



# Mobile technology usage in early childhood: Pre-COVID-19 and the national lockdown period in North Cyprus

Nihan Koran<sup>1</sup> · Bengü Berkmen<sup>2</sup> · Ahmet Adalier<sup>3</sup>

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## Abstract

COVID-19 has affected North Cyprus since the beginning of March 2020. On March 10<sup>th</sup> 2020, the council of ministers in North Cyprus announced a lockdown and listed some restrictions to prevent the spread of the virus; schools and entertainment centres were closed, and children had to spend most of their day at home. This study aims to examine the use of mobile technology before and during the COVID-19 lockdown period by children aged three to six, based on parents' opinions. This is a descriptive study with a sample of 319 parents. Data and demographic information were collected with a questionnaire and analysed with SPSS (24.0). Comparing the duration of mobile technology device usage before the pandemic and during the lockdown period, an increase is evident, as expected. Of note, when compared to the pre-pandemic period, it is found that there is a decrease in the rate of mobile technology device usage for video viewing during the lockdown period. The findings also suggest that children mostly first experienced mobile technology devices in some way before 36 months of age. This study has determined that most children do not have their own mobile technology device.

**Keywords** COVID-19 · Early Childhood · Lockdown · Mobile Technology Usage · Parenting

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✉ Bengü Berkmen  
bberkmen@ciu.edu.tr

Nihan Koran  
nihan.koran@emu.edu.tr

Ahmet Adalier  
aadalier@ciu.edu.tr

<sup>1</sup> Faculty of Education, Elementary Education Department, Eastern Mediterranean University, North Cyprus, Famagusta, via Mersin 10, Turkey

<sup>2</sup> Faculty of Education, Department of Guidance and Psychological Counseling, Cyprus International University, North Cyprus, Nicosia, via Mersin 10, Turkey

<sup>3</sup> Faculty of Education, Department of Computer Education and Instructional Technology, Cyprus International University, North Cyprus, Nicosia, via Mersin 10, Turkey

## 1 Introduction

Mobile technology, which is defined as internet-enabled devices that provide mobility to the user and can be accessed from wherever the user is (IBM, 2021), has an important place in children's lives (Kumar & Mohite, 2018). Mobile technology devices that are compact and lightweight includes tablets, smartphones laptops, etc. The availability of mobile technology allows us to access the internet with a whole spectrum of devices ranging from wearable accessories to smartphones, tablets, and devices (IBM, 2021). Mobile technology allows us to untether ourselves and our always-connected devices from the bulk of cables that would otherwise be needed to go online. Nowadays, the Internet is shaping our lives through mobile technology devices and immersed in our daily routines, such as at work, in education, shopping, entertainment, and a plethora of other activities. In the reality of worldwide COVID-19 lockdowns, society learned to adapt to the online lifestyle faster than ever before. The ease of access to the Internet is the driving force behind our fast-paced adaptation to the online world, and children are no exception to that reality since they were born into a mobile online world (Rashid et al., 2020).

With the increasing use of Internet technology worldwide, it is seen that Internet technology has become an integral part of children's lives. According to the Programme for International Student Assessment (PISA) data, a child attending school spends more than two hours per week using mobile technology devices. While this period was approximately 40 min in 2012, it had increased to more than two hours by 2017. According to the Organisation for Economic Co-operation and Development report, 18% of the students participating in the study in 2015 accessed and used the Internet before the age of six (OECD 2017). Similar results have been obtained in studies conducted with early childhood children and their families on technology use. Genç (2014), investigating families with children aged 3–6, determined that the time children spend in front of the screen is approximately three hours a day. Data indicate that both the rate of technology use of children in this age group has increased, and the age of first access to technology has decreased, compared to previous years. In a report published by OFCOM (2019), it is stated that 19% of children between the ages of 3–4 living in the UK have tablets, 1% have phones, and 3% spend about 6.5 h a week playing games online. As a result of another study conducted with families living in the North Cyprus involving children aged between 5 and 6, it is reported that children use mobile phones and tablets for more than 3 h. Most parents have difficulty in controlling the time their children spend using mobile phones and tablets (Ateş and Durmuşoğlu Saltalı 2019).

The use of mobile technologies in early childhood, how that use can and will be regulated, and the effects on children's development, are topics of discussion and research among experts today. The American Academy of Pediatrics (2010), NAEYC (2012), and the US Department of Education & US Department of Health and Human Services (2016) underline that children should not be exposed to any television, tablet, or phone screen before the age of two, although

it is appropriate for children between the ages of two and five to be exposed to the screen for no more than two hours per day. However, to consider the use of mobile technologies for the period between the ages of two and five only in terms of age and duration of use would be to approach the subject in a very superficial and mechanical way. Although there are data that show the use of mobile technologies appropriate for the age and developmental periods of children between the ages of two and five supports the development and learning of children, attention must be paid to the selection of content suitable for the age, developmental characteristics, and experiences of children, to establish a balanced daily routine between active and non-active activities, and the interaction between adults and children (NAEYC 2012; US Department of Education & US Department of Health and Human Services 2016).

