study. The primary health care units (PHCUs) in Ismailia City were first stratified into urban and rural units. From each stratum, two PHCUs were randomly selected, resulting in a total of four PHCUs included in the study. Then the total sample size (n=310 children) was recruited from the selected PHCUs. Children with any CNS problems, and children with family history of any cognitive impairment or developmental delay were excluded.

Study methods:

Data collection was done using an interview questionnaire consisting of three distinct sections.

- **Part 1:** Family and child socio-demographic data.
- Part 2**: Screen exposure assessment including a 24-hour recall** of a typical weekday of duration of screen exposure, type of screen, age at first exposure to screens, parents' own screen exposure.
- **Part 3:** Assessment of child's developmental milestones by the Arabic adaptation of the Ages and Stages Questionnaire, a Parent- Completed Child Monitoring System, Third Edition (A-ASQ-3)[13]. The ASQ-3 serves as a developmental screening tool administered by a parent in an interview format for children ranging from 2 to 60 months of age. The AASQ- 3 questionnaire at each age point contains 6 questions in each of 5 domains of development: fine motor, gross motor, communication, problem solving, and personal-social, for a total of 30 questions. ASQ-3 has adequate reliability and validity [14]. The Arabic version of the ASQ-3 questionnaire is regarded as a suitable, reliable, and easy to use instrument for assessment and follow up of child development [15]. Scoring of ASQ-3: answer options for each question included "yes", "sometimes", or "not yet". A "yes" response received 10 points, "sometimes" received 5 points, and "not yet" received 0 points. Each of the 5 domains was scored separately. In this study we used the ASQ-3 at 2 to 24 months.

Ethical approval

The study received approval from the Research Ethics Committee of Faculty of Medicine, Suez Canal University (approval No. 4677# on 25/10/2021) and was conducted in accordance with the principles of the Declaration of Helsinki. After explaining the objectives, procedures, and benefits of the study, the participants' parents agreed on ethical consent before starting to fill out the survey. Participation was entirely voluntary, and confidentiality and anonymity of the collected data were strictly maintained throughout the study.

Statistical analysis

The statistical program for social sciences (SPSS) software program version 23 was utilized for data entry and statistical analysis. Qualitative variables were described in frequency and percentage form. While quantitative variables were summarized in the form of mean ± standard deviation (SD) or median (interquartile range). The normality of continuous data was tested by Kolmogorov-Smirnov test. Chi-square test or Fisher exact and Kruskal–Wallis test were used as needed to evaluate the significance of association between screen exposure and developmental outcomes. Spearman correlation coefficient was done to detect the relation between screen exposure time (SET) and scores of developmental domains according to ASQ-3. Multivariate logistic regression was done to study the predictors of > 1 screen exposure time (> 1 SET) in studied children. A significance level of p-value less than 0.05 was used to determine statistical significance.

RESULTS

Table (1): Socio-demographic characteristics of the studied children (n=310)

Characteristic	Number (n)	Percentage (%)
Gender		
Boys	150	48.4%
Girls	160	51.6%
Age: Mean (±SD*) (months)	11.54 (±6.27)	
≤ 6	85	27.4%
>6 – 12	110	35.5%
>12 – 18	84	27.1%
>18 – 24	31	10%
Residence		
Urban	168	54.2%
Rural	142	45.8%
Mother age: Mean (±SD*) (years)	28.9 (±5.3)	
Mother education		
Primary or less	63	20.4%
High school	120	38.7%
University education	127	40.9%
Father age: Mean (±SD*) (years)	33.5 (±6.7)	
Father education		
Primary or less	57	18.5%
High school	128	41.6%
University education	123	39.9%

SD*: Standard deviation.

Table (**1**) shows socio-demographic characteristics of the study sample. The distribution of gender is nearly equal, with boys comprising 48.4% and girls 51.6% of the sample.

The majority of children (62.9%) are aged ≤12 months, with a mean age of 11.54 ± 6.27 months. Regarding residence, the majority (54.2%) live in urban areas, while 45.8% reside in rural settings.

Table (2): Description of screen exposure in the exposed children (n=280).

