Smart Devices and Family Roles: A Study of Smart Device Use Among Children Aged 2-5 in Thailand's Health Region 3

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Abstract

This research investigated smart device use among young Thai children. The study likewise explored the relationship between smart device screen time, family roles in smart device use, and effects of smart device use. In 2020, primary data were collected through questionnaires from 1,100 primary parents of 2-5-year-old children in five provinces in Health Region 3. A Mann-Whitney U Test and Median Test were used in data analyses of the associations. The results revealed that 2-5-year-old children had an average screen time per day of 1 hour and 33 minutes, with 54.3% spending more than 1 hour on smart devices daily. In addition, 21.5% reported owning a smartphone, of which 55.2% accessed YouTube to watch cartoons and movies. In terms of screen time, 21.7% of the children reported unrestricted use. In terms of effects from smart device use, children being easily irritated and moody was noted by most parents (61.5%). In addition, variables under family roles and effects of smart device use showed a statistically significant correlation with smart device screen time. However, median screen time varied by each variable under family roles and effects of smart device use. The findings are essential for future policy planning, which will enable families with young children to become aware of appropriate smartphone or tablet usage by their children.

Keywords

Early childhood; family; smart device; smartphone; Thailand

Introduction

A study of the development of Thai children over the past 20 years revealed that children aged 3-5 exhibited slow language development (Ministry of Public Health, 2016b). Access to television or smartphones during the first three years of life was one of the reasons (Rajanagarindra Institute of Child Development, 2016). Nationwide data has demonstrated that 68.6% of Thai families own smartphones. At the same time, 24.6% reported ownership of tablets (National Statistical Office, 2016). This finding may result in young children having access to smartphones and tablets either belonging to or given to them by their parents. In this way, smartphones and tablets have become a part of young children's normal daily lives.

At present, Thailand has few studies that have contributed directly to the use of smartphones and tablets by young children. Data on a global scale were similarly limited. Nevertheless, research results from various countries regarding young children's smartphone and tablet use and the effects of such use are consistent. In Italy, 20% of children aged 3-5 began using a smartphone during the first year of life. At the same time, 80% were granted permission to use their parent's smartphones. This behavior stemmed from the parents' wish to calm their children. However, it was also found that smartphone use in young children also interfered with learning and development, well-being, sleep, sight, listening, and caregiver-child relationships (Bozzola et al., 2018). The findings of this study agree with those of another study on children aged six months to four years in Philadelphia, Pennsylvania, U.S.A., which explored the adoption of smartphones among children from a low-income community.

Similarly, smartphone use started before the children reached the age of one. In this regard, giving children smartphones allowed parents to do chores (70%) and calm their children (65%). Most children at the age of two use smartphones daily. For children aged 3-4, smartphone use was unrestricted and without parental supervision. Popular applications included YouTube and Netflix (Kabali et al., 2015). In Japan, children at six years old who frequently use smartphones and tablets often experience emotional problems. In addition, frequent smartphone and tablet use also affected their ability to adjust socially. The severity of the effect was often determined by the length of exposure and type of content delivered. Repeated exposure to violence in games and videos usually had negative consequences on the children's social development (Hosokawa & Katsura, 2018).