The COVID-19 pandemic, which started to affect the world in the first months of 2020, began to show its effects in North Cyprus in March 2020. As of March 10, 2020, with the Council of North Cyprus Ministers' decision, some restrictions were made in the country to prevent the epidemic from increasing with the lockdown. The lockdown was expressed as *"People can only; go out to go to markets, butchers, pharmacies, and gas stations, and to meet their urgent health needs, agricultural, and supply activities."* These measures came to an end on May 4, 2020. One of the country's restrictions to prevent the virus's spread was to close private and public schools. On March 10, 2020, education and training activities were suspended in both private and public nurseries. Private nurseries started education again on June 1, 2020, but public schools did not start education until a later date. As a result of these measures, children could not go to school; however, as playgrounds and entertainment centres were closed, they had to spend most of the day at home. However, some schools started online education activities and continued until June. In terms of families, some continued to work as home offices, some were unemployed, and some continued to work actively by going to work during the lockdown restrictions. As a result, families and children had to spend most of the day at home, isolated from their social environment during this period. As researchers, this enabled us to focus on conducting a study on the use of mobile technology in children during the COVID-19 lockdown.

There is no comprehensive study conducted in our country on the use of mobile technology devices by children between the ages of 3 and 6. It is vital for adults such as parents, teachers, and researchers to have information about the general awareness of mobile technology use of children before guiding them about using mobile technology. For this reason, this research provides information about the use of mobile technology devices by children between the ages of 3–6 before COVID-19, and provides data on how this happened during the COVID-19 shutdown process, and compares these data with the COVID-19 shutdown process. In order for children to be technology literate, they must receive guidance and training from adults to use technology from an early age in terms of factors such as duration and purpose of use, according to their age and developmental levels (Judge et al., 2015; NAEYC, 2017; Nikolopoulou, 2018). Otherwise, children will learn to use technology through trial and error. Although children can recognize and use mobile technology devices through trial and error,

this may cause children to use technology for limited and wrong purposes and create an obstacle for children to benefit from technology at the maximum level (American Academy of Pediatrics., 2019; Plowman & McPake, 2013; Radesky et al., 2015).

With mobile technology devices, children can access information whenever and wherever they want and individualize their learning process in the light of their interest and learning time (Kumar & Mohite, 2018). In addition, the correct use of mobile technology devices in early childhood supports children's cognitive, social-emotional development, early literacy, and mathematics skills. When evaluated in terms of cognitive development, research findings show that properly used mobile technology devices support children's skills such as thinking, analysis, planning, reasoning, hand-eye coordination (Anderson & Subrahmanyam, 2017; Danovitch, 2019). When evaluated in terms of Socio-emotional development, mobile technology devices offer children the opportunity to collaborate and share their views with their peers and adults (Bracken, 2015; Quesenberry et al., 2016; Ralph, 2018;). When evaluated in terms of early literacy skills, it provides data that the applications used with these devices contribute to children's expression of themselves in written and spoken language and letter and sound awareness (Masataka, 2014; Neumann, 2014; Willoughby et al., 2015). In addition to contributing to the development of mathematical skills by using the applications on these devices, it also contributes to children's fun in acquiring these skills and developing a positive attitude towards mathematics (McCarthy et al., 2018; Miller, 2018).

While children can benefit from mobile technology devices in many aspects, using these devices for periods that exceed the age and development level of children or when they are limited to playing games they do not create the expected positive effect on children's development and the contrary, they may harm children's development (Tran & Subrahmanyam, 2013). There are data such as misuse negatively affects the physical development of children, may cause obesity, cause attention deficit, behavioral problems, and sleep disorders in children (Hingle & Kunkel, 2012; Hosokawa, & Katsura, 2018; World Health Organization 2019). In addition, improper use of these devices can also harm children's learning process by doing, which is very important in early childhood. Instead of doing a job, children do it in a virtual environment so that their real-life experiences are limited, and children can acquire misleading information (Epstein, 2015; Zoomer & Kay, 2016).

The purpose of this research is to identify and compare the use of mobile technology by children between the ages of 3 and 6, pre-COVID-19 and national lockdown period during COVID-19, in terms of parents' opinions. For this purpose, the following research questions were determined as:

RQ1: At what age do the children first exposure to mobile technology devices?

RQ2: Do children have their own personal mobile technology device? If yes, which type of mobile technology device do they own? If children do not have a mobile technology device, whose mobile technology devices are used?

RQ3: What is the daily duration of mobile technology usage pre-COVID-19 and during COVID-19 lockdown?

RQ4: What is their purpose for using mobile technology?

RQ5: Who audits the use of their mobile technology pre-COVID-19 and during COVID-19 lockdown?

RQ6: How is the use of mobile technology audited pre-COVID-19 or during COVID-19 lockdown? (limitation period, age etc.)

In this paper, the terms ‘early childhood education’ (ECE), ‘preschool’ and ‘kindergarten’ are used as synonymous, indicating the formal educational settings that attend, in North Cyprus, children aged between 3 and 6 years old (TRNC Ministry of National Education and Culture n.d.). Also, Nikolopoulou (2021) indicated that in most countries, early childhood education age is between 3 and 6.5.

The structure of this paper is as follows: The following section will discuss previous studies related to this research. This is followed by the method of the study in Section 3. In Section 4, the research results are highlighted, and Section 5 results are discussed. The study is concluded in Section 6.

## 2 Literature review

There are some studies in the literature on the use of mobile technology in children in early childhood. Although these studies provide vital data on the use of mobile technology in early childhood, most of them were conducted before the COVID-19 period. This situation provides us with limited data on the use of mobile technology in the shutdown period of children due to COVID-19. In North Cyprus, there is only one research conducted on this subject. In this study conducted by Ateş and Durmuşoğlu Saltalı (2019), it was aimed to determine the parents’ views on the use of tablets and mobile phones in children aged 5–6. In this research conducted with the qualitative research method, semi-structured interviews were conducted with 55 parents living in North Cyprus. As a result of the interviews, it was determined that families had difficulty controlling the duration of tablet and mobile phone use and the content accessed by children through these devices. It has been determined that their children generally use these devices for playing games and watching educational videos. In addition, it has been determined that some families use these devices to stop the child’s unwanted behavior or reward the child’s desired behavior. Half of the families listed the positive effects of these devices on children as providing educational support, keeping up with age, and keeping the child well-behaved. Some families stated that they think these devices negatively affect eye health problems, lack of movement, and language development.

