

Original Research Article

Exposure and use of digital media among under-five children

Shajeeda Babusabgari¹, Bhavani Bangarkodi Balakrishna^{2*}

¹Department of Child Health Nursing, The Oxford College of Nursing, Bangalore, Karnataka, India

²Department of Child Health Nursing, Sri Shankara College of Nursing, Bangalore, Karnataka, India

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*Correspondence:

Dr. Bhavani Bangarkodi Balakrishna,
E-mail: bhavanibb@yahoo.com

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ABSTRACT

Background: The use of digital media, such as television, smart phones, tablets, iPod has become a significant part of children's lives. Children's exposure to digital media is increasing, as are concerns about the impact that screen time has on children and families. The study evaluates the exposure and use of digital media among under five children.

Methods: The study was conducted among mothers of under-five children attending Paediatric outpatient department of a hospital. The sample included 150 mothers of under-five children. A structured questionnaire was used to collect data on selected demographic variables. A modified rating scale was used to elicit data regarding the exposure and use of digital media among under-five children.

Results: Around half of children were exposed to smartphones between 1-2 years of age. During infancy around forty percent of children were exposed to smart phones. More than half the mothers used mobile devices while doing household chores. A higher proportion of under five children had increased screen time and large proportion (65.3%) of under-five children had high levels of exposure to digital media.

Conclusions: A significant number of under five children were using the digital media and screen time exposure exceeded than that of recommended limit.

Keywords: Digital media, Under-five children, Mother, Screen time

INTRODUCTION

Like globalization and urbanization, 'digitalization' has already changed the world. The rapid proliferation of information and communication technology is an unstoppable force, touching virtually every sphere of modern life, from economic, social, cultural and shaping everyday life. Childhood is no exception. From the moment, millions of children enter the world, they are steeped in a steady stream of digital communication and connection, and from the way their medical care is managed and delivered to the online pictures of their first precious moments.¹ Digital technology has changed the world and as more and more children go online around the world, it is increasingly changing childhood. Children

and adolescents under 18 years' account for an estimated one in three internet users around the world¹. Digital media refers to any type of information in digital format, including television, computer-generated text, graphics, animations, photographs, sound, and video. Today's children not only use traditional, toys and materials such as, dolls, balls, puzzles, sand, but they also interaction a daily basis with technologies like digital media. Children's exposure to digital media is on the rise, as are concerns about how screen time affects children and families. Young children frequently use digital interactive technologies as one of the dominant activities in their play experiences. These technologies may include things like smartphones, tablets, mp3 players, iPods, iPads, gaming applications, television, desktops and laptops. Young children live in the technology era, and their

exposure to and uses of digital media has changed the modality of their current family lives, their ways of communicating, and methods of learning.²

Children learn by observing, parents and other family members in the first instance. They also learn from older siblings and peers. Interestingly, parents seem in most cases not aware of their children mirroring behaviour. Children use digital technology individually rather than socially, while watching video, gaming, browsing for information or being more creative with pictures or videos.² The present generation of children is being brought up in a media-rich homes. They are daily in contact with a wide range of digital tools. They are immersed in both traditional and new forms of digital media. Research on traditional media, such as television, has identified health concerns and negative outcomes that correlate with the duration and content of viewing. Over the past decade, the use of digital media, including interactive and social media, has grown, and research evidence suggests that these newer media offer both benefits and risks to the health of children and teenagers. Evidence-based benefits identified for the use of digital and social media include early learning, exposure to new ideas and knowledge, increased opportunities for social contact and support, and new opportunities to access health promotion messages and information. The risks of such media include negative health effects on sleep, attention, and learning; a higher incidence of obesity and depression; exposure to inaccurate, inappropriate, or unsafe content and contacts; and compromised privacy and confidentiality.³ Smartphones have been described as the melting pot devices as they are very versatile in their use. They allow watching videos, playing games, sending messages, taking pictures, and making video-calls and ultimately phone-calls. In most cases, children use their parents' device equipped with free-apps in a different context and different activities, but recurrently for filling gaps in the day, to keep the children occupied in waiting time or when parents need to retrieve time for themselves. Using devices that are not configured for their use increases children's risks of problematic experiences with pop ups and in-app purchases.⁴ There has been a significant increase in the use of mobile screen media especially smartphones and tablets among young children. Touchscreen devices easily appeal to children, and even after a short exposure, children become expert users.⁵ Parents are increasingly using these devices to pacify their children, with nearly one in ten parents giving smartphones or tablets to their children when they are undertaking household chores.⁶ There has been an increase in the availability of infant-directed video material and the corresponding increase in the amount of time that infants and toddlers spend viewing them, have prompted concern among parents and professionals that these media might impede aspects of cognitive and social development. In contrast, supporters and producers of these media contend that, age-appropriate videos with carefully selected educational content can provide an opportunity to support and enhance early learning.⁷ The

