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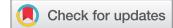
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Video game playing among preschoolers: prevalence and home environment in three provinces from Turkey

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ABSTRACT

We aimed to investigate the video game habits and their relationship with home environment in children 2–5 years in Turkey. A structured questionnaire about the child's demographic, screen, and video gaming characteristics was completed by parents in five health centers from three provinces. One-quarter of 1245 preschoolers were found to play video games. The prevalence of playing video games was higher in older age, male gender, low parental education, families with 3 or more children, having a game console, computers and tablets at home, child's screen time of more than 2 hours per day, child's non-compliance with the parental screen rules, and presence of someone else playing videogame at home. Of the parents, 54.5% did not know the name of the video game the child was playing. Parents should be counseled about supervising on their children's video game playing habits and selection of well-designed games with the right content.

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KEYWORDS

Children; digital games; devices; media; parental rules; preschool; screen time; video game

Introduction

Nowadays, children grow up in environments with a variety of technological devices. Digital technology and media are regarded as important tools for children's education, whereas, overexposure to the screen may lead to sleep, vision, and hearing impairments as well as cognitive, language, social, and emotional delays, especially in early childhood. Additionally, it can cause obesity and parent-child relationship issues (Granic et al. 2014; Radesky et al. 2016; Radesky and Christakis 2016; Bozzola et al. 2018). Therefore, ensuring safe access to digital technology and media content for young children becomes gradually important. Primarily, parents are responsible for the supervision of their children's use of digital technology and media (Ihmeideh and Alkhawaldeh 2017). Pediatrics Associations recommend that screen time for preschool children aged 2 to 5 should be limited to 1 hour per day, and this time should be spent under the supervision of their parents (Radesky et al. 2016; Canadian Paediatric Society 2017; Bozzola et al. 2018). Despite the recommendations, many preschoolers are exposed to screens at a very early ages and for extreme periods of time in Turkey (Tuncer and Yalcin 1999; Yalcin et al. 2002; Erat Nergiz et al. 2020).

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Preliminary part of the study was presented orally; Yalçın SS, Yahşi Yıldız D, Oflu A, Tezol Ö, Erat NM, Ceylan Ş Demirli Çaylan N, Yurdakök K. Multi-centered investigation of pre-school children's screen time and digital game playing habits. International Child and Information Safety Congress "Digital Games". Ankara. 11-13 April 2018'

Technological developments, especially in mobile devices, have changed the play habits of children as they affected many things in our lives (Yalçın and Kondolot 2008; Gentile 2011; ISFE. 2012; Rideout et al. 2013; Huh 2017; Király et al. 2018; Kılıç et al. 2019). Young children play a wide range of digital video games which are now easily accessible on various types of screens (computer, laptop, smartphone, electronic learning systems, toys, etc.) and the time spent on with games is gradually increasing. In parallel with the widespread use of video games, the positive or negative effects of this habit on children and adolescents have begun to be questioned (Ferguson 2007; Oflu and Yalcin 2019). Well-designed video games can greatly contribute to hand, eye coordination, focus, and problem-solving skills in preschool children (Akçay and Özcebe 2012; Espinosa-Curiel et al. 2020). On the contrary, poorly designed games containing violent and negative behavioral patterns, have been associated with aggressive behaviors, low academic performance, attention deficit, and psychosocial problems (Irwin and Gross 1995; Lieberman et al. 2009; Ferguson 2015; Paulus et al. 2018; Oflu and Yalcin 2019; Tezol et al. 2020). Unlike other types of interactive media content, digital games are rule-based tools that provide feedback on player progress and include a challenge to reach a goal. The rules, challenges, and feedback of digital games can build or destroy self-confidence and can teach wanted or unwanted lessons (Lieberman et al. 2009).

Early childhood is a crucial period for developing healthy behaviors that will last a lifetime. The home environment can be an important determinant of the video game habits of preschool children, and interventions for risky gamers can be designed by knowing the relevant factors (Carson and Janssen 2012). But few studies specifically focus on digital games of preschool children (Rideout et al. 2003; Carson and Janssen 2012; Kanak and Özyazici 2018; Van Petegem et al. 2019). Investigating video game playing habits in preschool children, who are at a critical stage in terms of development, will enable us to better understand the basic processes of video gaming and make it easier to develop favorable mediation strategies. Despite several types of research on parental mediation for screen time, there are limited studies for video games (Nikken and Jansz 2006; ISFE. 2012; Zaman et al. 2016; The Republic of Turkey 2017; Coşkun and Filiz 2019). Recent studies in children during the coronavirus pandemic point out a strong reduction in the time of physical activity due to the lockdown and staying at home and also increase in the screen time and playing video games (Sa et al. 2020; Oflu et al. 2021). In this study, we aimed to investigate the video game playing habits and home environment-related factors of preschool children aged 2 to 5 years comprehensively in three provinces from Turkey. This research, conducted just before the pandemic, may be a reference study that offers an opportunity to compare it to future research investigating the impact of the pandemic on young children's video game playing characteristics.