Characteristic	Number (n)	Percentage (%)
Duration of SET, hr/day: Mean (±SD*)	1.41 (±1.3)	
Child SET, hr/day		
No SET*	30	9.7%
≤ 1	177	57.1%
> 1 – 2	61	19.7%
> 2 – 4	35	11.3%
> 4	7	2.3%
Type of screen		
TV	270	96.4%
Smartphones	146	52.1%
Tablets and laptops	7	2.5%
Age at first exposure, months: Mean (±SD*)	4.66 (±2.81)	

* **SET:** screen exposure time, **SD*:** Standard deviation.

According to table (**2**), the mean screen exposure time for children is 1.41 ± 1.3 hours per day. Only 9.7% of children had no screen exposure. Televisions are the most popular screens among children younger than 2 years old 96.4%, followed by smartphones 52.1%. The age of children at first exposure to any kind of screens was 4.66 ± 2.81 months old.

Table (3): Socio-demographic characteristics of the children according to their screen exposure time (n=310)

Variables	Child screen exposure time, hr/day			Total (n=310)	*P*-value
	No SET (n=30) n (%)	≤ 1 SET (n=177) n (%)	> 1 SET (n=103) n (%)		
Gender					
Boys	18(12%)	85(56.6%)	47(31.3%)	150	0.321 [b]
Girls	12(5.8%)	92(58.3%)	56(35.9%)	160	
Age, months					
≤ 6	14(16.5%)	62(72.9%)	9(10.6%)	85	**(<0.001[*])[b]**
>6 – 12	13(11.8%)	62(56.4%)	35(31.8%)	110	
>12 – 18	2(2.4%)	46(54.8%)	36(42.9%)	84	
>18 – 24	1(3.2%)	7(22.6%)	23(74.2%)	31	
Residence					
Urban	9(5.4%)	100(59.5%)	59(35.1%)	168	**(<0.001[*])[b]**
Rural	21(14.8%)	95(66.9%)	26(18.3%)	142	
Mother Age, years					
< 30	21(10%)	114(54.3%)	75(37.7%)	210	0.586[b]
30 – 40	8(8.5%)	59(62.8%)	27(28.7%)	94	
>40	1(16.7%)	4(66.6%)	1(16.7%)	6	
Mother Education					
Primary or less	7(11.1%)	41(65.1%)	15(23.8%)	63	0.165[b]
High school and institutes	12(10%)	72(60%)	36(30%)	120	
University and higher	11(8.7%)	64(50.4%)	52(40.9%)	127	
Mother Employment status					
Housewife	25(10.2%)	140(56.9%)	81(32.9%)	246	0.848[b]
Employed	5(7.8%)	37(57.8%)	22(34.4%)	64	
Mother screen time, hr/day					
Mean (±SD)	1.4 (±0.87)	3.04 (±1.74)	3.76(±1.97)	**(<0.001[*])[a]**	
Father Age, years					
< 30	11(9.3%)	65(55.1%)	42(35.6%)	118	0.36[b]
30 – 40	15(9.9%)	84(55.2%)	53(34.9%)	152	
>40	4(10.5%)	27(71.1%)	7(18.4%)	38	
Father Education					
Primary or less	9(15.7%)	34(59.7%)	14(24.6%)	57	**(0.022[*])[b]**
High school and institutes	13(10.2%)	80(62.5%)	35(27.3%)	128	
University and higher	8(6.5%)	62(50.4%)	53(43.1%)	123	
Father Employment status					
Employed	23(10.6%)	125(57.9%)	68(31.5%)	216	0.224[b]
Free occupation	5(6%)	45(54.2%)	33(39.8%)	83	
Temporary not working	2(22.2%)	6(66.7%)	1(11.1%)	9	
Father screen time, hr/day					
Mean (±SD)	1.9 (±1.53)	2.12 (±1.39)	2.59 (±2.07)	0.123[a]	
Parental role in limiting SET, n(%)					
Positive	26(86.7%)	46(26%)	17(16.5%)	**(<0.001[*]) [b]**	
Negative	4(13.3%)	131(74 %)	86(83.5%)		

SET: screen exposure time, **[a]:** Kruskal-Wallis Test, **[b]:** Chi square test, **[*]**: Statistically significant p-value.