evolution of media from traditional to newer forms of digital media in the past decade has resulted in changes in the patterns of media use. For example, in 1970, children began to regularly watch television at 4 years of age, whereas today, children begin interacting with digital media at 4 months of age.⁸

On one hand research has tested the effectiveness of several digital media products for young children's learning and has found, improvements in children's knowledge and skills for thinking, planning, observing, problem-solving, reading, language, mathematics, hypothesis formation and testing, creativity, and collaborative learning.⁹ A significant body of research compiled over the past couple of decades has found that a well-designed digital media curriculum is effective in enhancing young children's learning. Digital media use supported the development of young children mathematical and cognitive skills. This kind of use of digital media can support enhancements to their attention and concentration levels, consistency, and knowledge expansion and application. Using digital media for young children's learning is more effective, as a way of providing information for an early childhood by professionals and educators who are interested in using digital media for young children's learning.¹⁰ On the other hand, numerous harmful issues have been associated with children's digital media use such as eye strain (red, dry or irritated eyes; blurred vision; or eye fatigue); back, neck and shoulder pain; and headaches. Excessive exposure to the use of smartphones at an early age can also trigger poor eyesight. Excessive childhood involvement with digital media limits children's social interactions, which hinders brain development and have negative effects on their overall development.¹¹ Research suggests that the use of digital media might have an effect on children's attention skills, such as increasing hyperactivity and difficulty in concentrating.¹² Late academic achievement studies suggest that excessive media use mainly computers or video games at an earlier age are associated with lower academic achievement later in life.¹³ Children who spend more time with media devices reportedly have lower levels of personal contentment and have a tendency to get in trouble more often.¹⁴ Studies on the use of digital media among under five children in India are limited. The present study aimed to identify the exposure and use of digital media among under five children in Bengaluru, Karnataka, India.

Objectives

Objectives of current study were to; assess the screen time exposure and use of digital media among the under-five children, identify the type of digital media used, assess the level of exposure and use of digital media, identify the circumstances for using digital media and determine the association between the level of exposure to digital media and demographic variables of mothers.

METHODS

The research design selected for the present study was descriptive survey design. The study was conducted among mothers of under-five children attending paediatric outpatient department at The Oxford medical college hospital in Bengaluru, Karnataka, India. The study period was January 2019 to April 2019. The sample size for the study was 150 mothers of under-five children selected by non-probability purposive sampling technique.

Inclusion and exclusion criteria

Inclusion criteria for current study were; all mothers having under-five children aged 1 month to 5 years, mothers who could understand English or Kannada and mothers willing to participate for the study. Exclusion criterion for current study was; mothers with physically or mentally challenged child.

Sample size estimation

Sample size was determined based on the findings of the pilot study. In a hypothesis testing descriptive study, an approximate formula for determining the sample size for a variable expressed as a percentage was:

$$n = (1 - n/N) \times t^2(p \times q) \div d^2$$

Where; n= sample size, N=size of the eligible population, t^2 = square value of the SD score that refers to the area under normal distribution of values, p= percentage category for which we are computing the sample size $q=(1-p)$, d^2 = square value of one-half of the precision interval around the sample estimate. In this study not taking in consideration $(1-n/N)$, as it has very little effect on sample size estimation, $t=1.96$; it is standard deviation score for 95% set interval, p=assumed or estimated proportion of under five children of mothers as estimated 10% (0.1), $q=1-p(1-0.1=0.9)$, d=confidence interval, i.e. 5% (0.005). The estimated sample size was 149.932. So, a total of 150 mothers of under-five children, were taken as study samples.