Two research studies on closure due to the COVID-19 outbreak and the use of mobile technology are related to our study. Dong et al. (2020) worked with 3275 families whose children attended school and were between the ages of 3–5 in a study they conducted to determine the attitudes and beliefs of parents about online learning processes of young children in the process of closure due to the COVID-19 outbreak. As a result of the research, it was determined that 92.7% of the families continue the online learning process at home, and these learning practices generally take less than half an hour. In addition, as a result of the research, it was concluded that families have a negative attitude towards online learning processes, and they prefer

their children to continue their education face-to-face. This is because children cannot regulate their behavior in participating in the online education process, and families feel inadequate in terms of knowledge and equipment about online education. The research conducted by Eyimaya and Irmak (2020) on the implementation of families and screen times of children during the COVID-19 process was conducted with 1115 families with children between the ages of 6 and 13. It was found that the majority of families set rules for screen time, but despite the rules, 71.7% of the COVID-19 outbreak increased screen time. The research question concluded that they could obtain the results of their inadequacy in problem-solving behaviors and over reactive behaviors. In addition, it was concluded that the children participating in the study could not regulate their screen-time restrictions and that they needed consistent rules and limits were determined. Apart from the two studies mentioned above, no research was found on the COVID-19 closure process on early childhood and mobile technology use. Considering that it is related to our research in the literature review, other studies that constitute the basis for our research are the studies conducted on early childhood and the use of mobile technology in the period before the closure due to the COVID-19 outbreak.

Gralczyk (2019) conducted a study to determine the use of smartphones and tablets in children's daily lives according to the opinions of families and teachers in early childhood. Ninety-one families with children between the ages of 2.5 and 6 and fourteen teachers attended this study. As a result of the research, it was determined that the daily use of smartphones and tablets is not suitable for their age. It is generally over 1 h a day, which is more than the recommended time. It has been determined that children generally use these devices during transportation and eating, and playing games with these devices are among the most preferred activities. In school, it was concluded that teachers use these devices for playing games and reading books and that children are aware of the importance of acquiring technology literacy skills at an early age. The families participating in the study stated that their children display crying and angering behaviors when using smartphones and tablets for a long time.

Papadakis et al. (2019) determines the participation and attitude of families towards children's phone use, 293 families with children between the ages of 4–6 were reached in their study. When the data collected from the families through questionnaires are evaluated, it is revealed that most families have a positive attitude towards the use of phones, and they use these devices as a stimulus to support children's learning in the home environment. The research results show that the age and education level of the families are influential on the attitude of the families. Older and low-educated families find it challenging to follow rapid technological change and offer their children the advantages of mobile technology devices. In addition, families who are younger and have a high socio-economic level follow technological developments and support children's learning processes in the home environment through these devices.

Oliemat et al. (2018) investigate the answer of the questions of how children use touch screen tablets, what their knowledge and skills are about tablets, their attitudes towards tablets, and what their families' roles in tablet use are in their research on the use of touch screens in early childhood. Within the scope of the research, interviews were conducted with forty children with an average age of 6. As a result of

the interviews conducted with the children, it was determined that children perceive tablets as an entertainment tool rather than a learning tool and that they mostly use tablets for gameplay, followed by YouTube watching. In addition, it was determined that children have the skills to use tablets, but these skills can be developed, and that children receive guidance from their families in using tablets. As a result of the research, the researchers found that traditional game-based activities in early childhood were replaced by gaming or entertainment applications on touch screen tablets.

Bentley et al. (2016) conducted semi-structured interviews with 26 mothers with children between the ages of 2 and 4 as part of their qualitative study to determine the screen display behaviors of their children. As a result of these interviews, mothers stated that children frequently perform screen viewing via mobile devices, and they are exposed to mobile device screens more often than television screens. Since these devices are portable, they are generally used as a distraction outside the home environment. Devices are generally used to watch something, like a portable television, and educational game applications are used through devices. In general, mothers stated that these devices have an important role in children's lives and that they are a part of children's lives, but some mothers stated that they were concerned about the time their children were exposed to the screen.

### 3 Methodology

This section provides information about the research model, the population and sample, research instruments, data collection technique, ethical approach, and the data analysis.

This research was conducted to collect information on the use of mobile technology devices by their children before COVID-19 and during the lockdown, through the views of parents having children between the ages of 3–6, and is structured based on a survey model. This study uses a descriptive research survey model; a working model that allows the current situation of a group to be determined and examined according to its various characteristics (Büyüköztürk et al., 2017; Sönmez & Alacapınar, 2014; Tabachnick & Fidell, 2012). The research questions are designed appropriately for the descriptive research. Descriptive research is defined as research that tries to determine a situation. Although the cause-and-effect relationship is not sought in these studies, the data obtained from these studies provide the researchers with an idea about the research topics planned for the future (Karasar, 2005; Lans & Van der Voordt, 2002).

#### 3.1 Population and sample

The research population is the parents who have children between the ages of 3–6 in North Cyprus. In order to collect data from the target population, researchers depended on parents to fill the survey questionnaire (considering that it is not possible to collect data from children due to the COVID-19 pandemic conditions) related to their children's mobile technology usage. The number of children in

this age group is 5700 in North Cyprus (TRNC Ministry of National Education & Culture, 2020), and the calculated sample size (Büyüköztürk et al., 2017) is 360. In order to achieve the calculated target sample size, we shared 400 electronic questionnaires with parents (directly or through school administrators). 331 questionnaires were returned, but 12 were not completely filled. So, 319 is the valid questionnaire for analysis. Therefore, these 319 valid questionnaires represent 361 children. Demographic information of the participants can be seen in Table 1.