There was no statistical difference between screen exposure time in boys when compared to girls. The mean age of the children was significantly associated with screen time (P<0.001). Moreover, 14.8% of children living in rural areas weren't exposed to screens at all compared to only 5.4% of children in urban areas, with statistically significant difference (P<0.001). As for parental education, there was a statistically significant difference between groups regarding fathers' education (P=0.022) unlike the mothers' education. While mothers' screen time was significantly associated with children's screen exposure time. There was a statistically significant difference between screen exposure time of children whose parents had a positive role in limiting screen exposure when compared to screen exposure time of children whose parents had a negative role (P<0.001) as shown in Table (3).

Table (4): The association between children screen exposure time and their development by ASQ-3 (n=310)

Domain (Total score)	Screen exposure time, hr/day			*P*-value
	No SET (n=30)	≤ 1 SET (n=177)	> 1 SET (n=103)	
Gross motor (Mean ±SD)	50.3 (±10.9)	50.06 (±10.4)	49.7(±10.2)	0.842[a]
Fine motor (Mean ±SD)	52.2 (±9.9)	49.7 (±9.8)	46.4 (±11.6)	**(0.008[*])[a]**
Communication (Mean ±SD)	48.7 (±10.5)	42.5 (±10.4)	32.2 (±11.3)	**(<0.001[*])[a]**
Problem-solving (Mean ±SD)	46.5 (±9.8)	42.3 (±11.2)	40.2 (±11.3)	**(0.015[*])[a]**
Social domain (Mean ±SD)	45.8 (±9.2)	45.8 (±10.1)	42.4 (±10.8)	**(0.019[*])[a]**

SET: screen exposure time, **[*]**: Statistically significant p-value, **[a]** : Kruskal-Wallis Test.

The total gross motor scores show minimal variation across the screen exposure groups, with no statistically significant difference (P=0.842). Moreover, the total fine motor, the total communication, and the total problem-solving scores demonstrate a statistically significant decline with increased screen exposure time. Regarding social development, the total score for social development shows a statistically significant decline as screen exposure time increases, with children in the >1 SET group scoring the lowest (42.4 ± 10.8; P=0.019) as illustrated in Table (4).

Table (5): Spearman correlation between screen time and scores of each domain of ASQ-3 (n= 310).

ASQ-3 Domains	Screen exposure time	
	r[**]	***P*-value**
Communication	**-0.493**	**<0.001[*]**
Gross motor	**-0.093**	**0.103[*]**
Fine motor	**-0.223**	**<0.001[*]**
Problem solving	**-0.226**	**<0.001[*]**
Social	**-0.146**	**0.01[*]**

[*]: Statistically significant p-value, **r [**]:** Coefficient of correlation.

Additionally, there is a statistically significant weak to moderate negative correlation between screen exposure time and communication (r=-0.493), fine motor (r=-0.223), problem-solving (r=-0.226), and social scores (r=-0.146) (p<0.001) as displayed in Table (5).

Table (6): Multivariate logistic regression of the predictors of > 1 hour/day screen exposure time in children aged 2–24 months old

	Predictors	OR (95% CI)	*P*-value
Child age in months		1.125 (1.073 – 1.179)	**<0.001[*]**
Residence	Urban	Reference	
	Rural	1.358 (0.716 – 2.579)	0.349
Father's education	University and higher education	Reference	
	High school and institutes	0.603 (0.312 – 1.168)	0.134
	Primary or less	0.582 (0.239 – 1.415)	0.232
	Mother's screen time	1.199 (1.022 – 1.408)	**0.026[*]**
Parental role in limiting children SET	Negative	Reference	
	Positive	0.37 (0.205 – 0.671)	**<0.001[*]**

SET: Screen exposure time, **OR:** Odds Ratio, **CI:** Confidence Interval, **[*]:** Statistically significant p-value.

The results of multivariate logistic regression as displayed in Table 6 show that children's age (OR = 1.125, 95% CI = 1.073 – 1.179), parental role in limiting children SET (OR = 0.37, 95% CI = 0 .205 – 0.671), and mothers' daily screen time (OR = 1.199, 95% CI = 1.022 – 1.408) were the significant predictors of more than 1 hour per day screen exposure time.