Data collection

The data collection tool included a structured questionnaire to gather information on selected demographic variables and use of digital media. A five-point rating scale with 11 items was used to elicit data on the daily screen time and circumstances in which mothers let their children use digital media and frequency of usage. Content validity of the tool was established and tool was pretested. Reliability of the tool was established using test-retest method. A pilot study was conducted among 15 mothers. Study was found to be feasible. Data collection was done after obtaining the permission from the hospital authority. Consent was taken from mothers of under five children.

Statistical analysis

SPSS version 16.0 was used for statistical analysis. Descriptive statistics such as frequency and percentage and Chi square for association between level of digital media exposure and demographic variables were done.

RESULTS

In the present study most of the mothers (46.0%) were in the age group of 26-30 years. Almost equal proportion of under five children were male (49.3%) and female (50.7%). The majority (62.0%) belonged to Hindu religion. Half of the children (53.3%) did not have siblings, 46.7% of the mothers of under-five children were housewives and 30.7% worked as labourer, 56% belonged to the nuclear family, and less than 50% families had monthly income below Rs 20000. As per age distribution, 37.3% children were within the agegroup of 1-2 years, 28% and around 21% in the age group of 3.1 to 4 years, and 2.1 to 3.1 years respectively, 53.3% mothers had one under five child in the family. (Table 1).

Table 1: Demographic variables of mothers and under five children (n=150).

Variables	Categories	N	%
Age of the mother (years)	20-25	18	12.0
	26-30	69	46.0
	31-35	53	35.3
	36-40	10	6.7
Gender of the child	Male	74	49.3
	Female	76	50.7
Religion of the child	Christian	15	10.0
	Hindu	93	62.0
	Muslim	42	28.0
Occupation of the family	House wife	70	46.7
	Labour	46	30.7
	Govt. employee	4	2.6
	Pvt. employee	30	20.0
Economic status of the family (monthly)	<1000	60	40.0
	10001-20000	68	45.3
	20001-30000	7	4.7
	>30000	15	10.0
Type of family children	Nuclear family	84	56.0
	Joint family	66	44.0
Age of the child (years)	1 month-1 year	5	3.3
	1-2	56	37.3
	2.1-3	31	20.7
	3.1-4	42	28.0
	4.1-5	16	10.7
Number of the under five children in the family	One child	80	53.3
	Two children	68	45.3
	Three children and above	2	1.3

The findings regarding the type of digital media used, showed that 36.0% of the under-five children were exposed to television and smart phones, 24.0% children used a combination of television, smart phone, tablet and iPads and 21.3% children used a combination of television, smartphones and tablet (Table 2).

Table 2: Type of digital media used by children (n=150).

Type of the digital media	N	(%)
Television	16	10.7
Smart phone	12	8.0
Tablet	-	-
Ipads	-	-
Television and smart phone	54	36.0
Television, smart phone, tablet	32	21.3
Television, smart phone, tablet, iPads	36	24.0

In the present study the age at initiation of digital media usage showed that more than half of the children (54%) were exposed to smartphones between 1-2 years (toddler) of age. During infancy (1 month to 1 year) 44% of children were exposed to smart phones (Table 3).

Table 3: Age of initiation of digital media exposure and screen time (n=150).

Variables	Categories	N	(%)
Age of child at initiated of digital media exposure (years)	6 months-1	66	44.0
	1.1-2	81	54.0
	2.1-3	-	-
	3.1-4	3	2.0
	4.1-5	-	-
Daily screen time	<30 minutes	1	0.7
	30-1	3	2.0
	1-2	4	2.7
	2-3	83	55.3
	>3	59	39.3

With regard to screen time exposure to digital media, out of total 39.3% children were exposed to digital media for more than 3 hours. More than half to the children (55.3%) were exposed for 2-3 hours and around 2% children were exposed for less than 2 hours. These results indicated that higher proportion of under five children had increased screen time (Table 3). Most (80%) children used smartphones for watching videos (Table 4).