**Table 1** Demographic information of parents

		n	%
Degree of kinship	Mother	292	91.5
	Father	27	8.5
Number of children	One child	278	87.1
	Two children	40	12.5
	Three children	1	0.3
Age of children	36–49 months	158	43.77
	50–60 months	77	21.33
	61–72 months	126	34.90
Gender of the children	Girl	225	62.33
	Boy	136	37.67
Caregiver of the children	Mother	146	26.30
	Father	59	10.63
	Grandparents	139	25.05
	Mother—Grandparents	110	19.82
	Teacher/caregiver	101	18.20
Parents' age	21–25 years	1	0.3
	26–30 years	36	11.3
	31–35 years	138	43.3
	36–40 years	112	35.1
	41 and above	32	10
Education Level of Parents	Literate	2	0.6
	Primary school graduate	1	0.3
	Secondary school graduate	7	2.2
	High school graduate	40	12.5
	University graduate	150	47
	Postgraduate	119	37.3
Employment Status of Parents Before COVID-19	Employed	272	85.26
	Not employed	49	14.74
Employment Status of Parents During COVID-19	Employed	133	41.07
	Not employed	188	58.93
Number of children attending to preschool before COVID-19	Attending	269	74.52
	Not Attending	92	25.48

Snowball sampling method was preferred to collect data from the participants due to the interruption of education due to the pandemic. For this reason, the school administrators that authors of this study could reach were asked to reach the parents of the students in their schools as well as the administrators of other schools and send the survey links to them. In addition, parents who meet the research criteria were invited through social media platforms such as WhatsApp and Facebook to spread the survey link and participate to the study. The snowball sample selection method, which focuses on people and critical situations where rich data can be obtained, reaching the population by following these people and critical situations (Büyüköztürk et. al 2017).

Table 1 shows that 91.5% (n=292) of the parents who participated in the study were mothers and 8.5% (n=27) were fathers. 87.1% (278) of the parents have one child, 12.5% (n=40) two children, and 0.3% (n=1) have three children. When the age distribution of the children was examined, it was seen that 43.77% (n=158) were 36–49 months, 21.33% (n=77) 50–60 months, and 34.90% (n=126) were 61–72 months. 62.33% of the children were stated to be girls, and 37.67% were stated to be boys. The caregivers of the children during the day were 26.3% (n=146) mothers, 10.63% (n=59) fathers, 25.05% (n=139) grandparents, 19.82% (n=110) mothers-grandparents, and 18.20% (n=101) caregivers or teachers. Of the parents who participated in the study, 0.3% (n=1) is 21–25, 11.3% (n=36) are between 26 and 30, 43.3% (n=138) are between 31 and 35, 35.1% (n=112) are between 36 and 40 years old, and 10% (n=32) are 41 years old and above. Respondents defined their educational status as: literate 0.6% (n=2), primary school graduates 0.3% (n=1), secondary school graduates 2.2% (n=7), high school graduates 12.5% (n=40), university graduates 47% (n=150), and postgraduate 37.3% (n=119). It was determined that 85.26% (n=272) of the parents who participated in the study worked before COVID-19. It was stated that 74.52% of the children of the parents participating in the study went to a preschool educational institution.

### 3.2 Research instruments

The Demographic Information Form was created by the researchers to obtain information about the parents who participated in the study. The form includes questions about the degree of kinship, the number of children, the age, gender, caregiver, and number of children attending preschool of their child/children between the ages of 3 and 6, as well as the parents' age, education level, employment status pre COVID-19, and the lockdown period.

### 3.3 Children's use of mobile technology devices pre and during the Covid-19 lockdown questionnaire

In this study, a Children's Use of Mobile Technology Devices Pre and During COVID-19 Lockdown Questionnaire was prepared by the researchers to explore the opinions of parents with children between the ages of 3–6, to collect information about the use of mobile technology by their children before COVID-19 and during the lockdown period. The questionnaire is a data collection method used to find out

the opinions of people on a specific subject through the opinion research strategy (Büyüköztürk et. al 2017). This questionnaire has three sections: Section 1 consists of 5 questions about general information about children's mobile technology usage, Section 2 consists of 3 questions about the usage before COVID-19, and Section 3 consists of 3 questions about the usage during COVID-19 lockdown.

In order to prepare this questionnaire form, the literature on the subject was reviewed, and then a pool of questions was established accordingly as stated by Büyüköztürk et al. (2017). In order to measure the validity, the questionnaire was then sent to three experts for their comments and feedback. Two of the experts were from the preschool teaching/child development field, and one expert was from the Information Technology and Strategic Innovation field. The experts only requested a few modifications to some of the questions. The questionnaire took its final form after the modifications were made. Abdelmoula et al. (2015) confirmed that sample size has a positive effect on reliability. Also, some other researchers have found that the sample size has an effect on reliability (Bonett, 2002; Charter, 2003; Duhachek et al., 2005; Helms et. al 2006). Nunnally and Bernstein (1994, p. 228) claim that “measurement theory cannot usually tolerate large doses of sampling error...” and then recommend a sample size of “300 or more”. In light of these studies, we safely confirm that this questionnaire is reliable since this study's sample size is 319.