Methods

Study design

A multicentered cross-sectional descriptive study was carried out in the pediatric outpatient clinics of 5 centers from 3 provinces in Turkey (Hacettepe University Ihsan Doğramacı Children Hospital; Yenimahalle Research Hospital and Etimesgut Şehit Sait Ertürk Hospital from Ankara, and Afyonkarahisar Health Sciences University and Mersin University, Faculty of Medicine); between June 1st and October 31st, 2019. The hospitals where the study was conducted were health institutions to which people from all sociocultural levels applied. The study was approved by Hacettepe University Ethical Committee.

Participants and enrollment

Information about the study was given to the parents of children aged 2 to 5 years who were admitted to the pediatric outpatient clinics. If a family has two or more children 2 to 5 years old, only one child was included in the study. Children with any known or reported chronic disease and

neurodevelopmental disorder were not enrolled, as these situations could be potential confounders and the relations of playing video games could also be different from healthy children.

Parent-child couples waiting in the outpatient clinic before the examination were informed about the content and purpose of the study. Enrolment was offered with the following statement: 'We would like to invite you to answer some questions investigating the screen use and video game playing characteristics of your child. Completing the questionnaire is voluntary. If you do not want to participate in the survey, it will not affect your child's examination processes. If you accept the answer the survey questions, we will evaluate your answers and brief you about outcomes after your child's examination.' We obtained verbal and written informed consent and gave the participants the structured questionnaire. Then, we collected the fulfilled forms and counselled the parents on 'recommended screen usage including video games; and quality leisure time activities with their children' at the end of the well-child visit. Parents of problematic screen users and video gamers (longer screen time than recommended, inappropriate content, etc.) were informed and children were planned to be followed in this respect.

We invited 1450 parents of children 2 to 5 years of age to participate in the study: A total of 72 parents refused to participate and 8 children were excluded because of a chronic illness or neurodevelopmental disorder. Forms missing-incomplete from the remaining 1370 samples were also excluded and a total of 1245 parent-child pairs (90.9%) were included in the study. The proportion of incomplete-missing data forms was similar in all of the five centers (range: 89.2–92.4%). The data are missing is not related to either the specific value which is supposed to be obtained or the set of observed responses which is 'missing completely at random'. Cases with missing or inconsistent data were similar rates in centers and did not change the representativeness of the samples. Therefore we simply omit those cases with the missing data and analyze the remaining data.

Questionnaire

The self-completion questionnaire was developed collectively by the researchers of the study, examining previous studies (Rideout et al. 2013; Kabali et al. 2015). The draft questionnaire was administered to 70 parent-child pairs (14 for each center). The questions found not to be understood by the parents were reviewed, discussed, and edited by researchers. The final version was used for the survey.

The questionnaire was created to collect data on the demographic characteristics of the child (age, gender), parents (age, educational status, occupation), family (type of family, number of children, daycare of the child), and screen and video gaming characteristics of the children [the child's daily screen time (TV, tablet, computer, smartphone, game console, etc.), other individuals playing video games in the family, social media usage of the parents, and the names of the video games the child played]. It was questioned whether there are devices such as computers, tablets, smartphones, game consoles in the house, and these devices' ownership (whether they belong to the child or other family members) and usage of these devices by family members. To measure the screen time of the child, the parents were asked the following questions: 'When the weekdays and weekends are considered in last month, how many hours on average your child watched the screen (TV, tablet, smartphone, game console, computer) per day? If he/she is playing a video game, how much of this time has been spent playing video games?'

We asked parents 'What are the names of the video games he/she plays?' For each game specified by parents, we examined the developer's description, recommended age by regulatory agencies, how it is played (online, offline), and content. We made grouping as age-appropriate games and age-inappropriate games. We determined the criteria for a game not to be suitable for age as follows: (a) abstract concepts that preschool child cannot understand, content such as violence, war, etc. (b) age-inappropriate label (+7,+9; +15; +18, etc.) (c) Online games (playing video games with one or

more people together by connecting to the internet with computers or some mobile devices) (Felini 2015; The Republic of Turkey 2017).

