

CORRELATION BETWEEN SCREEN TIME AGE EXPOSURE AND SCREEN TIME DURATION WITH DEVELOPMENTAL SKILLS AMONG CHILDREN AGED 6-36 MONTHS: A CROSS-SECTIONAL STUDY

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Abstract

Excessive screen usage is becoming a contentious issue, and research is being done to identify strategies to limit screen time. The child's age might influence parents' decisions on screen time and the amount of exposure. Thus, this study was carried out to examine the correlation between screen time age exposure and screen time duration with developmental skills (communication, problem-solving, personal social and motor) of children. A cross-sectional survey of Malaysian parents (n = 109) was carried out through online platforms. The child's and parent's demographics, and developmental skills were collected to achieve the study's objective. Children's developmental skills were evaluated using the Ages & Stages Questionnaires, Third Edition (ASQ-3). Parents admitted to exposing their children to screens before they were 24 months old (80.7%, n = 88), and said the time they spent on screens each day was greater than an hour (83.5%, n = 91). Screen time age exposure showed a significant correlation with communication skills (r = 0.30, p < 0.01), gross motor skills (r = 0.23, p < 0.01), problem-solving skills (r = 0.26, p < 0.01), and personal social skills (r = 0.21, p < 0.01). Similarly, a significant correlation between screen time duration with communication skills (r = -0.40, p < 0.01), gross motor skills (r = -0.31, p < 0.01), fine motor skills (r = -0.29, p < 0.01), problem-solving skills (r = -0.32, p < 0.01), and personal social skills (r = -0.32, p < 0.01) was discovered. It is projected children who are exposed to screen time, particularly after 24 months and expected to have less than an hour, would do better in their development of communication, gross motor, problem-solving, and interpersonal skills.

Keywords: Screen Time, Screen Age, Children's Development

Introduction

Many children have been exposed to screen time since infancy, which has persisted throughout childhood (1). Screen time is the time set aside for using gadgets like smartphones, tablets, laptops, televisions, and video games (2). More than 48% of parents in recent research on screen time exposure disregarded the American Academy of Pediatrics (AAP) recommendations for screen exposure (3). AAP recommends no screen time should be given during the infant stage aside from active interaction via video chatting; however, by the age of 18 to 24 months, exposure to screen time along with high-quality programming that is entertaining and engaging for other adults in the child's environment is advised. Then, when the child is two years

old or older, parents can allow screen time with a cap of one hour of high-quality programming in their presence. Children between the ages of two and five should not spend more than one hour each day on screens (3, 4).

Moving from one location to another while standing against gravity in an upright position over time, starting in the foetal position, is a normal early gross motor development skill (5). The children will eventually improvise their postural control system and learn significant actions like sprinting, walking backwards, climbing stairs, kicking a ball forward, tossing it overhand, and jumping up (6). While playing with same-age peers, kids will concurrently improve fine motor skills by tossing and catching a ball and stacking blocks to make a figure (7). Engaging in social contact, children will

also pick up linguistic cues to help them communicate and develop cognitive abilities like problem-solving (8). Nonetheless, children growing and developing their motor and communicative abilities may have several problems as a result of excessive screen time exposure. A study that examined the relationship between screen time and language development showed that children who watched more than two hours of television per day had higher probabilities of having poor communication and language skills without parental or other career guidance (9). Additionally, early exposure to screens was linked to poor development of social and emotional, cognitive, linguistic abilities and hand skills, as well as other talents (10, 11).

A child's growth is crucial and fast in the early years of life. When young children are exposed to a screen, they can lose out on many opportunities to practise and improve their motor, communication and social skills with their peers (12). Children must spend less time sitting still while viewing devices and being confined in their movements to have more time for active play and get healthier sleep (13). Children will naturally enhance their verbal, social, and cognitive abilities as they engage in creative play and critical thinking (14). Therefore, excessive screen exposure will have the opposite impact on children's growth. Recently, research efforts have concentrated on discovering strategies to control screen use since it affects child health and development and is now becoming a public health priority (15). The reason behind excessive and early screen time exposure among children is that parents want their children to be occupied while they perform independent activities like working and doing daily chores and errands (16).

Therefore, this study is highly significant in preventing excessive screen time usage by children as young as 6 months old. There is a need for research that examines the connections between screen usage and developmental skills to date. Most studies are primarily concerned with children in elementary and secondary schools and behavioural problems, including aggression and inactivity (1, 3, 15, 17). Thus, this study aimed to ascertain the correlation between screen time age exposure and duration of screen time with children's development skills; communication, problem-solving, personal social and motor skills. In addition, this study sought to examine the level of children's developmental skills (communication, problem-solving, personal social and motor skills). This study allows parents and other related personnel to be better aware of how screen time is used and how it affects children's developmental skills, thus reducing the likelihood of developmental delays in the future. This study hypothesized that there was a correlation between screen time age exposure and duration of screen time with children's developmental skills communication, problem-solving, personal social and motor skills.