In this study, survey questions were used to identify and compare the use of mobile technology by children between the ages of 3 and 6, pre-COVID-19 and during COVID-19 lockdown. This study items (variables) were measured on two scales. Firstly, (yes, no) questions and secondly, ordinal scale questions. Data were defined and coded accordingly.

### 3.4 Ethical approach

In order to conduct the study, ethical permissions were obtained from the Ethics Committee of the university at which the second author works. In order to obtain consent from the parents participating in the study, information about the conditions of participation in the study and the withdrawal conditions were provided at the start of the questionnaire, together with an explanation of the purpose for which the data were being collected. Also, they are informed that their comments and input would remain anonymous; the data gathered will be used solely for research purposes.

### 3.5 Data collection

The data collection process for the survey which includes questions for both the pre-COVID-19 and the COVID-19 lockdown period was carried out using Google Forms due to the ongoing COVID-19 pandemic in North Cyprus. The school administrators that authors of this study could reach were asked to reach the parents of the students in their schools as well as the administrators of other schools and send the survey links to them. In addition, parents who meet the research criteria were invited through social media platforms such as WhatsApp and Facebook to spread

the survey link and participate to the study. The data collection process was completed in four weeks.

### 3.6 Data analysis

The data obtained from the parents were analysed using the SPSS 24.0 program. In the first place, the data was organised to transfer to SPSS. Descriptive statistics were chosen because of the purpose of the study. Frequency analyses were computed to evaluate demographic factors and categorical questions (Yaratan, 2017). With an addition to this, differences in mobile technology usage between pre-COVID-19 and COVID-19 lockdown was calculated.

## 4 Results

This section presents the demographic information of the parents and the analysis of the Children's use of mobile technology devices before and during COVID-19 lockdown survey. Descriptive statistics were used in the analysis of the survey. In the study, there are 6 research questions regarding the use of mobile technology by children between the ages of 3–6 before and national lockdown period during covid-19. The results obtained regarding these research questions are given below.

When the children's first exposure to mobile technology devices is examined in terms of age (Table 2), it is seen that 14.13% ( $n=51$ ) of the children were 0–12 months, 36.56% ( $n=130$ ) 13–24 between months, 29.36% ( $n=90$ ) between 25–36 months, 11.36% ( $n=32$ ) between 37–49 months, 4.16% ( $n=10$ ) between 50–60 months, and 4.43% ( $n=8$ ) between 61–72 months.

Table 3 shows that 37.96% of the parents ( $n=137$ ) stated that their children have one or more mobile devices of their own. Considering the mobile technology devices that children have, 28.94% ( $n=90$ ) of the children have smartphones,

**Table 2** Age of the children first exposure to mobile technology

	First Exposure to Mobile Device	0–12 month	13–24 month	25–36 month	37–49 month	50–60 month	61–72 month
n	First Child	41	101	89	32	11	15
	Second Child	10	31	16	9	4	1
	Third Child	0	0	1	0	0	0
	Total	51	132	106	41	15	16
%		14.13	36.56	29.36	11.36	4.16	4.43

**Table 3** Children's ownership of mobile technology devices

		Owns a Mobile Device	n	%		
		Yes	137	37.96		
		No	224	62.04		
n	Owns a Mobile Device	Smartphone	PSP	Tablet	Others	
	First Child	63	51	79	11	
	Second Child	11	11	25	1	
	Third Child	0	0	0	1	
	Both Children	16	14	0	28	
	Total	90	76	104	41	
	%	28.94	24.44	33.44	13.18	

24.44% (n = 76) have PlayStation Portable, 33.44% (n = 104) have tablets, and 13.18% (n = 41) have a different mobile technology device.

Table 4 shows that 413 respondents answered the question of whose mobile devices children are using. According to this, 46.25% (n = 191) of the children who do not have their own mobile technology devices use their mothers', 34.38% (n = 142) their fathers', 4.12% (n = 17) their siblings', 0.72% (n = 3) their caregivers', and 14.53% (n = 60) use their grandparents'.

Table 5 shows comparisons of the time periods of children using mobile technology devices before the pandemic and during the lockdown. Accordingly, there were decreases of 50.42% and 28.91% in the rate of children using mobile technology device with usage times between 0–30 and 31–60 min, respectively. There were increases of 66.12%, 363.64 and 520.00% in the rate of children using mobile technology device with usage times between 61–120, 121–180 and over 180 min, respectively. It is thought that because of the lockdown, many children had to stay at home with their families which resulted in sharp increases in the use of mobile technology devices, due to education, entertainment, and communication activities all being carried out online.

**Table 4** Data regarding whose mobile devices are used by children who do not have a mobile device

		Mother	Father	Brother/Sister	Caregiver	Grandparents	Total
n	First Child	150	112	11	3	45	
	Second Child	37	29	4	0	15	
	Third Child	0	1	0	0	0	
	Both Children	4	0	2	0	0	
	Total	191	142	17	3	60	413
	%	46.25	34.38	4.12	0.72	14.53	

**Table 5** Daily duration of mobile technology devices usage pre-covid-19 and during lockdown

	0–30 min		31–60 min		61–120 min		121–180 min		180 and above	
	Pre	Lockdown	Pre	Lockdown	Pre	Lockdown	Pre	Lockdown	Pre	Lockdown
First Child	86	39	107	73	40	68	8	39	3	29
Second Child	13	8	17	15	4	13	3	10	2	2
Third Child	0	1	0	0	0	0	0	0	0	0
Both Children	18	10	42	30	18	22	0	2	0	0
Total	117	58	166	118	62	103	11	51	5	31
%	50.42		28.91		66.12		363.64		520	

Table 6 shows the children's purposes for using mobile technology devices before the pandemic and during the lockdown. The parents who gave more than one answer were evaluated. The responses show that the children played intensively with these devices and communicated with their friends, both before the pandemic and during the lockdown. Parallel to this, the rates of using mobile technology devices to play games and meet friends increased by 0.91% and 4.88%, respectively. Another finding is the 55.26% decrease in watching videos with mobile technology devices during lockdown. One of the reasons that showed a significant increase in the use of mobile technology devices by children was using these devices for homework, which has increased by 235%. Considering these data, the fact that educational activities were carried out in schools before the pandemic, added to the fact that many educational institutions switched to online education during lockdown suggests that children began to use mobile technology devices for homework instead of watching videos.