In addition, in this survey, we questioned whether the parents set rules for the child's screen usage (a.Yes, he/she obey; b.Yes, he/she does not obey; c.No); The reaction of the child and the parent when the device is taken away (a. he/she acknowledges; b. He/she cries, I give it back according to the severity of the cry; c. He/she cries, but I don't break the rules).

Statistics

The data were analyzed using IBM SPSS 22.0 package program. The Kolmogorov–Smirnov test, histograms, skewness and kurtosis was used to determine the normality of data distribution. Descriptive statistics were presented as mean \pm standard deviation (SD) for normally distributed data, median for skewed-data, and as numbers and percentages for categorical data. Case distributions according to the characteristics were analyzed with the chi-square test. Subgroup differences in 3×2 and 4×2 tables were determined by calculating adjusted residuals.

Logistic regression analysis was used to examine the relationship between the child, family characteristics, and the presence of playing a video game, and OR and 95% CI were calculated.

Survival analysis with life table evaluated the starting age for video gaming with time intervals by 0.5 years. The median values were calculated and comparisons were made with Wilcoxon (Gehan) Statistics .

Values of $p < 0.05$ were considered statistically significant.

Results

Study population

The socio-demographic characteristics of the cases are shown in Table 1. Of the parents who filled the questionnaire, 82.4% were mothers and 17.6% were fathers. The mean maternal and paternal ages were 32.8 ± 5.2 years and 36.1 ± 5.5 respectively. Overall, 48.9% of mothers and 47.3% of fathers had <12 years of education and 48.4% of the mothers had wage-earning employment. While of the families 86.4% is nuclear family, 11.6% is extended family and, only 2.0% is single-parent family. 64.5% of the families had 2 or more children (Table 1). The mean (\pm SD) age for the children was $3.9 (\pm 1.1)$ years. Slightly more than half (51.0%) of the children involved in the study were boys. While 45.1% of daycare of the children was provided by the mother, 34.2% of them went to kindergarten (Table 1).

Screen use, ownership, and control

The median daily screen time of the children was 90 minutes. Screen time was <1 hour/day in 43.3%; 1, 2 hour/day in 23.9%; >2 hour/day in 32.8% of the children.

In 60.0% of the cases, there was a computer and in 58.8% there was a tablet at home. While 8.7% of the children had their own tablet, 11.1% had a tablet shared with their siblings and 19.9% shared the tablet with their parents. Only 22.3% of them did not have a computer or tablet at home. Smartphone ownership of mothers and fathers were 67.1% and 97.5% respectively. The frequency of having a smartphone for at least one of the household members was 99.1%. Of the children, 50.7% were using a smartphone. Game console ownership of the families was 12.5%. While 86.0% of mothers were active on social media, 89.9% of fathers were social media users (Table 2).

The answer to the question of 'Do parents set rules for the child's screen usage?' was 'No' in 14.8% of the participants. The answer of 'When the device is taken away, what is the reaction of your child?' given by the parents was 'reacted' in 53.1% ($n = 637$) of the children. Of these parents with crying

Table 1. Child, family characteristics and video game playing status in preschool children.

	Overall	Video game prevalence		
	N (%) [*]	% ^{**}	p [#]	OR (95%CI) ^{##}
Overall	1245 (100)	26.7		
Child's Age, yrs				
2–3	646 (51.9)	19.0	<0.001	1
4–5	599 (48.1)	34.9		2.80 (1.76, 2.95)
Gender				
Female	610 (49.0)	22.1	<0.001	1
Male	635 (51.0)	31.0		1.58 (1.23, 2.04)
Maternal age, yrs				
<30	313 (25.1)	26.5	0.878	1
30–39	815 (65.5)	27.0		1.02 (0.76, 1.37)
≥40	117 (9.4)	24.8		0.91 (0.56, 1.48)
Paternal age, yrs				
<30	126 (10.1)	32.5	0.087	1
30–39	816 (65.5)	24.8		0.68 (0.45, 1.02)
≥40	303 (24.3)	29.4		0.86 (0.55, 1.34)
Maternal education				
<12 years	608 (48.9)	29.9	0.011	1.27 (1.06, 1.53)
≥12 years	637 (51.1)	23.5		1
Paternal education				
<12 years	586 (47.3)	29.9	0.016	1.25 (1.04, 1.51)
≥12 years	659 (52.7)	23.8		1
Maternal occupation				
Working	603 (48.4)	24.4	0.077	1
Housewife	642 (51.6)	28.8		1.25 (0.97, 1.61)
Family type				
Nuclear	1076 (86.4)	25.8	0.152	1
Extended	144 (11.6)	40.0		1.91 (0.85, 4.30)
Single parent	25 (2.0)	30.6		1.26 (0.86, 1.84)
Number of children				
1	442 (35.5)	23.3	0.045	1
2	580 (46.6)	27.1		1.22 (0.91, 1.62)
≥3	223 (17.9)	32.3		1.56 (1.09, 2.24)
Daycare of the child				
Mother	561 (45.1)	27.5	0.635	1
Grandparent	200 (16.1)	23.0		0.78 (0.54, 1.15)
Childminder	58 (4.7)	25.9		0.92 (0.49, 1.70)
Kindergarten	426 (34.2)	27.5		1.00 (0.75, 1.32)
Child's screen time (hr/day)				
<1	539 (43.3)	22.4 ^a	0.009	1
1–2	297 (23.9)	28.3 ^{ab}		1.36 (0.98, 1.88)
>2	409 (32.8)	31.1 ^b		1.56 (1.16, 2.08)
Do parents set rules for the child's screen usage? [§]				
Yes, he/she obey	790 (65.8)	23.9 ^a	0.002	1
Yes, he/she does not obey	233 (19.4)	35.2 ^b		1.73 (1.24, 2.38)
No	177 (14.8)	28.8 ^{ab}		1.23 (0.86, 1.75)
When the device is taken away [§]				
Compliance of the child	563 (46.9)	24.5	0.162	1
He/she cries; I give back according to the severity	262 (21.8)	27.1		1.13 (0.81, 1.56)
He/she cries; but I don't break the rules	375 (31.3)	30.1		1.32 (0.98, 1.79)