DISCUSSION

Screen exposure in young children aged 0-2 years old is now considered as a major public health concern that predisposes those children to detrimental health effects in the short and long-term. The current study revealed that the prevalence of screen exposure among children younger than two years who attend primary healthcare centers (PHCs) is 90.3% and only 9.7% are following the guidelines of AAP and WHO of no screen exposure before the age of 2 years old. Ninety-six-point four percent (96.4%) are exposed to televisions, and more than half of the studied children were exposed to or used smartphones. This finding agrees with a study in Thailand found that 98.34% of the children younger than 2 years were exposed or used screen-based devices. For these, the highest rank was 95.9% exposed to TV viewing, followed by 78.3% exposed to and used smartphone or tablets [(8)]. Moreover, a recent systematic review and meta-analysis examined data from about 95 international samples to establish that only 24.7% of children younger than 2 years were meeting the guidelines outlined by the AAP and WHO [(16)].

The present study shows that the average duration of screen exposure among the study sample was 1.41 hours per day, with an average estimated in the 6 months age group of 0.77 hour per day increasing to 2.5 hours daily in 18-24 months age group which is consistent with the findings of a study conducted in UK which revealed that high levels of TV viewing were common with an average of 55 min/day at 6 months increasing to 124 min\day at 36 months [(5)].

In the current study, the results showed that parental education, and employment were not significant predictors of children's screen exposure time. These findings are similar to previous study that concluded that parental education and socioeconomic status have no significant association with screen exposure time and other sedentary behaviors [(6)].

Consistent with research by **Duch *et al.* [(17)]**, the current study identified no association between child's gender, and screen exposure time. However, this study disagrees with **Frata *et al.* [(18)]** who found that higher parental education was related with less screen time for the children. This variability can be explained by the fact that even families with low socio-economic status have access to screen gadgets. Highly educated parents in Egypt may not have the awareness about the detrimental effects of screen exposure on their young children. The main key factors on children screen time in our study were parental, especially mothers' screen time and parental influence and role in limiting SET of their children according to the results of the present study. This is in consistence with **Pons *et al.* [(19)]** who stated that children's behavior can be influenced by parents' screen time and background TV. This is supported by the multiple linear regression model used in that study, which demonstrated a direct and positive relationship between the parents' screen time and the child's screen time exposure (STE).

During the initial five years of life, a child's development happens quickly. The current study looked at developmental outcomes during a crucial stage of both growth and maturation, and it found that screen exposure can hinder children's capacity to grow to their full potential. The current study found a significant moderate negative correlation between child screen exposure and communication domain scores by ASQ-3, which indicates the longer the screen exposure time, the lower communication scores. **Duch *et al.* [(20)]** found in both longitudinal and cross-sectional analyses that children younger than 2 years old who watched more than 2 hours of TV per day had increased odds of poor communication scores measured by ASQ-3 in a sample of 119 Hispanic children. In UAE, **Al Hosani *et al.* [(21)]** found that children who were exposed to screen extensively had a higher risk of delayed language and communication development. The mechanism that could explain this association is that when children younger than 2 years old are watching screens, they don't practice their language and communication skills. Young children learn and master their language by interacting with their caregivers. On the other hand, it would be difficult to learn from 2D screen media before the age of 30 months, this is due to the lack of symbolic thought, immature attention, and insufficient flexibility to apply the knowledge they receive from different screen media to the real life [(22)]. As for motor development of the children, the current study didn't find any association between screen exposure time and children's gross motor development. A study conducted in Japan on 149 children examining the association between screen exposure at one year old and developmental outcomes at two and four years old by ASQ-3 supported these findings regarding motor development [(23)].

Although, it has been argued that touchscreen media may encourage and stimulate fine motor skills (FMS) such as swiping, pinching and tapping. And unlike **Rocha *et al.* [(10)]** and **Takahashi *et al.* [(23)]** who reported that there was no association between children screen exposure and motor development. The present study found a significant negative association between screen exposure time and fine motor skills development of children younger than 2 years old. The probable mechanism behind these findings is that most screen time in children aged 0 – 2 years old depends on viewing only as they can't use touchscreens properly yet. This sedentary behavior may displace other activities involved in fine motor learning in 3-dimensional real life [(24)].

Regarding cognitive and problem-solving development, there was a negative association between screen exposure and problem-solving skills in children in

this study. Similarly, **Rocha *et al.* [10]** detected poorer cognitive and problem-solving development with increased screen time among 0 – 60 months of age children in Ceará, Brazil. Another longitudinal study reported that Children's screen time at 2 years old was correlated to lower scores in cognitive development at 3 years old, indicating superiority of screen exposure on cognitive development in children younger than 3 years old [25].