Table 7 shows who audited the use of mobile technology before and during the lockdown. While there was not much change in the practices of the parents who intensively regulate their children's mobile technology devices usage, it was observed that there was a 4.92% decrease by the grandparents, and a 41.67% decrease in the caregivers of the children. However, according to the answers given by the parents who stated that their children regulate the use of their own mobile technology devices themselves, there is 23.52%. Although it is conceivable that grandparents and caregivers could not meet with children during the lockdown, the increase in self-auditing by the children is due to both parents' ignorance to leave this responsibility to the children and that the auditing carried out by grandparents and caregivers are now continued by the children themselves.

Table 8 shows responses on how the parents audit their children's mobile technology device usage. Parents supervise their children by making time limits, with 47.21%, followed by family protection, with 22.79%, and age restriction setting at 17.70%. 4.43% of the parents stated that they synchronise their devices with their children's devices, and 5.90% of them use different methods, and as little as 1.97% of children use mobile devices without any supervision.

**Table 6** The purposes of children using mobile technology devices pre-covid-19 and during lockdown

	Watching Video		Playing Games		Communicating with Friends		Homework	
	Pre	Lockdown	Pre	Lockdown	Pre	Lockdown	Pre	Lockdown
n								
First Child	30	16	210	206	137	141	17	58
Second Child	4	1	28	27	23	23	1	5
Third Child	0	0	1	3	1	1	0	0
Both Children	4	4	92	98	44	50	2	4
Total	38	21	331	334	205	215	20	67
%	55.26		0.91		4.88		235	

**Table 7** Who audits the mobile technology devices of children pre-covid-19 and during lockdown

	Mother		Father		Grandparents		Caregiver		Self	
	Pre	Lockdown	Pre	Lockdown	Pre	Lockdown	Pre	Lockdown	Pre	Lockdown
n	224	220	152	156	43	43	9	6	37	46
First Child	27	28	28	25	10	7	1	1	2	3
Second Child	1	1	1	1	0	0	0	0	0	0
Third Child	92	94	54	56	8	8	2	0	12	14
Both Children	344	343	235	238	61	58	12	7	51	63
%	0.29		1.28		4.92		41.67		23.52	

**Table 8** Auditing method of children's mobile technology device usage

	Age Restriction	Time Restriction	Family Protection	Synchronising Devices	Other Methods	Not Auditing
n						
First Child	70	180	101	17	18	10
Second Child	11	30	16	0	10	0
Third Child	1	0	0	0	0	0
Both Children	26	78	22	10	8	2
Total	108	288	139	27	36	12
%	17.70	47.21	22.79	4.43	5.90	1.97

## 5 Discussion

This study set out to determine the use of mobile technology devices both before COVID-19 and during the lockdown, according to the opinions of parents who have children between the ages of 3–6. Several findings of relevance necessitate further discussion. First, the findings suggest that children mostly first experienced mobile technology devices in some way before 36 months of age. The most common children's age range for getting acquainted with mobile technology devices is determined as 13–24 months. Many researchers working in this field underline the importance of children not experiencing or using mobile technology devices before 24 months years of age. American Academy of Pediatrics (2019) recommends that children under 18-months should not use technology other than video chat, and children of 18 to 24 months should only watch high-quality programmes chosen by their parents, who should watch those programmes with the child. The use of mobile technology devices before this age may create an obstacle for the child to learn by doing and experiencing. This situation causes children to acquire cognitive, social, emotional, language, and motor skills in the virtual environment in a more limited way, which they can reinforce through their real-life experiences (Blackwell et al., 2014; Mustafaoglu et al., 2018). Besides, this age range is especially important for developing the relationship between parent and child, and the necessary sense of trust. It is thought that mobile technology devices, which we encounter as a factor for preventing one-to-one sharing between children and adults, may also harm this relationship (Napier, 2014; Radesky et al., 2015). Although the child will experience mobile technology devices in these months, it is recommended that those experiences and use of mobile technology devices be co-viewed with the adult. In this case, the adult follows the game the child watches or plays with the mobile technology device, asks the child questions from time to time, and answers any questions asked by the child. This way, adults guide children to make sense of what they watch and support their learning through the guidance they provide (Strouse et al., 2013, 2018). Co-viewing by families can be performed at high or low levels. Even low-level co-viewing behaviors are thought to affect children's making sense of what they watch (Dore & Zimmermann, 2020; Plowman & McPake, 2013). According to a report published by the American Academy of Paediatrics, 1 out of 5 families with children between 18–24 months in America uses mobile technology with their children in this way (American Academy of Paediatrics 2019).