*Column percentage; **Row percentage

[#]Chi square; ^{##}Logistic regression analysis[§]n = 1200^{a,b}Values having different letters were found to be statistically different; p < 0.05.

children, 41.1% (n = 262) stated that they gave back the device according to the severity of their child's crying (Table 1).

Table 2. Relations of preschool children's household electronic device opportunities, household social media usage and video game playing.

	Overall	Video game prevalence		
	N (%) [*]	% ^{**}	p [#]	OR (95%CI) ^{##}
Child's tablet usage				
Own tablet	108 (8.7)	39.8 ^a	<0.001	2.31 (1.50, 3.65)
Sharing with siblings	138 (11.1)	34.8 ^a		1.87 (1.25, 2.79)
Sharing with parents	248 (19.9)	32.3 ^a		1.67 (1.20, 2.32)
Not using	180 (14.5)	18.9 ^b		0.81 (0.53, 1.24)
Absence	571 (45.9)	22.2 ^b		1
Devices at home				
Computer and tablet	454(36.5)	32.8 ^a	0.002	1.78 (1.26, 2.51)
Computer	293 (23.5)	22.9 ^b		1.08 (0.73, 1.60)
Tablet	220 (17.7)	25.5 ^{ab}		1.24 (0.82, 1.88)
No	278 (22.3)	21.6 ^b		1
Child's smartphone usage				
Yes	631 (50.7)	29.6	0.016	1.36 (1.06, 1.75)
No	614 (49.3)	23.6		1
Game console at home				
Yes	156 (12.5)	44.9	<0.001	2.56 (1.82, 3.62)
No	1089 (87.5)	24.1		1
Maternal smartphone ownership				
Yes	836 (67.1)	26.9	0.196	1.78 (0.73, 4.33)
No	409 (32.9)	17.1		1
Paternal smartphone ownership				
Yes	1214 (97.5)	26.9	0.179	1.91 (0.73, 5.0)
No	31 (2.5)	16.1		1
Maternal social media usage				
Yes	1071 (86.0)	27.2	0.318	0.82 (0.56, 1.20)
No	174 (14.0)	23.6		1
Paternal social media usage				
Yes	1119 (89.9)	27.1	0.328	0.80 (0.52, 1.24)
No	126 (10.1)	23.0		1
Someone else playing videogame at home				
Yes	367 (29.5)	52.6	<0.001	5.89 (4.48, 7.75)
No	878 (70.5)	15.8		1

^{*}Column percentage; ^{**}Row percentage

[#]Chi square; ^{##}Logistic regression analysis

^{a,b}Values having different letters were found to be statistically different; $p < 0.05$

Video game playing status

Of the children, 332 (26.7%) were playing video games and apart from the index child, at least one other person was playing video games in the family of 367 (29.5%) of the participants (Table 1, Table 2).

The median daily video game playing time was 45 minutes. Daily video game playing time was <30 minutes in 42.5%; 0.5–1 hr in 29.2%; 1–2 hr in 18.7%; >2 hrs in 9.0% of the children.