The circumstances in which mothers let their children use digital media revealed that 41.33% always used mobile device when going out for work. More than 30% parents gave mobile device for keeping child calm, 25% mothers often used mobile device for putting to sleep, sometimes (30%) mothers utilized it for learning 38% used it for teaching purpose, around 30% mentioned it rarely or never used it only for entertaining the child, more than

50% mothers used mobile devices while doing household chores. More than 50% children never needed help to navigate mobile devices (Table 5).

Table 4: Purpose of smart phone use among under five children (n=134).

Variables	Categories	N	(%)
Purpose of using smartphones	Video games	4	2.7
	Watch videos	127	95.5
	Video call	2	1.3

Table 5: Circumstances for the use of digital media by under five children (n=150).

Questions	Always	Often	Sometimes	Rarely	Never
How frequently mothers let their children use digital media for following purpose					
When going out for work	41.33	38.00	12.67	1.33	6.67
Keeping child calm in public places	17.33	38.0	31.33	4.0	9.33
Putting child to sleep	23.33	25.33	38.67	7.33	5.33
Learning	4.67	22.0	30.0	33.33	10.0
Entertainment	14.67	14.0	12.67	30.0	28.67
Teaching	24.0	38.0	25.33	4.0	8.67
Doing chores around the house	24.67	54.0	15.33	2.0	4.0
How frequently child needed any help to					
Navigate the mobile device	1.33	7.33	12.0	26.67	52.67

According to the frequency of use of digital media, the level of exposure and use was arbitrarily calculated and classified as mild, moderate and high level of use of digital media. In the present study substantially greater proportion (65.3%) of under-five children had a high level of exposure to digital media (Table 6). Chi-square test, was done to determine the association between the level of exposure to digital media and demographic variables of mothers. Of these variables accounted, the level of exposure to digital media was significantly associated with age of mothers and type of family.

Table 6: Level of exposure to digital media (n=150).

Level of exposure of under five children	Exposure of digital media	
	N	%
Mild (<25%)	12	6.6
Moderate (25-50%)	40	26.6
High (>50%)	98	65.3

DISCUSSION

In the current scenario of technological growth worldwide, various types of digital media are easily available to all age groups of people. Children in particular are increasingly exposed to digital resources. The present study aimed at exploring the exposure and use of digital media among under five children. The findings of the study revealed that under five children were exposed to different types of digital media. Television and smart phones were the most commonly used. The prevalence of digital media use was high among very young children.

The current study showed that mothers used the digital media for their children at a very early age 1-2 years, 55.3% and 44% initiated it during infancy (5 to 12 months). The results of this study are similar to a study conducted in Korea by Chang HY et al, wherein they reported that 31.3% of the children were using smartphones before 24 months of age.¹⁵ Kim SJ et al, reported 74.2% started using mobile media before the age of two years.¹⁶ Harsh et al reported that 32% children were introduced to media before 1 year.¹⁷ Exposure to digital media at a very early age will have adverse effect on various development aspects of a growing child. According to Wolf et al exposing children to screens at an early age has the potential to become an addictive behavior. Growing up in a media-driven world will affect every generation differently. The negative effects that accompany the current culture of early screen exposure are extensive and need to be considered as technology continues to enter the home and overpower social interactions. Increased levels of early screen exposure have been associated with decreased cognitive abilities, decreased growth, addictive behavior, poor school performance, poor sleep patterns, and increased levels of obesity.¹⁸