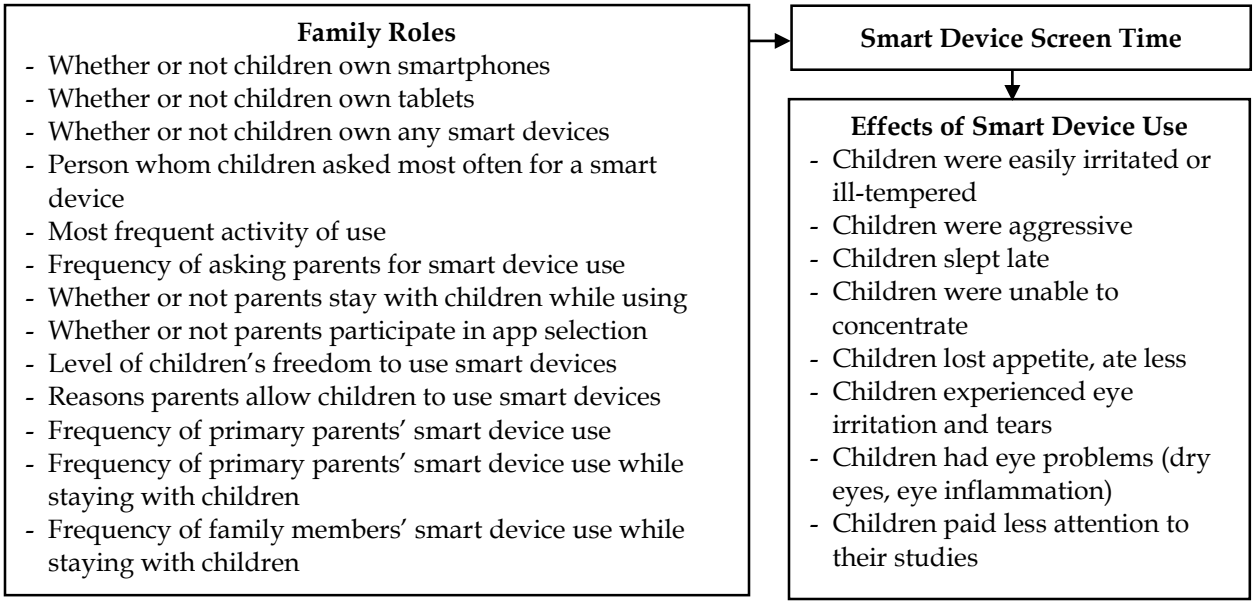
Similarly, studies from Europe (e.g., Belgium, Czech Republic, Finland, Germany, Italy, and the United Kingdom) and Russia have shown that children use their parents' tablets and smartphones to play games. However, their limited understanding, framed by their youthfulness, resulted in the children mimicking the games' inappropriate language (Chaudron, 2015). This finding aligned with an opinion from the Department of Pediatrics, Faculty of Medicine at Siriraj Hospital in Thailand (2015), reflecting the lack of research to support the benefits of smartphone and tablet use in children younger than three years old. Such usage, then, should be supervised by parents with controlled screen time and encouragement for parents to converse or play with their children while their children are using smartphones (Bozzola et al., 2018; Hosokawa & Katsura, 2018; World Health Organization, 2019).

For the above reasons, the researchers took an interest in studying smart device use among 2-5-year-old Thai children, family roles, and the effects of smart device use. This interest also extended to include the relationship between smart device screen time, family roles in use, and the effects of use. The research focused on 2-5-year-old children in Thailand's Health Region 3, including Nakhon Sawan, Uthai Thani, Chai Nat, Phichit, and Kamphaeng Phet Provinces. The findings will provide essential groundwork data for future policy planning, so families with young children can be aware of appropriate smartphone or tablet use for children.

Conceptual framework

Early childhood is a period when children develop rapidly. This period is the most crucial moment in the foundation of human life; therefore, a family must include activities that stimulate the child's physical, cognitive, linguistic, and socio-emotional development. There should be opportunities for leisure in learning such as play, art, music, drama, and sports. It is most important to present the program in the child's mother tongue. (Institute of Medicine and National Research Council, 2015; Manas, 2020). The use of smart devices in childhood is one of the environmental factors that affect child development. Parents or family members play a huge role in supporting or limiting the use of smart devices for children. This role is consistent with the theory of intergenerational solidarity, which explains the relationship between different generations in a family as either supportive or reciprocal in resources such as food, materials, time, assets/money, emotions, information, and other benefits. If family support is appropriate, it can lead to a peaceful co-existence for both givers and receivers. The theory pays attention to the importance of relationship building and its transition among family members, reflecting the family role as the most intimate source of its members (Bengtson & Schrader, 1982; McChesney & Bengtson, 1988). Families, therefore, are likely to play an essential role in developing or hindering ideas and smart device use in young children. A literature review and both of the above concepts were used to construct this study's conceptual framework (Figure 1).

Figure 1: The Relationship Between Family Roles and Smart Device Screen Time, and the Impact of Smart Device Use on Young Children



Research methodology

Research design

This quantitative research used a cross-sectional method with a questionnaire to collect data from primary parents of children aged 2-5 who lived in the same households as their children. The quality of the questionnaire was validated by three experts and a pre-test involving 30 parents who were similar to the study group. Likert-scale questions were tested for their reliability with the criteria of Cronbach's alpha coefficient at 0.7 or higher.

Population and sample

Our study targeted children aged 2-5 years old enrolled in child development centers or kindergarten schools in Health Region 3 comprising the following five provinces: Nakhon Sawan, Uthai Thani, Chai Nat, Phichit, and Kamphaeng Phet. Children aged 2 - 5 years have small hand muscles that have been developed. They are capable of pressing and swiping smartphone and tablet screens. Children at this age begin to understand language and enjoy video media. A quota sampling method was used with a quota of at least 200 samples per province. In one province, there had to be at least 20 children in each of at least ten centers or kindergartens with five centers or kindergartens in each urban or rural area. A total of 1,100 samples were finally included in the study. Determining the closest proportion of representatives for each province was a limitation of this research.