The prevalence of video game playing increased with age. In the study, the prevalence of playing video games was 2.8 times higher in children aged 4–5 compared to children 2–3 years of age (Table 1). While the frequency of playing video games at the age of 2 was 11.3%, this rate increased to 36.0% at the age of 5 (OR:4.4; 95% CI: 2.8, 6.9) (Figure 1).

When all the participants were evaluated together, boys were 1.58 times more likely to play video games than girls ($p < 0.001$, Table 1). When the prevalence of playing video games by gender is evaluated by stratification according to age group, video game playing was more common only in girls at 2 years old (12.6% girls vs 10.1% boys). It was more common in boys for all other ages (Figure 1).

The prevalence of playing video games of the children was higher for those having maternal and paternal education <12 years than having ≥12 year educated counterparts ($p = 0.011$, $p = 0.016$,

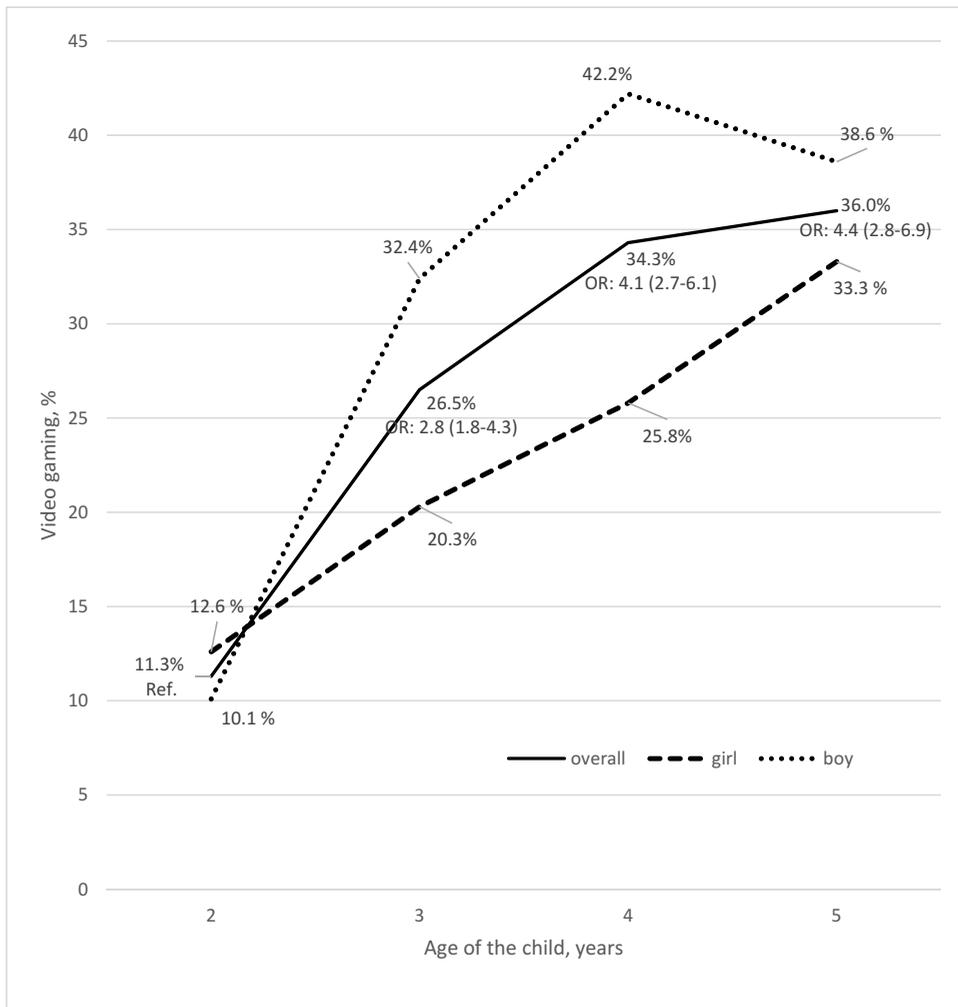


Figure 1. The prevalence of children's video gaming and changes in ratio by age and gender.

respectively; Table 1). The study results showed that the rate of playing video games was 1.56 times higher in families with 3 or more children compared to those with only one child (95% CI: 1.09, 2.24). The results showed that a child's screen time of more than 2 hours per day was associated with an increase in the frequency of video game playing (OR: 1.56; 95% CI: 1.16, 2.08).

Not obeying the parental screen rules was increased the child's odds of playing video games 1.73 fold (95% CI: 1.24, 2.38) compared to those who followed the parental screen rules.