Materials and Methods

Design

A total of 109 parents ($n = 109$) out of 384 targeted parents from all over Malaysia were recruited for this cross-sectional study using purposive sampling after receiving ethical permission from the Ethics Committee of Universiti Teknologi MARA (UiTM) (REC/07/2021(MR/516)). The participants would only participate in the study if they met the requirements for inclusion and gave their consent before completing the survey.

Samples

The participants of the study were parent of typically developing children who live and stay in Malaysia. They were included in the study if they possess the following criteria; (a) have children between the ages of six months and three years with normal vision and hearing functions; (b) can read and understand English. They were excluded if their children have a diagnosis affecting their motor, communication, and problem-solving skills.

Data collection procedure

An online survey (Facebook and WhatsApp) was used to distribute a set of online questions. It is divided into two sections, the first of which includes sociodemographic information (age, gender, current state of residence, working status, marital status, educational attainment, primary carers, participant's child's gender, age, parents' knowledge of appropriate screen time and the age they first exposed their child to screen time). The second section is a questionnaire from the Ages & Stages Questionnaires, Third Edition (ASQ-3) that evaluates a child's performance.

ASQ-3 is meant for children aged 1 month to 65 months (5 years and 5 months), with 21 age-specific questions. Participants must select one of the options for the subtest question on child participation: regularly (yes), sometimes, or not yet. Each subtest was graded with "Yes" receiving 10 points, "Sometimes" receiving 5 points, and "Not yet" receiving 0 points. The sum of the scores for each component will be interpreted as either indicating that the child's development is on track, that further learning and monitoring activities are needed, or that an additional evaluation by a health professional is necessary. Every component has its cut-off score; communication skills (34.6), gross motor (38.4), fine motor (29.6), problem-solving (34.9) and personal social (33.1). For the ASQ-3, a monitoring zone of 1–2 standard deviations below the mean score in each domain was highlighted on the ASQ-3 Information Summary sheet forms. This monitoring zone was added to alert ASQ-3 users that children not identified as needing follow-up assessment (i.e., with scores that were two standard deviations below the mean) might benefit from targeted interventions. Next, the ASQ -3

total score will be refer to the ASQ-3 score chart for each of development skills components and age range indicate children performance. If the child’s score is above the cut-off it indicate the child development appears to be on schedule. Next, if the score close to cut-off, it indicates monitoring are required to see child’s development. Further assessment with a professional may be needed if the child’s ASQ score is below the cut-off. Within the five components, the ASQ-3’s internal consistency ranges from poor to excellent, with a Cronbach Alpha of 0.51 to 0.87 for children aged 2 to 60 months (18).

Data analysis

The Statistical Package for the Social Science (SPSS) version 21 was used to analyse the data collected from the self-report questionnaire by the parents. Using descriptive analysis, the sociodemographic factors and the ASQ-3 score were examined. The correlation between screen time age exposure and screen time duration with children’s development skills (communication, problem-solving, personal social, and motor) was analysed using the Spearman Correlation test.

Results

In this study, 56.9% of the participants (n = 62) fell within the 20–40 age range, as shown in Table 1. At 74.3% (n = 81) versus 25.7% (n = 28), women participated at a greater rate than men. Out of 109 participants, 98.2% (n = 107) of them were married parents and 83.5% (n = 91) were working parents. Majority of participants (99.1%, n = 108) had degree and postgraduate education background. Most of the participants’ children (57.8%; n = 63) were classified as male. The participants’ children ranged in age from six months to three years, with a mean (SD) of 26.99. (8.08). Additionally, 50.5% of the participants (n = 55) were the primary carers for their children. More than half of the participants claimed to be familiar with the recommended screen time exposure and length (55%, n = 60). The actual screen time exposure age was reported to start at three months, with a mean and SD of 14.56±8.34 months, and 80.7% (n = 88) of participants said they had begun exposing their kids to screens before they became 24 months old. A minimum of one hour and a maximum of five hours per day were reported as the typical amount of screen time exposure with a mean and SD of 2.92± 1.35 hours. Even though more than half of the participants reported that their child had a suitable amount of screen time exposure, 83.5% (n = 91) of the participants exposed their child to more than an hour of screen time when they were under 24 months old. In comparison, only 16.5% (n = 18) of the participants did not exceed the recommended one-hour limit.