On the contrary, both **Bustamante *et al.* [26]** and **Jusienė *et al.* [27]** indicated no significant associations between using different screen-based devices and cognitive and executive functions measures. This difference might be understandable when considering the content and context of children's screen exposure and home environment. The results of the present study could be explained by the fact that screen viewing tends to make young children engage in less thinking and problem solving, since cartoons and related activities do not interact with the child. Another possible mechanism that explains the impact of screen exposure on the cognitive processes involved in forming executive functions up to the age of 2. Integrating several sensory input sources is essential to cognitive and executive functions development. Considering this, Media editing on screens moves quickly, which may influence sensory information pathways and the early development of executive function, especially in the attention domain [28].

In terms of social and emotional development, the current study found a significant association between its development and screen exposure time in children younger than two. A study in Brazil conducted to study screen time and early childhood development found that increased screen time was negatively associated with child socio-emotional domain scores [10]. On the contrary, **Sugiyama *et al.* [29]** discovered that screen exposure time was not associated with social skills in children aged two years and at age 4 years old.

Study strength

There is one significant advantage to this study. The ASQ-3, which has been used in numerous studies and has been validated globally, was used to quantify developmental delays. The ASQ-3 is a suitable screening instrument for evaluating developmental delays in accordance with many developmental domains, even though it is not a diagnostic tool.

Study limitations

There are some limitations in our study that deserve discussion. This current study is unable to confirm the causal association because of the cross-sectional design. Also, because parent interviews were the only method used to gather data on these characteristics, the study was lacking in standardized measures to identify additional significant variables such temperament, behavioral issues, interactive activity, and parenting style.

CONCLUSION

In conclusion, most children do not meet international screen time guidelines. Screen exposure in children is associated with several factors including parents' own screen time and living in urban areas. Greater screen exposure time for children was associated with poorer developmental outcomes in communication, fine motor and problem-solving domains.

RECOMMENDATIONS

Based on the findings of this study, there is a need for more causal research to clarify the directional relationship between screen exposure time and developmental outcomes in children. Also, routine screening for developmental delays should be implemented to facilitate early detection and timely intervention. Finally, educational campaigns targeting parents are necessary to raise awareness about the impact of screen exposure during early childhood and to promote informed decision-making regarding children's media use.

- **Conflict of interests:** No Conflict of Interests.
- **Funding:** No Funding.

REFERENCES

1. **Nwankwo F, Shin H, Al-Habaibeh A *et al.* (2019):** Evaluation of children's screen viewing time and parental role in household context. Glob. Pediatr. Health, 6:2333794X19878062.
2. **Leblanc A, Gunnell K, Prince S *et al.* (2017):** The ubiquity of the screen: an overview of the risks and benefits of screen time in our modern world. Transl. J. ACSM., 2(17):104-113.
3. **American Academy of Pediatrics (2022):** Developmental surveillance and screening patient care. https://www.aap.org/en/patient-care/developmental-surveillance-and-screening-patient-care/developmental-surveillance-resources-for-pediatricians/?srsltid=AfmBOopkHwpjvX2TSIe16qtvcWfSz
4. **Ibrahem R, Shalaby A, Hegazy N (2022):** Internet addiction in relation to mental health among medical students, Menoufia University, Egypt. Egypt. J. Hosp. Med., 88(1):2325-2331.
5. **Barber S, Kelly B, Collings P *et al.* (2017):** Prevalence, trajectories, and determinants of television viewing time in an ethnically diverse sample of young children from the UK. Int. J. Behav. Nutr. Phys. Act., 14(1):88.
6. **Carson V, Kuzik N (2017):** Demographic correlates of screen time and objectively measured sedentary time and

physical activity among toddlers: a cross-sectional study. BMC Public Health, 17(1):564.