Using a shared tablet with parents, siblings, and using his/ her own tablet increased the odds of playing video games by 1.67 times, 1.87 times, and 2.31 times, respectively, compared to those who do not have a tablet at home (Table 2). Having both a computer and tablet at home increased the odds of playing video games by 1.78 times compared to those without these devices (95% CI: 1.26, 2.51). While the child's smartphone use increased the odds of playing video games by 1.36 times (95% CI: 1.06, 1.75), having a game console at home increased this rate by 2.56 (95% CI: 1.82, 3.62) times.

Of the children who played video games 58.1% (n = 193) had one or more other video game players in their households (Table 2). The distribution of the other individuals playing video games were: 60.0% siblings, 42.0% fathers, 19.7% mothers and, 3.6% others. The one with the highest odds

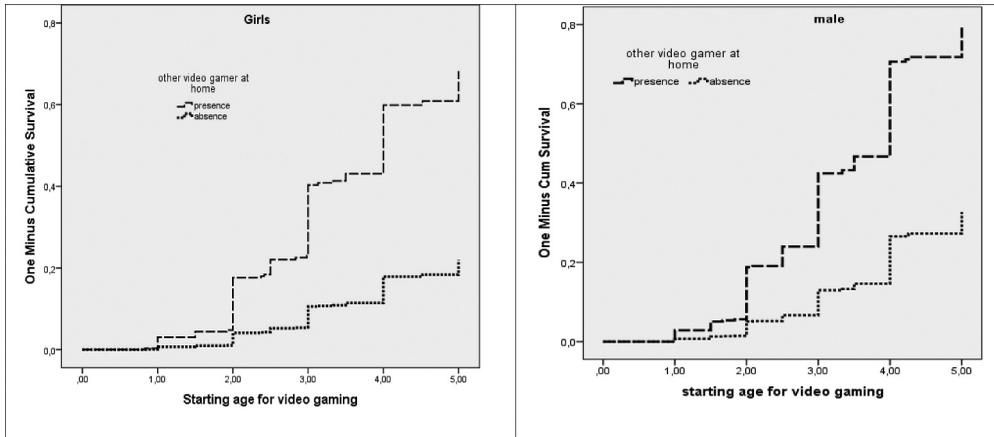


Figure 2. Effect of presence of another video-game player at home on child's video-gaming by child's gender.

ratio among the variables that increased the child's probability of playing video games was someone else playing video games at home (OR: 5.89, 95% CI: 4.48, 7.75).

Maternal and paternal age, maternal occupation, family type, daycare type of the child, the maternal and paternal ownership of a smartphone, social media use of parents, and the reaction type of the child and parent when the device is taken away seem unrelated with child's video gaming (Table 1, Table 2).

Starting age of video game playing

The median age for children to start playing video games was 5.5 years for girls and 5.4 for males ($p = 0.006$). The median age for starting video gaming was 4.4 years in cases having a game console at home and 6.0 in cases having no console ($p < 0.001$).

The median starting age of child's playing video game was associated with someone else playing videogame at home in girls (presence vs. absence: 4.1 vs. 5.5 yrs, respectively, $p < 0.001$) and boys (presence vs. absence: 3.6 vs. 6.0 yrs, respectively, $p < 0.001$) as seen in Figure 2.

Knowledge of parents about children's video game preferences

When the video game preferences of the children are examined, it was found that 54.5% of the parents did not know the name of the video game the child was playing and it was observed that the parents' ignorance on this issue was more common in the 4–5 age group than in the 2–3 years ($p = 0.008$, Table 3). Of the children, 10.8% were playing video games which are not appropriate for their age. The presence of someone else playing videogame at home was not associated with the type of game the child was playing.

Discussion

This cross-sectional study showed that more than a quarter of children aged 2 to 5 years played video games. The daily screen exposure time was over the recommended time, which is 1 hour per day for the 2–5 years age group, in 56.7% of the children. Of the children playing video games, 27.7% of the children exceeded the recommended time just by playing video games. Moreover, having screen time of more than 2 hours per day was associated with increased odds of playing video games. This result can be interpreted as video games may make the screen more attractive and increase the daily spent time on the screen. A large-scale, nationally representative study of 0–

Table 3. Knowledge of parents for children's video game preferences (n = 332).

	n	Age-appropriate*	Unappropriate*	Unknown*	p
Overall	332	34.9	10.8	54.2	
Age (yr)					
2–3	123	45.5	9.8	44.7	0.008
4–5	209	28.7 ^a	11.5 ^{ab}	59.8 ^b	
Gender					
Female	135	39.3	7.4	53.3	0.155
Male	197	32.0	13.2	54.8	
The person completing the study questionnaire					
Mother	275	32.4	11.3	56.4	0.097
Father	57	47.4	8.8	43.9	
Someone else playing videogame at home					
Presence	193	32.1	13.5	54.4	0.136
Absence	139	38.8	7.2	54.0	