Definition

The term smart devices in this research only refers to smartphones and tablets.

Data collection

The researchers coordinated with the samples of centers or schools and conducted the data collection with primary parents of children aged 2-5 who lived in the same households as children. Primary data were collected in August 2020 from the primary parent of a child dropped off or picked up at a child development center or kindergarten in the morning or afternoon. Additional requirements comprised of the following: (1) The children had to have experience with smart device use; (2) Parents had to take the children to school themselves; and (3) The parents had to be willing to be interviewed.

This research was approved by the Mahidol University Central Institutional Review Board (MU-CIRB 2020/001.0601).

Data analysis

Descriptive statistics were employed to present how children used smart devices, the roles of their families toward smart device use, and the effects. Comparative statistics, Mann-Whitney U tests, and Median Tests were also used to test the relationships between the variables with 0.05 as the level of statistical significance since the tests of normality indicated that smart device screen time, the main variable, held a non-normal distribution.

Results

Characteristics of children and their primary parents

Our study obtained information on the smart device use of children aged 2-5 through their primary parents' responses. A total of 1,100 respondents from five provinces in Health Region 3 participated, including respondents from Phichit (21.5%), Kamphaeng Phet (20.7%), Chai Nat (19.7%), Nakhon Sawan (19.3%), and Uthai Thani (18.7%). Children in urban areas made up 53.8% of the samples, whereas 46.2% lived in rural areas. Proportions of girls and boys were similar. Their average age was 3.5 years, with 3-year-old children accounting for the highest portion, followed by 4-year-olds (23.5%), 5-year-olds (22.7%), and 2-year-olds (18.9%). More than half (51.1%) were enrolled in kindergarten 1-3, and the rest were in child development centers (48.9%). The majority of the respondents were females; approximately 51% were mothers, followed by grandmothers (27.2%). The primary parents had an average age of 40 years. The highest proportion was in the 30–39-year-old age range (27.3%), followed by the 20-29-year- old age range (25.2%). Most parents had completed elementary education (33.7%). However, 52.1% of the parents had graduated from high school, and the remainder (10.3%) had bachelor's degrees.

Smart device screen time of children aged 2-5

According to primary parents, 93.8% of the children were frequent smartphone users. Approximately 48% had begun using smart devices at the age of two. The other 30.5% initially used smartphones at the age of three, whereas 13% had started at 4-5. Approximately 9% of the parents let their children use smartphones, even before reaching one year. Smartphone and tablet screen time was presented within a weekly summary by the duration of use, including weekdays when the children attended school and on weekends when they stayed home. The study showed that the average screen time per day was 1 hour and 25 minutes from Monday to Friday. The number increased to 1 hour and 57 minutes on Saturday and Sunday (approximately 2 hours). In a weekly summary (including weekdays and weekends), the average screen time per day was 1 hour and 33 minutes.

The fact that some young children were allowed 10-12-hours of screen time per day was worrisome. When analyzing average screen time per day throughout the week, the families that allowed young children more than 1 hour of screen time per day in smartphone or tablet use

made up 54.3% of all samples. The screen time increased to 3 hours per day on weekends for 17.2% of the population (Table 1).

Table 1: Smart Device Screen Time Per Day Among Children Aged 2-5, 2020 (n=1,100)

Smart Device Screen Time	Monday-Friday f (%)	Saturday-Sunday f (%)	Monday-Sunday f (%)
Less than 30 minutes	308 (28.0)	277 (25.2)	185 (16.8)
31 minutes - 1 hour	354 (32.2)	267 (24.3)	316 (28.7)
1 hr. 1 min. - 1 hr. 30 min.	47 (4.3)	20 (1.8)	153 (13.9)
1 hr. 31 min. - 2 hrs.	227 (20.6)	202 (18.4)	171 (15.5)
2 hrs. 1 min. - 2 hrs. 30 min.	34 (3.1)	19 (1.7)	75 (6.8)
2 hrs. 31 min. - 3 hrs.	79 (7.2)	126 (11.5)	95 (8.6)
More than 3 hours	51 (4.6)	189 (17.2)	105 (9.5)
Mean	1 hr. 25 min.	1 hr. 57 min.	1 hr. 33 min.
Median	1 hour	1 hr. 30 min.	1 hr. 17 min.
SD	1 hr. 04 min.	1 hr. 52 min.	1 hr. 10 min.
Min – Max	0-10 hours	0-12 hours	2 min.-10 hrs. 34 min.