Findings related to screen time exposure depicted that 39.3% of children were exposed to digital media for more than 3 hours, 55.3% were exposed for 2-3 hours. These are higher than the recommended AAP guidelines of 1 hour per day of screen time for children. Similar findings were reported by Tandon PS et al, wherein on an average, children were exposed to 4.1 hours of screen time daily.¹⁹ In another study, Shah et al reported average screen time among the 379 children was 2.7 hours, with an average daily television screen time of 1.6 hours. Half of the parents have introduced screens to their kids before the age of 2 years.²⁰ Bansal et al reported 43.1% of the children were using mobiles for 1-3 hours followed by 28.8% children those who used mobile for more than 4 hours.²¹ As per a survey study by Radesky et al of 346 parents of children aged 3-5 years as well as data from programs that objectively track device usage, 35% of preschoolers had their own device, and they used it for an average of nearly 2 hours a day. Among the children in this group, 40.5% used their device less than an hour a day, 26.5% used it one to two hours, 12% used it two to three hours, 6% used it three to four hours and 15% used

it four or more hours.²² The findings of our study and the similar supporting studies with regard to increased screen time is alarming. Increased screen time among young children is a worrisome issue as it has impact not only on the physical health but also the behavior of children. Xie et al observed that preschooler with screen time of >60 minutes tend to have more behavioral problems. They further revealed that ADHD syndromes are prominently higher in children with >60 minute screen time.²³

According to UNICEF document on parenting increased screen time affects attention span and focus. For a brain to develop and grow, it needs essential stimuli from the outside world. More importantly, they need time to process those stimuli. Activities like reading storybooks out loud gives children time to process words, images and voices, the constant absorption of on-screen images and messages affects their attention span and focus. Increased screen reduces empathy as it inhibits young children's ability to read faces and learn social skills, which are two key factors needed to develop empathy. Face-to-face interactions are the only way young children learn to understand non-verbal cues and interpret them. Constant stimulation by digital screen can lead to frustration, restricts imagination, motivation and creativity. Experience of boredom also is important as it teaches coping with frustration and control of impulses.²⁴

In the present study majority (80%) of the children used mobile device for watching videos. This is similar to finding of Shah et al who reported that nearly all of the parents (90%) related to games or videos as their child's primary activity on a smartphone.²⁰ Kılıç et al too reported the most frequent activity with mobile devices was watching videos (70.8%, n=226).²⁵ Bansal et al mentioned the following as reasons to give mobile device, majority (42.5%) of the children were using mobile for playing games, followed by (35.0%) watching U-tube videos and (25.1%) children were surfing internet.²¹ One must ponder upon why children are attracted more to the videos than getting attracted to actual human interaction, traditional toys, games and pleasurable physical activity. What makes digital media addictive?

Findings related to circumstances and frequency under which mothers exposed children to digital media in our study revealed that 41.33% mothers always used mobile device when going out for work. More than 38% parents often gave mobile device for keeping child calm, 25% mothers often used mobile device for putting to sleep, sometimes (30%) mothers utilized it for learning, 38% used it for teaching purposes, and more than 50% mothers used mobile devices while doing house hold chores. These findings are consistent with findings of Harsh P et al who reported 46.1% of the parents gave smart phones to their children to keep them calm at home and in public places, 40.8% of parents gave to do household work. 51.3% of parent useful for children in early childhood when given under proper supervision and

with limited screen time.¹⁷ Kabbali et al reported parents gave children devices when doing house chores (70%), to keep them calm (65%), and at bedtime (29%).²⁶ Bansal et al study mentioned that in majority (50.0%) cases mobile was given to tackle with the tantrums of not giving mobile, (37.1%) cases to keep child engaged and in (32.1%) children don't listen or obey parents to not use mobile.²¹ Kılıç et al study stated that 59.6% parents, let their children use mobile devices while they are doing daily tasks or domestic chores.²⁵