Table 1: Demographic data of participants

Variables	Mean	SD	Frequency (%)
Age group of participants			
19-29 years old			39 (35.8)
20-40 years old			62 (56.9)
40-60 years old			8 (7.3)
Gender			
Male			28 (25.7)
Female			81 (74.3)
Marital status			
Single			1 (0.9)
Married			107 (98.2)
Divorced			1 (0.9)
Working status			
Yes			91 (83.5)
No			18 (16.5)
Education levels			
High school and below			0 (0)
Diploma			1 (0.9)
Degree and Postgraduates			108 (99.1)
Child gender			
Male			63 (57.8)
Female			46 (42.2)
Child age (months old)	26.99	8.08	
6-36 (months old)			
Main Caregivers			
Yes			55 (50.5)
No (Daycare, Grandparents, Nanny, Maid)			54 (49.5)
Knowledge on suitable screen time exposure			
Yes			60 (55)
No			49 (45)
Actual age exposure on-screen time (3months-36 months)	14.56	8.34	
Exposure duration of screen time per daily basis (1-5 hours)	2.92	1.35	
Exposure duration more than 1 hour per daily basis (hours)			
Yes			91(83.5)
No			18(16.5)

Table 2 displays the results of the ASQ-3’s children developmental evaluation and its interpretation. Gross motor skills had the highest score across all five developmental domains with mean and SD of 40.32 ± 15.72, followed by fine motor and problem-solving skills at 33.17 ± 16.77 and 33.12 ± 16.60, respectively. Personal-social skills received the lowest rating, with 29.72 ± 17.88) and 27.89 ± 18.27, respectively. Most of the children fell below the cut-off for communication skills, with 49.5% (n = 54) in the monitoring zone and 28.4% (n = 31) above it. Additionally, the percentage of individuals scoring at or above the stated cut-off for gross motor abilities was 44% (n = 48). Following this, 23.15% (n = 26) in the monitoring zone and 32.15% (n = 35) were below the cut-off score for gross motor skills. Next, for fine motor skills, the children’s performance was categorised as highest in the above cut-off score with 41.3% (n = 45) followed by 23.1% (n = 35) below the cut-off score and 26.6% (n = 29) in the monitoring zone. The highest group for problem-solving abilities was below the cut-off score at 46.8% (n = 51), and the monitoring zone with 18.3% (n = 20). Last but not least, for personal social, the highest group was below the cut-off score with 51.4% (n = 56), followed by 32.1% (n = 35) in the above cut-off score and 16.5% (n = 18) in monitoring zone. Therefore, it shows the majority of children’s development are below the normal development for communication, problem solving and personal social skills.

Table 2: Toddler’s developmental scoring and interpretation ASQ-3 scoring

Variable	Mean (SD)	Below Cut-off score	Monitoring Zone	Above Cut-off
		n (%)	n (%)	n (%)
Communication skills	27.89 (18.27)	54 (49.5)	24(22.0)	31 (28.4)
Gross motor skills	40.32 (15.72)	35 (32.1)	26 (23.1)	48 (44.0)
Fine motor skills	33.17 (16.77)	35 (32.1)	29 (26.6)	45 (41.3)
Problem solving skills	33.12 (16.60)	51 (46.8)	20 (18.3)	35 (32.1)
Personal social skills	29.72 (17.88)	56 (51.4)	18 (16.5)	35 (32.1)

Above cut-off: child’s development appears to be on schedule
 Monitoring zone: provide learning activities and monitor
 Below cut-off: further assessment with a professional may be needed

As shown in Table 3, there was a significant, positive weak correlation between children’s screen time age exposure with the development of their communication abilities (r = 0.30, p < 0.01), gross motor skills (r = 0.23, p < 0.01), problem-solving skills (r = 0.26, p < 0.01) and personal social skills (r = 0.22, p < 0.01). Hence, the later of screen time

age exposure, the better of children’s development in their communication abilities, gross motor, problem solving and personal social skills Similarly, a significant, negative weak correlation was found between screen time duration with the development of communication abilities (r = -0.40, p < 0.01), gross motor skills (r = -0.31, p < 0.01), fine motor skills (r = -0.29, p < 0.01), problem-solving skills (r = -0.33, p < 0.01), and personal social skills (r = -0.32, p < 0.01). Hence, the shortest screen time duration given, the better children’s development in their communication abilities, gross motor, fine motor, problem solving and personal social skills).