Family roles on smart device use of children, and the relationship between family roles and smart device screen time

Concerning the roles families had in children's use of a smart device, it was found that the children in 21.5% and 6.7% of the families owned smartphones and tablets, respectively. However, the other 74.3% owned neither smartphones nor tablets. On the other hand, 85% of the children often borrowed smart devices from other family members, whereas the additional 15% used their own. Fifty-five percent used smart devices to watch cartoons and movies. The other 23.3% favored children's television shows on YouTube, toy and game reviews, and TikTok. Only 8.2% pestered their parents for smart device access.

Meanwhile, a high proportion of children (82.3%) used smart devices in their parents' presence. Nonetheless, 39.4% of the parents reported their lack of ability to select the applications for their children. At the same time, 21.7% of parents imposed neither restrictions nor time limits over their children's smart device use. The reasons behind parental consent on children's use of smart devices comprised the following: kids can study school subjects such as languages and mathematics (76.5%), kids can have fun (83.3%), and kids can get acquainted with technologies at an early age (61.1%). However, more than half of the parents reported letting their children use smart devices to prevent the children from interfering with their work (54%) and to keep the children still and quiet (51.6%). The other 24.1% discussed having heavy workloads and, therefore, using the devices to help raise their children (Table 2).

Table 2: Smart Device Screen Time Among Children Aged 2-5 by Family Roles in Use, 2020 (n=1,100)

Variable	f (%)	Mean	Median	Z/x^2	*P*-value
Whether or not children own smartphones					
No	864 (78.5)	1 hr. 25 min.	1 hour	Z=-8.269	<0.001*
Yes	236 (21.5)	2 hrs. 10 min.	2 hours		
Whether or not children own tablets					
No	1,026 (93.3)	1 hr. 32 min.	1 hr. 17 min.	Z=-4.785	<0.001*
Yes	74 (6.7)	2 hrs. 11 min.	2 hours		
Whether or not children own any smart devices					
None	817 (74.3)	1 hr. 22 min.	1 hour	x^2=55.192	<0.001*
Yes, only smartphones	209 (19.0)	2 hrs. 9 min.	1 hr. 56 min.		
Yes, only tablets	47 (4.3)	2 hrs. 5 min.	2 hours		
Yes, both smart devices	27 (2.5)	2 hrs. 20 min.	2 hrs. 17 min.		
The person whom children asked most often for a smart device					
No one, use own device	275 (25.0)	2 hrs. 11 min.	2 hours	x^2=59.517	<0.001*
Mother	420 (38.2)	1 hr. 24 min.	1 hour		
Grandmother	177 (16.1)	1 hr. 16 min.	1 hour		
Father	96 (8.7)	1 hr. 35 min.	1 hour		
Grandfather	74 (6.7)	1 hr. 21 min.	1 hr. 05 min.		
Others	58 (5.3)	1 hr. 12 min.	1 hour		
Most frequent activity of use					
School-related: language teaching videos	97 (8.8)	1 hr. 09 min.	1 hour	x^2=17.780	0.003*
Listening to music	30 (2.7)	1 hr. 19 min.	1 hr. 17 min.		
Watching media for children: story-telling videos, singing classes	80 (7.3)	1 hr. 28 min.	1 hr. 17 min.		
Watching cartoons/movies	607 (55.2)	1 hr. 37 min.	1 hr. 17 min.		
Children's television shows via YouTube, toys/games review, TikTok	256 (23.3)	1 hr. 38 min.	1 hr. 26 min.		
Playing games	30 (2.7)	2 hrs. 20 min.	2 hrs. 34 min.		
Frequency of asking parents for smart device use					
Never	519 (47.2)	1 hr. 21 min.	1 hour	x^2=37.144	<0.001*
Rarely	491 (44.6)	1 hr. 41 min.	1 hr. 17 min.		
Often	90 (8.2)	2 hrs. 20 min.	2 hours		
Whether or not parents stay with children while using smart devices					
Always	905 (82.3)	1 hr. 30 min.	1 hr. 13 min.	x^2=20.618	<0.001*
Sometimes	186 (16.9)	1 hr. 51 min.	1 hr. 30 min.		
Never	9 (0.8)	3 hrs. 03 min.	2 hours		
Whether or not parents participate in app selection					
Yes	667 (60.6)	1 hr. 31 min.	1 hr. 17 min.	Z=-1.533	0.125
No	433 (39.4)	1 hr. 40 min.	1 hr. 17 min.		