7. **Black M, Walker S, Fernald L *et al.* (2017):** Early childhood development coming of age: science through the life course. Lancet, 389(10064):77-90.
8. **Plitponkarnpim A, Srikaew C, Puranitee P *et al.* (2018):** ICT exposure in children younger than 2 years: Rates, associated factors, and health outcomes. J. Med. Assoc. Thai., 101(3):345-349.
9. **Emond J, Tantum L, Gilbert-Diamond D *et al.* (2018):** Household chaos and screen media use among preschool-aged children: A cross-sectional study. BMC Public Health, 18(1):1210.
10. **Rocha H, Correia L, Leite Á *et al.* (2021):** Screen time and early childhood development in Ceará, Brazil: a population-based study. BMC Public Health, 21(1):2070.
11. **Ruangdaraganon N, Chuthapisith J, Mo-suwan L *et al.* (2009):** Television viewing in Thai infants and toddlers: Impacts to language development and parental perceptions. BMC Pediatr., 9:34.
12. **Kılıç A, Sari E, Yucel H *et al.* (2019):** Exposure to and use of mobile devices in children aged 1-60 months. Eur. J. Pediatr., 178(2):221-227.
13. **Squires J, Bricker D, Clifford J *et al.* (2009):** Ages & Stages Questionnaires, Third Edition (ASQ-3): A Parent-Completed Child-Monitoring System (3rd ed.). Brookes Publishing. http://www.bestkc.com/wp-content/uploads/2017/05/3-year-ASQ-ENGLISH.pdf
14. **Charafeddine L, Dani A, Badr L *et al.* (2019):** The psychometric properties of the Ages and Stages Questionnaires-3 in Arabic: Cross-sectional observational study. Early Hum. Dev., 136:33-38.
15. **Abdelkader H (2020):** Developing and assessing validity and reliability of an Arabic version of Ages and Stages Questionnaire for developmental screening of 2-18 months aged children. Alex. Med. E Posters, [Epub ahead of print].
16. **McArthur B, Volkova V, Tomopoulos S *et al.* (2022):** Global prevalence of meeting screen time guidelines among children 5 years and younger: A systematic review and meta-analysis. JAMA Pediatr., 176(4):373-383.
17. **Duch H, Fisher E, Ensari I *et al.* (2013):** Screen time use in children under 3 years old: a systematic review of correlates. Int. J. Behav. Nutr. Phys. Act., 10(1):102.
18. **Frata B, Souza J, Montemezzo D *et al.* (2021):** Predictors for screen time exposure among children between 3 and 5 years old in southern Brazil. J. Trop. Pediatr., 67(5):fmab092.
19. **Pons M, Bennasar-Veny M, Yañez A (2020):** Maternal education level and excessive recreational screen time in children: A mediation analysis. Int. J. Environ. Res. Public Health, 17(23):8930.
20. **Duch H, Fisher E, Ensari I *et al.* (2013):** Association of screen time use and language development in Hispanic toddlers: A cross-sectional and longitudinal study. Clin. Pediatr., 52(9):857-865.
21. **Al Hosani S, Darwish E, Ayanikalath S *et al.* (2023):** Screen time and speech and language delay in children aged 12-48 months in UAE: a case-control study. Middle East Curr. Psychiatry, 30(1):69.
22. **Heimann M, Hedendahl L, Ottmer E *et al.* (2021):** 2-year-olds learning from 2D media with and without parental support: Comparing two forms of joint media engagement with passive viewing and learning from 3D. Front. Psychol., 11:576940.
23. **Takahashi I, Obara T, Ishikuro M *et al.* (2023):** Screen time at age 1 year and communication and problem-solving developmental delay at 2 and 4 years. JAMA Pediatr., 177(10):1039-1046.
24. **Martzog P, Suggate S (2022):** Screen media are associated with fine motor skill development in preschool children. Early Child. Res. Q., 60:363-373.
25. **Madigan S, Browne D, Racine N *et al.* (2019):** Association between screen time and children's performance on a developmental screening test. JAMA Pediatr., 173(3):244-250.
26. **Bustamante J, Fernández-Castilla B, Alcaraz-Iborra M (2023):** Relation between executive functions and screen time exposure in under 6 year-olds: A meta-analysis. Comput. Hum. Behav., 145:107739.
27. **Jusienė R, Rakickienė L, Breidokienė R *et al.* (2020):** Executive function and screen-based media use in preschool children. Infant Child Dev., 29(1):e2173.
28. **Gastaud L, Trettim J, Scholl C *et al.* (2023):** Screen time: Implications for early childhood cognitive development. Early Hum. Dev., 183:105792.
29. **Sugiyama M, Tsuchiya K, Okubo Y *et al.* (2023):** Outdoor play as a mitigating factor in the association between screen time for young children and neurodevelopmental outcomes. JAMA Pediatr., 177(3):303-310.