Table 3: Relationship of screen time age exposure, screen time duration and toddler’s developmental skills

Variables	Screen time age exposure	Screen time duration
	Spearman rho (r)	Spearman rho (r)
Communication skills	0.30*	-0.41*
Gross motor skills	0.23*	-0.31*
Fine motor skills	0.83	-0.29*
Problem solving skills	0.26*	-0.33*
Personal social skills	0.21*	-0.32*

*Significant p-value < 0.05

Discussion

The study sought to determine the correlation between children’s communication, problem-solving, personal social, motor development with screen time age exposure and duration of screen time. The study findings revealed that over half of the population had yet to adopt the correct recommendations for children’s screen time as advised by the AAP. Children older than 24 months should spend less than an hour of high-quality content screen time with adults present for active social engagement, but not during meals or right before bedtime (4). Early screen time age exposure and excessive screen time duration can be caused by various factors, such as the availability of digital devices in every Malaysian home owing to the advancement and expansion of contemporary technology in the 21st century.

Many screen kinds are now available because of technology, most notably on television and mobile devices. Also, parents could have wished to expose their children to media for play and instruction, such as nursery rhymes, cartoons, and lessons on the alphabet, numbers, colours, and shapes (19). Nevertheless, as television was the only “gadget time” available to them when they were growing up, parents may not be aware of how screen time may have harmed their children’s development. The accessibility of digital technology, the development of social media, and instructional labelling on children’s screen material are just a few reasons for screen time usage among children that

makes parenting challenging (20). Some frequent causes of parenting becoming more difficult include shifting morals and beliefs and the high costs of raising a child that increases the desire for screen time (20).

This study's results demonstrated significant correlation between screen time age exposure and duration of screen time with children's development in their communication, gross motor, problem-solving, and personal social skills. The results were in line with a prior study that showed that children who were exposed to screens do not receive adequate multisensory and social stimulation throughout the early stages of development were more likely to have delays (21). Children younger than three years old have a brain that functions as a sponge to absorb any language input, and it quickly develops from cooing to eventually being able to say three-word structures when expressing their needs. Additionally, their list of receptive skills should be fundamentally flawless (22). Therefore, exposing young children to screens at a young age for an extended period will eventually eliminate all live and active interactions, including speaking, understanding causes and effects, interpreting facial expressions, and two-way communication, leaving only very passive viewing or listening to screens without the need to respond (23).

Young children's developmental skills will be limited if exposed to excessive and early screen time, especially when they are required to engage in sensorimotor play (24). Sensorimotor play is important to develop good motor skills (25). Yet, the growth of gross motor skills is associated with the growth of physiological, spatial, and temporal awareness, and these abilities are crucial for both motor learning and cognitive tasks (26). Meanwhile, the fundamentals of fine motor skills development continue throughout infancy and be exposed from infancy through sensorimotor play and being an explorative child in the surroundings (27). Children exposed to the screen would also have poor initiation, logical thinking, and cause-and-effect relationships. According to research, exposing a children to a screen for longer than an hour might result in sedentary behaviour, passive behaviour, and fewer learning chances for the child. Although the brain should be challenged and exposed to various daily activities, children who spend much time watching screens find it challenging to apply what they learn in real life (17). This would undoubtedly cause problems with communication, gross motor, fine motor, and problem-solving, all of which are necessary for a children to carry out a simple daily living activities (28).

The finding indicates that more early screen time age exposure has no association with fine motor skills. However, the longer duration of usage will affect the fine motor skills (29). The development of fine motor skills may not be as complex as gross motor skills as the child would be considered adequate to be able to pick a small raisin using thumb and finger grasp, stacking cubes by imitation, scribble, emerging tripod grasp, making simple strokes or copying a circle by the age of 3-year-old (30). The

fundamental of refined in-hand manipulation of objects and tools, the strength and upper limb coordination were supposed to continues developed during infancy which should be exposed since infancy during sensorimotor play and being an explorative child in the environment (31). Nevertheless, some study highlights the negative effect of screen time at an early age is linked with fine motor skills as it is developed since early infancy and mature from time to time (32).

Conclusion

The findings indicate that children exposed to screen time at a young age, mainly before 24 months, in accordance with AAP recommendations, are connected with developmental skills problems in communication, gross motor, problem-solving, and personal social skills. It can be concluded that the impact of screen time on children's communication, motor, problem-solving and personal social developmental skills could cause the children to be in between of "monitoring zone", which requires more activity exposure and continuous observation, and "below cut-off score" of performance open to the risk of developmental delay which the children will need further assessment from health professions.

It is recommended a further study on confounding factors such as parents' screen time behavior, parental stressor and parental barrier in reducing screen time usage among children. Moreover, a guideline for the parents and health-related professionals including occupational therapy practitioners can be developed to prevent excessive screen time usage among children.

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Competing interests

The authors declare that they have no competing interests.

Ethical clearance

This research has approve by ethics committee of Universiti Teknologi MARA (UiTM) (REC/07/2021(MR/516).

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