Variable	f (%)	Mean	Median	Z/x^2	*P*-value
Level of children's freedom to use smart devices					
Parents limit time before use (set up rules)	535 (48.6)	1 hr. 28 min.	1 hr. 09 min.	x^2=6.596	0.037*
Parents limit time when appropriate (no rules)	326 (29.6)	1 hr. 37 min.	1 hr. 17 min.		
Children can use freely without time limits	239 (21.7)	1 hr. 45 min.	1 hr. 17 min.		
Reasons Parents Allow Children to Use Smart Devices					
To calm/make children stay still					
No	532 (48.4)	1 hr. 29 min.	1 hr. 04 min.	Z=-2.491	0.013*
Yes	568 (51.6)	1 hr. 39 min.	1 hr. 17 min.		
To prevent children from interrupting while parents are working					
No	506 (46.0)	1 hr. 28 min.	1 hour	Z=-3.570	<0.001*
Yes	594 (54.0)	1 hr. 40 min.	1 hr. 21 min.		
Parents with heavy workloads use devices to 'babysit' children					
No	844 (75.9)	1 hr. 32 min.	1 hr. 17 min.	Z=-2.396	0.017*
Yes	265 (24.1)	1 hr. 43 min.	1 hr. 26 min.		

The average and median screen times were nearly twice as high for 2-5-year-old children whose parents permitted them smartphone and tablet ownership than those without ownership of the devices. Similarly, the average and median screen times were almost twice as high for children who played games on smart devices than those using them for studying, listening to music, watching cartoons, movies, and children's television shows such as story-telling videos and online singing courses. One other interesting discovery pertained to children who frequently pestered their parents for the use of smart devices. The approximate average and median screen times for this group of children were twice as high as the group of children who had never or seldom asked to use smart devices. Children who often spent time in their parents' company had twice the lower average and median screen times than children whose parents were usually away. In terms of screen time limits, a group without time restrictions or with time restrictions, but without predefined rules, had greater average and median screen time than a group with time restrictions and predefined rules.

On the other hand, the parental decision over application selection showed no effects over smart device screen time; both shared the median screen time of 1 hour and 17 minutes. In summary, three reasons contributed to parental inclinations toward permitting their children to use smart devices: To keep their children still and quiet, to keep their children from interfering with their work, and to help parents with heavy workloads with child care. The average and median screen times were also greater for parents who rejected those reasons.

An analysis of screen time classified by family roles toward smart device uses, using Mann-Whitney U Test and Median test at a 0.05 significance level, yielded an interesting result, as shown in Table 2. As a whole, the median screen time was related to nearly all variables under family roles at a 0.05 significance level. Nevertheless, regarding parental decisions over application selection, whether or not they were involved showed no statistically significant correlation, shown at the 0.05 level for median screen time.

Smart device use of family members and relationship with children's smart device screen time

Some parents (21.6%) owned no smart devices. On the contrary, parents who owned smart devices and were frequent users and made up as high as 36.5% of the samples, whereas 21.3% of the primary parents reported using the devices in front of their children, and approximately 19% reported similar use by family members in the children's presence. The average and median screen times were higher for children whose primary parents used smart devices frequently than children whose primary parents rarely or never used smart devices. Similarly, children whose primary parents or family members frequently used smart devices in their presence showed higher average and median screen times compared to children whose primary parents or family members rarely or never used smart devices in their presence. A Median Test at the 0.05 significance level on the correlation between children's screen time and the type of use by family members revealed median screen times to vary by primary parents' frequency of smart device use, their frequency of use in the children's presence, and family members' frequency of use in the children's presence (Table 3).

Table 3: Smart Device Screen Time Among Children Aged 2-5 by Family Members' Use of Smart Devices in 2020; Median Test (n=1,100)

Variable	f (%)	Mean	Median	x^2	*P*-value
Frequency of primary parents' smart device use					
None; no smartphones owned	238 (21.6)	1 hr. 24 min.	1 hour	13.709	<0.001*
Rarely	461 (41.6)	1 hr. 29 min.	1 hr. 17 min.		
Often	401 (36.5)	1 hr. 49 min.	1 hr. 26 min.		
Frequency of primary parents' smart device use while staying with children					
None; no smartphones owned	238 (21.6)	1 hr. 24 min.	1 hour	26.651	<0.001*
Never	180 (16.4)	1 hr. 24 min.	1 hour		
Rarely	448 (40.7)	1 hr. 36 min.	1 hr. 17 min.		
Often	234 (21.3)	1 hr. 52 min.	1 hr. 34 min.		
Frequency of family members' smart device use while staying with children					
Never	392 (35.6)	1 hr. 24 min.	1 hour	15.447	<0.001*
Rarely	504 (45.8)	1 hr. 38 min.	1 hr. 17 min.		
Often	204 (18.5)	1 hr. 45 min.	1 hr. 26 min.		