These facts raise questions as to whether parents are to be held accountable for early initiation and increased screen time of young children. UNICEF parenting document reiterates that many parents use screens to keep young children entertained or distracted while they juggle other needs. It works as screens captivate children's attention in a way almost nothing else does, allowing parents a bit of a breather.²⁴ In the present study, more than half the children (52.7%) did not need parental help to navigate mobile device. Similar fact was reported by Kılıç AO et al, wherein parents reported that 22.3% never received help while navigating the mobile device.²⁵ The current study revealed a very high level of exposure and use of Digital media among children (65.3%). High exposure of screen time can have grave consequences on children as indicated in a review article by Kaur et al who described that screen time has been associated with impairments in language development and behavioral, psychosocial, academic and physical wellbeing.²⁷ Excessive screen time is associated with sedentary behaviors in children and adolescents and may play a role in causing health risks and non-communicable diseases later in life.²⁷ Higher levels of screen time are associated with a variety of health harms, with evidence strongest for adiposity, unhealthy diet, depressive symptoms and quality of life.²⁸ Playing video games was associated with withdrawn/depressed syndrome, which is consistent with the notion that more time spent playing video games may be linked with social withdrawal, social isolation, and more internalizing problems.²⁹ Studies have also shown increasing screen time at a young age results in poor family functioning.²⁰

The findings of our study implicate that there is an increased need for an awareness program for parents regarding immediate and long-term consequences of exposure and use of digital media by under five children. Kılıç et al study stated that parents, 91.5% (n=386) reported not having been informed by a doctor about the effects of mobile devices on their children and concluded a high prevalence of exposure to mobile devices in young children.²⁵ Educational programs about exposure and the use of digital media by under five children, positive and negative effects, and screen time appropriate as per age of children is imperative. The educative role of nurse and all health professionals is very important in improving the knowledge of mothers regarding exposure and use of digital media by under five children. Nurses and other health professionals working in a pediatric outpatient

department must try to spend time with the children and their parents and conduct teaching programs about health hazards of increased exposure and use of digital media by under five children, so that certain guidelines can be followed in providing digital media to their child. It has also been observed by us that an increasing number of children have been glued to smartphones during their hospital stay. Particularly mothers have been noted to use smartphones as a distraction while feeding their children in the in-patient setting.

Play is essential to the development of children because it contributes to the physical, cognitive, social and emotional well-being of children and youth. Play also offers an ideal opportunity for parents to engage fully with their children. Despite the benefits derived from play for both children and parents, time for free play has been markedly reduced for many children. One among the several reasons for the decrease in free play can be explained by children being passively entertained through digital media through television, smartphones, computer/video games. In sharp contrast to the health benefits of active, creative play and the known developmental benefits of an appropriate level of organized activities, there is ample evidence that this passive entertainment is not protective and, in fact, has harmful effects.

Play in childhood has many benefits. It allows children to use their creativity while developing their imagination, dexterity, and physical, cognitive, and emotional strength. Play allows children to create and explore a world they can master, conquering their fears. It helps children develop new competencies that lead to enhanced confidence and the resiliency to face future challenges. Children learn to work in groups, to share, to negotiate, to resolve conflicts, and to learn self-advocacy skills, decision-making skills. In contrast to passive entertainment, play builds active, healthy bodies. Encouraging unstructured play may be an exceptional way to increase physical activity levels in children, which is one important strategy in the resolution of the obesity epidemic.³⁰

In view of the above facts and the findings of our study, we recommend that under-five children should have very limited screen time. Total elimination of mobile digital media and devices and restricted television exposure would be especially fruitful considering the addicting nature of digital media. Learning by imitation is one of the natural characteristics of under five children. In the current study greater percentages of infants also have been using digital media. An infant does not have the capacity to access the digital devices unless facilitated by parents. Also, children observe parent using various screen devices and tend to imitate the same. Hence, parents must be targeted for modifying their behaviours related to use of digital media. Children should be exposed to various physical activities, provided with age-appropriate toys and play material and unstructured play

must be encouraged for promoting global development - physical, psychological, social, language and emotional. Parents as primary care takers must not give in to their children's tantrums and facilitate digital media devices. Limiting and/or eliminating screen time in early years will give a lifetime advantage.

Limitations

The study had few limitations. It was done in only one hospital setting, sample size was small hence results cannot be generalised and recall bias cannot be ruled out.

CONCLUSION

In conclusion, the present study throws light on how aspects of digital media are invading the lives of children at a very young age. A large number of under five children surpass the screen time recommendations of the American academy of pediatrics. Parents are increasingly providing mobile devices to children to carry out their errands. Education and counselling and early control measures to restrict screen time in under five children is crucial.

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