*Row percentage. ^{a,b}Values having different letters were found to be statistically different compared to children aged 2-3 years; p<0.05

8 years old children in 2013 in the USA reported that the average daily screen use was roughly 2 hours; approximately half of this time is spent watching television, while 19% of the time is spent watching DVDs, and 9% video games. However, the most common mobile media activity among children is playing games which is 63% (Rideout et al. 2013). In Ontario, Canada, 37.9% of 746 preschool children (≤ 5 years old) were shown to play video/computer games (Carson and Janssen 2012). A study enrolling 4–6 year old children (n = 93) attending nursery schools showed that 44.1% of them played video games in 2012 in Turkey (Akçay and Özcebe 2012). A recent study with 60 months old children found that 56.7% of children use mobile devices to play video games (Kılıç et al. 2019).

The prevalence of playing video games gradually increased with the age of enrolled children, and this difference was statistically significant in the current study. Previous studies have shown that the ability to use mobile devices increases with age, especially in preschool children, watching videos is a more preferred activity than playing video games. However, as the child gets older, interest in video games is shown to increase (Radesky et al. 2016). In a cross-sectional study of 350 children aged 6 months to 4 years, nearly half (43.5%) of 1 year old used a mobile device daily to play games, watch a video, or use apps; the percentage increased to 76.6% in 2-year-olds. Additionally, most of 3–4 year old children were reported to use the devices without assistance, and one-third of the children engaged in media multitasking (Kabali et al. 2015). It is possible that the development of fine motor skills in children gradually increases with age, thus, with each passing year, they prefer playing video games to passive video watching activity (Radesky et al. 2016). It is also reported that young children can use touch screen devices without help from a very early age; unlocking the device effectively, swiping the screen to access the next page, and understanding what the keys do, etc. (Rideout et al. 2013; Kabali et al. 2015; Kılıç et al. 2019). Therefore, the increase in playing video games by age in preschool children may be related to the increase in parental permission as the growth of the child as well as the abilities of the child. However, in order to know this, it is necessary to examine in detail how parental mediation strategies change according to the age of children, especially in the use of mobile devices in future studies.

Compatible with previous studies (Hastings et al. 2009; Akçay and Özcebe 2012; Rideout et al. 2013), boys had more video game playing behaviors than girls. In the study examining the computer game addiction levels of primary school students, male students' inability to stop playing games, associating the game with real life, disrupting duties due to playing the game, preferring playing games to other activities, and total game addiction levels were found to be higher than female students (Horzum 2011).

Our study shows that the presence of various mobile and non-mobile media devices at home and the status of the child's possession of a device are also related to playing video games. However, in terms of starting age for video gaming, having a game console at home was found to be associated with an earlier age to start playing video games compared to those without a game console. While only 12.5% of the households participating in the study had a game console, 77.7% had either a computer or a tablet and at least one tablet possession was present in 8.7% of the children. In almost all of the participants in the study at least one of the household members had a smartphone in the current study. In recent years, touch screen mobile media devices such as smartphones, tablets, and iPads have become a media device option that can be easily accessed and used by children due to their ease of use, mobility, and reduced costs (Rideout et al. 2013; Kabali et al. 2015; Kılıç et al. 2019). Rideout et al. reported that the proportion of children aged 0–8 using mobile devices increased from 38% in 2011 to 72% in 2013 (Rideout et al. 2013). Kılıç et al. showed that the rate of encountering mobile devices was 75.6% and mobile device ownership was 30.7% among children aged 1–60 months and suggested the association of devices with both the early onset of screen exposure and the increase in exposure times (Kılıç et al. 2019).

Similar to the previous reports (Yalcin et al. 2002; Akçay and Özcebe 2012; Wijtzes et al. 2012; Veldhuis et al. 2014; Maatta et al. 2017; Kılıç et al. 2019; Erat Nergiz et al. 2020), the current study revealed lower parental education was associated with an increase in the frequency of playing video games. Since higher education is often associated with skills that lead to a healthy lifestyle, it can be assumed that parents with higher education levels may understand the need to limit the screen time, the importance of right content selection, and offer different options for children to enjoy and play (Coşkun and Filiz 2019).

The current study revealed similar rates for video gaming in children attending kindergarten compared to children cared for at home. On contrary, a previous study reported higher use of portable and home video games in kindergarteners aged 42 months in Japan (Horiuchi et al. 2020). Differences in child-care practices and education technologies might have a role in controversial results.