Effects of smart device use on the physical and psychological health of children and relationships between children's screen time and the effects

Based on parents' responses, as much as 61.5% of children were reported to become easily irritated and ill-tempered. Smart device use also caused children to sleep late (31%) and be more aggressive (29.3%). Furthermore, 19.3% of the children were unable to concentrate, and 18.9% had a loss of appetite and reduced food intake. At the same time, smart device use in dimly lit

environments caused eye pain, burning eyes, and excess tearing in 16.5% of the children. By the same token, 13.9% had eye problems such as dry eyes, eye inflammation and, in turn, decreased learning attention in 9.1% of the children. Between those children who were affected and those who were not, the study revealed that the average and median screen times were higher among those children who were affected. A Man-Whitney U Test revealed different median screen times at a 0.05 significance level concerning all eight issues, as listed in Table 4 below.

Table 4: Effects of Smart Device Use Toward Physical and Psychological Health of Children Aged 2-5, 2020 and Man-Whitney U Test (n=1,100)

Variable	f (%)	Mean	Median	Z	*P*-value
Children were easily irritated or ill-tempered					
No	423 (38.5)	1 hr. 26 min.	1 hour	-4.265	<0.001*
Yes	677 (61.5)	1 hr. 48 min.	1 hr. 26 min.		
Children were aggressive					
No	778 (70.7)	1 hr. 29 min.	1 hr. 09 min.	-3.850	<0.001*
Yes	322 (29.3)	1 hr. 48 min.	1 hr. 30 min.		
Children slept late					
No	759 (69.0)	1 hr. 27 min.	1 hr. 04 min.	-5.003	<0.001*
Yes	341 (31.0)	1 hr. 52 min.	1 hr. 34 min.		
Children were unable to concentrate					
No	888 (80.7)	1 hr. 30 min.	1 hr. 17 min.	-4.120	<0.001*
Yes	212 (19.3)	1 hr. 53 min.	1 hr. 34 min.		
Children lost appetite, ate less					
No	892 (81.1)	1 hr. 30 min.	1 hr. 17 min.	-4.172	<0.001*
Yes	208 (18.9)	1 hr. 56 min.	1 hr. 34 min.		
Children experienced eye irritation and tears					
No	918 (83.5)	1 hr. 32 min.	1 hr. 17 min.	-2.314	0.021*
Yes	182 (16.5)	1 hr. 46 min.	1 hr. 26 min.		
Children had eye problems (dry eyes, eye inflammation)					
No	947 (86.1)	1 hr. 31 min.	1 hr. 17 min.	-4.367	<0.001*
Yes	153 (13.9)	1 hr. 55 min.	1 hr. 39 min.		
Children paid less attention to their studies					
No	1,000 (90.9)	1 hr. 32 min.	1 hr. 17 min.	-2.689	0.007*
Yes	100 (9.1)	2 hours	1 hr. 34 min.		

Discussion

In five provinces (e.g., Nakhon Sawan, Uthai Thani, Chai Nat, Phichit, and Kamphaeng Phet) in Thailand, 2-5-year-old children had an average smart device screen time, particularly smartphones, of 1 hour and 33 minutes. The number fell to 1 hour and 17 minutes when calculated as a median. As much as 54.3% of children spent more than 1 hour per day with smart devices. Furthermore, the fact that some children's screen times exceeded 10 hours a day and reached a higher number during weekends was worrying. The screen time of 2-5-year-old Thai children far surpassed the recommended use by the American Academy of Pediatrics and the Australian Physiotherapists Association, which states that 2-5-year-old children should spend less than an

hour on smartphones daily (Bozzola et al., 2018). Of greater concern was the discovery that Thai children began using smart devices as young as 6 months.

Moreover, 8.9% were younger than one year when they first used smart devices. This observed circumstance hardly conformed to the World Health Organization's (WHO) guidance which suggested that children younger than one year old not using smart devices (smartphones, tablets, and televisions). The guidance further suggested that, at the same time, parents should have their children abstain from screen-based entertainment (World Health Organization, 2019).

Children aged 2-5 often watched cartoons, movies, toy reviews, or children's television shows. However, reports on the recent introduction of TikTok indicated a viewing rate of as high as 78.7%. In contrast, only 2.7% of children reported playing online games. These findings appear to be similar to the behaviors of young children in America and Japan, who favored YouTube, and watched movies on Netflix. Their media choices also included Disney movies and popular music videos (Chaudron, 2015; Kabali et al., 2015). These applications were primarily audio-visual-based. However, children rarely perform a text-based search for what they wish to watch because of their limited language comprehension and underdeveloped fine motor skills (Ministry of Public Health, 2016a). As a result, the content was often selected from an application's suggestions and only required the press of a finger for the video to play.