This study has determined that most children do not have their own mobile technology device. Children who do not have their own mobile technology devices use the devices of their mothers, fathers, grandparents, and siblings, respectively. Those children who do have mobile technology devices were found to have a tablet, phone, or PSP, respectively. This result has similarities to the results of the research conducted by Hosokawa and Katsura (2018) with the parents of 1,642 6-year-old children in Japan, which finds that the majority of children do not have a mobile technology device of their own and that those who do so, have a tablet, phone, or PSP. The report published by Common Sense Census (2017) based on a survey of parents with children up to the age of eight states that the rate of having mobile technology

devices in early childhood has increased; while 52% of children had their own mobile technology device in 2011, this rate was 98% in 2018. Furthermore, Ofcom (2019) survey regarding 3,200 children living in the UK reveals that 24% of children aged 3 to 4 years have their own tablets, and this rate is 37% between the ages of 5 and 7. In order to consider whether children having their own mobile technology device is positive or negative, the time spent in front of the screen, the purposes of use, and ways of using mobile technology devices should also be considered. The crucial point here is whether children who own a mobile technology device receive adult guidance in using the device in accordance with their age and development level (Dore & Zimmermann, 2020).

Comparing the duration of using mobile technology devices before the pandemic and during the lockdown period in children aged 3–6, the proportion of children who used mobile technology devices between 0–30 and 31–60 min before the pandemic, shows a decline from 50.42% and 28.91%, respectively. It is seen that there are increases of 66.12%, 372.73%, and 520% in the usage over 61–120, 121–180, and 180 min, respectively. The duration of mobile technology device usage before the pandemic is in accordance with the screen time recommended by international authorities (NAEYC, 2017; World Health Organization 2019; The American Academy for Pediatrics 2019). The World Health Organization (2019) states that screen exposure time should be a maximum of one hour for children aged 3–6, underlining that daily activities created for this age group should be physically active. The American Academy for Pediatrics (2019) also recommends that the screen time excluding educational content should be limited to one hour for children in this age group. The sharp increase in the use of mobile technology devices can be considered as a natural consequence of the children staying at home with their families due to the restrictions brought by the lockdown. The data obtained from the research reveals that children spend 2–3 h a day and 3 h and more using mobile technology, especially during the lockdown. Similar findings are reported by Eyimaya and Irmak (2020), who studied parents' parenting practices in Turkey with children aged 6–13 years and children's screen time during the COVID-19 pandemic. That study reports that 71.70% of the children have increased daily screen usage time, up to 3–6 h. This amount of time is well above the recommended duration for that age group. Prolonged screen time causes significant delays in language acquisition in children (American Academy of Paediatrics 2016; Heuvel et al., 2019), leading to attention and focus problems (Mendoza et al., 2007; Lerner & Barr, 2014). Research findings show that it negatively affects executive functions (Blankson et al., 2015; Courage & Setliff, 2010;). Also, research data show that children doing sedentary activities for a long time may cause weight gain and childhood obesity (Hingle & Kunkel, 2012; Silverstone & Teatum, 2011).

When the purposes of using mobile technology devices by children are examined, it is seen that children use these devices to play games and communicate with their friends during both periods. However, unlike the pre-pandemic period, there is a decrease in the rate of using mobile technology devices for video viewing during the lockdown period. Also, during the lockdown period, a considerably higher increase was observed in the rate of using these devices to do homework. The finding that children use mobile technology devices for watching videos and playing games is

similar to the results of other studies conducted in this field. According to the OECD (2019) report, 36% of children aged 3–4 and 63% of children aged 4–7 living in the UK use mobile technology devices to play games. The OFCOM (2019) report states that 98% of children aged 3–4 and 96% of children aged 4–7 living in the UK use mobile technology devices to watch videos of TV programmes. Similarly, Genç (2014) studied 85 families with children aged 3–6, finding that children generally use mobile technology devices for entertainment purposes. During the lockdown period, the increase in the rate of children using mobile technology devices to do homework can be interpreted as children who were attending school before the pandemic and who could not attend school during the lockdown period, so had online education. Both private and public institutions in the country sent samples of activities or study materials so that children could study with their families at home using applications such as WhatsApp, Zoom, and Dojo. Dong et al. (2020), in a study which set out to determine the opinions and beliefs of families regarding online education during the COVID-19 process, determined that children in early childhood were exposure to online education for the first time in their educational lives due to the restrictions imposed in lockdown; 92.7% of the families participating in the study stated that their children used technology for educational purposes in lockdown. Families often explained their children's use of technology for educational purposes as being to access materials sent by preschool teachers or activities guided by preschool teachers. The fact that children carried out their educational activities with these devices differentiated the purpose of the use of mobile technology devices and made the concept of 'homework', which does not belong in the early childhood period, a part of children's lives. It is recommended that activities to support children's development and education in early childhood should be carried out under adults' guidance by hands-on activities, and away from the screen as much as possible. Such practices could not be implemented in an ideal form by early childhood education institutions in the country during lockdown (Cyprus Turkish Teachers Union 2020). The use of mobile technology devices in early childhood is recommended to provide children with a rich and diverse learning opportunity. It is underlined that the use of mobile technology devices as a 'silencer' or 'instantly accessible, free babysitter' to calm children and keep them quiet should be avoided (Epstein, 2015; McManis & Gunnewig, 2012).