On the family's part, many reasons enabled 2-5-year-old children with more time to play on smartphones or tablets. Children's ownership of a smartphone was one such example (21.5%). Furthermore, indulging parents imposed neither a limit on their children's screen time nor rules on smart device use (21.7%). Smartphones or tablets also offer parents opportunities to care for their children while working or doing chores. In this scenario, smart devices were used to distract their children from interfering with parents' work (50%). This use of smart devices was similar to American parents who gave their children both unlimited screen time and unsupervised smartphone access to obtain time for chores and calmed their children (Kabali et al., 2015). It could be that as the nuclear family with support for individual autonomy grew to become the face of modern-day families, seeking help from relatives or neighbors became impossible. In this regard, smartphones adopted a role similar to a caregiver by keeping children engaged in animated screens. Often, parents believed that this distracted children from other activities that might cause them bodily injuries and property damages. The practice also simultaneously distracted children from interfering with the parents as they worked. Additionally, the study discovered that both primary parents and other family members – approximately 20%– had frequently used smartphones in front of their children in the past. This finding contradicted the belief that parents should be good role models for young children since children often mimic their elders' behavior (World Health Organization, 2019).

In terms of effects, children affected by inappropriate use of smart devices were ill-tempered when access to smart devices was not possible (61.5%) and aggressive (29.3%). They became late-sleepers, stayed up to play with smart devices (31%), and were unfocused or had trouble focusing (19.3%). Moreover, it was noted that both the average screen time and the median screen time per day were higher in children who were affected by smart device use than those who were not. This finding conformed to research from other countries, which found that daily, prolonged exposure to smart devices can interfere with children's learning ability, development (e.g., communication and fine-motor skills), sleep quality, sight, listening skills, emotional intelligence,

and problem-solving skills. Moreover, children could imitate the violent language and other forms of violence (Bozzola et al., 2018; Chaudron, 2015; Hosokawa & Katsura, 2018; LeBourgeois et al., 2017; Madigan et al., 2019; Tamana et al., 2019). The delay in language development and communication skills resulted from decreased parent-child interactions when replaced by screen time. In turn, confused children could not apply their learning from their parents and smart devices (van den Heuvel et al., 2019). However, in the impact assessment, the opinions of parents were considered. If healthcare professionals assess the impact of using smart devices, they will be affected in that the same benchmarks are used to measure outcomes. This presumption may be a limitation of this study.

Conclusion and recommendations

In this study, Thai children aged 2-5-year-old had an average smart device screen time of 1 hour and 33 minutes. For 54.3% of the children, the average screen time was greater than one hour per day. At present, as much as 55.2% of children watch cartoons, movies, toy reviews, or children's television shows on YouTube. At the same time, one out of every five children owns a smartphone and uses it without parental supervision. In this study, the smart device use of parents in front of children was frequently observed.

On the other hand, smart device deprivation was associated with psychological health in 61.5% of children. The study concluded that, in Thailand, family roles are vital factors that enable 2-5-year-old children with more screen time for either smartphones or tablets. As shown in an analysis of children's average and median screen time by family roles, the statistics were higher in a group that enabled children's smart device use. Effect-wise, the average and median screen times were higher for children who were affected compared with their counterparts.

The findings of this research can encourage families, parents, and other family members to be aware of their roles in strict supervision concerning their children's use of smart devices. Children should not own smart devices. Instead, parents should discipline their children by limiting screen time and regulating smart device use. Parents should also refrain from using smartphones or tablets in front of their children. However, the research remains limited, mainly for its lack of data on 0-1-year-old children, and other activities that could lessen smart device screen time, such as playing, helping with household chores, and doing outdoor activities. Therefore, future studies should include data on children aged 0-1 years and other activity-related variables for a more comprehensive outlook on young children and family roles.

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References

Bengtson, V. L., & Schrader, S. S. (1982). Parent-child relations. In D. J. Mangen & W. A. Peterson (Eds.), *Social roles and social participation: Research instruments in social gerontology* (Vol. 2, pp. 115–186). University of Minnesota Press.