When the parents' responses about how they control their children's mobile technology devices usage were examined, it was observed that they mostly achieved this by applying time restrictions. Although some sources (James et al., 2019; UK Council For Child Internet Safety, 2017;) suggest that time restrictions be applied, others (such as AAP 2016) suggest that steps must be taken in the direction of making children more informed to improve their ability to organize their use of technology devices by themselves, instead of methods such as time control. For many years, the 'proper' use of mobile technology devices by children has been measured by screen time. However, time restriction is not a sufficient criterion for controlling the use of mobile technology devices suitable for the age and developmental level of children. Instead, the purpose of using these devices, frequency of use, and the type of content that should be accessed must also be considered. It is emphasised that families should pay attention to the age and developmental characteristics of

children in line with the purpose of use and content and prefer high-quality applications or programmes (Zoomer & Kay, 2016). After time restriction, the most common strategies parents reported were family protection and age restriction, respectively. Family protection/control is a system that enables families to restrict access to applications that are not suitable for children and monitor their mobile technology device usage. This system generally works with a 'banned list' method, preventing children from accessing applications restricted by their families. Age restriction, on the other hand, allows families to prevent their children from accessing content that is not suitable for their age and is seen as a sub-step of family control (Burriss, 2019; Smahelova et al., 2017). Age limit applications allow mobile technology devices content to be limited to a suitable age for the child. Family control is considered an externally controlled practice and does not provide children with any information on identifying unsafe practices and the importance of not using these practices. This strategy is considered to have a limited contribution in terms of improving children's technology/digital literacy skills (Benedetto & Ingrassia, 2020). Technology literacy is defined as "exhibiting the knowledge, skills and attitude required to use, apply, design and change technology" (Davies, 2011, p.45). The International Technology Education Association (ITEA) (2007), on the other hand, refers to technology literacy as an ability to understand, use, evaluate, and manage technology. Technology literate individuals can make informed decisions about using technology in line with their own needs. Developing technology literacy from early childhood, through educators and families, improves children's ability to understand technology, analyse technology content, and adapt to technology, as well as to be more successful in the technology age (Bruce & Casey, 2012; Livingstone et al., 2015; Livingstone et al., 2017).

For the question of who regulates the children's use of mobile technology devices before and during the pandemic, it is concluded that parents are active controllers in both periods. The decrease in the rate of caregivers' use of mobile technology devices during the pandemic period compared to the pre-pandemic period is thought to be due to the fact that caregivers did not go to work during the lockdown period and the children stayed with their families at home. The fact that children regulated their use of mobile technology devices during the pandemic period suggests that children were more active in this period, which is a positive result in terms of technology literacy. This contributes to children being focused on self-control instead of external control mechanisms. Children who learn to use technology devices per their purpose, content, and duration without being exposed to the restrictions or prohibitions of an adult, or the system, will benefit as this is an essential point in raising individuals who can control themselves and direct their own usage process. Individuals with internal control tend to exhibit useful and appropriate behavior, even if they do not have external control mechanisms. Also, they give importance to their own thoughts and can decide the most suitable option for themselves by considering the events from multiple perspectives (Lee, 2013; Lee & Chae, 2012; Livingstone & Helsper, 2008).

## 6 Conclusion and recommendation

Within the scope of this research, it was determined that most of the children were exposure to mobile technology devices before 36 months. Most of the children get acquainted with these devices between the ages of 13–24 months. Most of the families participating in the study stated that the children do not have a mobile technology device of their own but use devices belonging to their families or siblings. When children use mobile technology devices before COVID-19, and during the shutdown period, it is seen that there is an increase in the duration of use in the shutdown period. When the purpose of use of mobile technology devices is examined, it is seen that before Covid, children used devices for watching videos and playing games, while the rate of watching videos decreased during the closing period and the rate of using these devices for homework increased. In addition, as a result of the research, it was determined that families frequently resort to time restrictions in auditing the use of devices during the COVID-19 shutdown period and that the responsibility for auditing the usage process lies with the families.

The following recommendations have been developed in light of the findings of this study. In addition to the fact that no other study has been conducted on this subject in our country, it is thought that deepening the findings we obtained with different studies to be carried out in the future will provide more detailed information about the subject. It may be suggested that families carefully consider the age their children first experience and use mobile technology devices according to their age and development levels. Also, activities that support children's development in the home environment during the lockdown will be a fun alternative to the time children spend in front of the screen. It is recommended that these activities are developed based on games with the participation of family members. In making rules for the use of mobile technology, families may be advised to include children in the decision-making processes regarding the rules and explain the reasons for these rules to children. In this process, families need to ensure that their children acquire positive behaviors rather than adopt a prohibitive attitude and take steps to develop children's self-auditing skills for using mobile technology devices. Besides, families should regulate their habits and behaviors using mobile technology devices and be positive role models for children in this process. In this process, families can focus on developing their children's digital literacy skills and receive support to develop their children's skills. Also, families can accompany their children in the process of using mobile technology devices and chat with them in line with their purpose of using those devices and interests. This way, they will have an idea about their children's use of mobile technology devices and have the opportunity to guide them towards the purposes of using mobile technology devices. In addition, families can predetermine the appropriate content for their children in line with their age, development level, and interests, and provide them with access to quality content through mobile technology devices.

This research has a limitation which warrants consideration. The number of fathers who participated in the study was very low. The reason is that mothers are seen as the primarily responsible caregivers of children and fathers provide support to the family in North Cyprus (Eser, 2016). Similar studies conducted with fathers could help provide a broader perspective on this topic.

**Data availability (data transparency)** We declare that the data and material are available if requested by the journal.

**Code availability (software application or custom code)** We declare that the software application is available if requested by the journal.

#### Declarations

**Conflicts of interest/Competing interests** The authors have no financial or proprietary interests in any material discussed in this article.

**Ethics approval (include appropriate approvals or waivers)** We declare that the researchers has ethics approval letter by the Ethical Committee.

**Consent to participate (include appropriate statements)** We declare that informed consent regarding the questionnaire was explained to participants.

**Consent for publication (include appropriate statements)** The researchers declare that they have the consent for publishing the study.

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