Bozzola, E., Spina, G., Ruggiero, M., Memo, L., Agostiniani, R., Bozzola, M., Corsello, G., &Villani, A. (2018). Media devices in pre-school children: The recommendations of the Italian pediatric society. *Italian Journal of Pediatrics*, *44*, 69. https://doi.org/10.1186/s13052-018-0508-7

Department of Pediatrics, Faculty of Medicine at Siriraj Hospital in Thailand. (2015). *เลี้ยงลูกด้วยแท็บเล็ตสมาร์ทโฟนดีจริงหรือ [Is it good to raise kids with smartphones and tablets?]*. https://www.si.mahidol.ac.th/siriraj_online/thai_version/Health_detail.asp?id=1188

Chaudron, S. (2015). *Young children (0-8) and digital technology: A qualitative exploratory study across seven countries* (EUR27052). Publications Office of the European Union. http://dx.doi.org/10.2788/00749

Hosokawa, R., & Katsura, T. (2018). Association between mobile technology use and child adjustment in early elementary school age. *PLoS ONE*, *13*(7), e0199959. https://doi.org/10.1371/journal.pone.0199959

Institute of Medicine and National Research Council. (2015). *Transforming the workforce for children birth through age 8: A unifying foundation*. The National Academies Press. https://doi.org/10.17226/19401

Kabali, H. K., Irigoyen, M. M., Nunez-Davis, R., Budacki, J. G., Mohanty, S. H., Leister, K. P., & Bonner, R. L. (2015). Exposure and use of mobile media devices by young children. *Pediatrics*, *136*(6), 1044-1050. https://doi.org/10.1542/peds.2015-2151

LeBourgeois, M. K., Hale, L., Chang, A. M., Akacem, L. D., Montgomery-Downs, H. E., & Buxton, O. M. (2017). Digital media and sleep in childhood and adolescence. *Pediatrics, 140*(Suppl 2), S92-S96. https://doi.org/10.1542/peds.2016-1758J

Madigan, S., Browne, D., Racine, N., Mori, C., & Tough, S. (2019). Association between screen time and children's performance on a developmental screening test. *JAMA Pediatrics*, *173*(3), 244-250. https://doi.org/10.1001/jamapediatrics.2018.5056

Manas, G. M. (2020). Study on childhood development in early stage. *Scholarly Research Journal for Interdisciplinary Studies*, *7*(59), 13927-13938. https://www.srjis.com/pages/pdfFiles/159531456910.%20harvinder%20kaur(OK)%20(2).pdf

McChesney, K. Y., & Bengtson, V. L. (1988). Solidarity, integration, and cohesion in families: Concepts and theories. In D. J. Mangen, V. L. Bengtson, & P. H. Landry, Jr. (Eds.), *Measurement of intergenerational relations* (pp. 15–30). Sage Publications, Inc.

Ministry of Public Health. (2016a). *คู่มือการพัฒนาเด็กปฐมวัย (อายุต่ำกว่า 5 ปี) สำหรับผู้ปกครอง [Handbook of early childhood (under 5 years of age) development for parents]*. http://www.thaichilddevelopment.com/images/doc/Ebook1.pdf.

Ministry of Public Health. (2016b). *เฝ้าระวังและส่งเสริมพัฒนาการเด็กปฐมวัย [Developmental Surveillance and Promotion Manual]*. https://apps.hpc.go.th/dl/web/upFile/2020/02-4052-20200220175136/297d40a3eef9ae0253e5bb14f8e4caf4.pdf

National Statistical Office. (2016). *Thailand Multiple Indicator Cluster Survey 2015-2016*.National Statistical Office. http://www.nso.go.th/sites/2014en/Survey/social/domographic/MICS/Thailand_MICS_Full_Report_EN.pdf

Rajanagarindra Institute of Child Development. (2016). *คู่มือคัดกรองและส่งเสริมพัฒนาการเด็กวัยแรกเกิด-5 ปี: สำหรับบุคลากรสาธารณสุข [Thai Development Skills Inventory for Children from Birth to Five Years (TDSI) for Healthcare Personnel]*. Rajanagarindra Institute of Child Development. https://www.thaichilddevelopment.com/images/doc/roporsortor70.pdf

Tamana, S. K., Ezeugwu, V., Chikuma, J., Lefebvre, D. L., Azad, M. B., Moraes, T. J., Subbarao, P., Becker, A. B., Turvey, S. E., Sears, M. R., Dick, B. D., Carson, V., Rasmussen, C., CHILD study investigators, & Pei, J. (2019). Screen-time is associated with inattention problems in preschoolers: Results from the CHILD birth cohort study. *PLoS ONE, 14*(4), e0213995. https://doi.org/10.1371/journal.pone.0213995

van den Heuvel, M., Ma, J., Borkhoff, C. M., Koroshegyi, C., Dai, D. W. H., Parkin, P. C., Maguire, J. L., & Birken, C. S. (2019). Mobile media device use is associated with expressive language delay in 18-month-old children. *Journal of Developmental and Behavioral Pediatrics, 40*(2), 99–104. https://dx.doi.org/10.1097%2FDBP.0000000000000630

World Health Organization. (2019). *Guidelines on physical activity, sedentary behaviour and sleep for children under 5 years of age*. World Health Organization. https://apps.who.int/iris/handle/10665/311664