In the current study, someone else playing video games at home was the strongest relationship with playing video games in preschool children and an earlier age to start video gaming. In some previous studies, it has been shown that there is a correlation between the screen use characteristics and video game playing habits of the parents and the children (Akçay and Özcebe 2012; Wijtzes et al. 2012; Xu et al. 2014; Erat Nergiz et al. 2020). In particular, in the early years of life, parents play a critical role in developing and shaping their children's behavior through role modeling and by creating a home environment that influences children's habits (Xu et al. 2014; Coyne et al. 2017).

As young children have limited ability to assess the appropriateness of media content, responsibility for managing young children's media consumption is almost entirely the responsibility of the parents (Radesky et al. 2016; The Republic of Turkey 2017; Lim 2019). It was also found that the possibility of video game playing of children increased in families having 3 or more children. This increase may be related to the decrease in family control. In addition, the bad role model of the older sibling in families with many children may also be a risk factor for younger siblings. As an important finding of our study, 65.8% of the parents stated that they set rules for screen usage and their children obeyed, and 14.8% of those stated that they did not set any rules. Of parents, 19.4% stated that although there was a rule, it was not followed by children. The highest statistically significant frequency of playing video games was shown in the latter group and this may indicate a parent-child conflict. Parental supervision, to set clear limits and regulate their children's media consumption is essential, but the style of restriction is also important (Zaman et al. 2016; Martins et al. 2017; Van Petegem et al. 2019). When setting rules and restrictions for digital games, parents should avoid using controlling language (threatening with punishments, or inducing guilt, etc.) as doing so counterproductive behavior not to result in a boomerang effect and child delinquency.

In our study, more than half of the parents did not know the name of the game the child played, and 10.8% of those the content was not age-appropriate. Recommended for the preschool

age group is to watch well-designed productions with educational and age-appropriate content under the supervision of their parents (Radesky et al. 2016; The Republic of Turkey 2017). Children between the ages of 0–6 years, which are the fastest and the most critical years of development, cannot easily distinguish between imagination and reality, natural and virtual, and their abstract thinking skills have not developed yet. The positive effects of the media on young children are directly related to the right content and the presence of parental interaction (Radesky et al. 2016; Bozzola et al. 2018). In addition, studies show that playing violent video games causes negative behavior and addiction in children and adolescents (Gentile et al. 2004; Anderson et al. 2008; Rehbein and Baier 2013; Ferguson 2015). that Inappropriate video game use during childhood also increases the risk of developing video game addiction in adolescence (Rehbein and Baier 2013).

Limitations and strengths

While evaluating screen times and video game playing times, it was asked to state an average time considering the usage time on a usual day on weekdays and weekends. As a retrospective study, the families gave their answers by categorizing them as “less than 1 hour”, ‘between 1 and 2 hours’ and ‘more than 2 hours’. In addition, parents of children whose screen time varies widely on weekends and weekdays may not have been able to give a properly weighted estimated time. In new prospective studies, the average daily screen time can be measured by chronometry both on weekdays and at weekends and weighted appropriately. In the current study, as the screen time and video gaming time are based on the parents’ statements, highly educated parents, who know that screen time should be restricted, may have stated the duration of the daily screen and video gaming less than they actually are. These statements may also include recall bias. The results of this study cannot be interpreted cause-effect relationship due to study design. Further longitudinal studies are needed to describe the determinants of young children’s playing video games and to demonstrate their causality.

The strong side of our study is that the results were generalizable to the society, because, although it was planned as a hospital-based study, the study was conducted multi-centered, and the number of participants was high, and those with chronic and serious diseases were excluded. Another strength of our study is that it emphasizes the preschool period when the basis of video game/screen addiction is laid and evaluates the factors associated with playing video games.

Conclusion

We determined that approximately more than one-quarter of children aged 2–5 years play video games. Considering that this age group is sensitive in terms of the unpredictable negative effects that may develop due to playing video games, this high frequency should not be underestimated. The prevalence of playing video games in the preschool age group increased with the child’s age, male gender, low parental education, families with 3 or more children, having computers and tablets at home, using a shared tablet with parents or sibling, using his/ her tablet, child’s smartphone use, having a game console at home, child’s screen time of more than 2 hours per day, child’s non-compliance with the parental screen rules, and presence of someone else playing videogame at home. Moreover, in our study, more than half of the parents did not know the name of the video game the child was playing. Practical implication is that it will be necessary for parents to gain video-game literacy. Parents should be informed about the importance to supervise their children’s video game playing habits and content selection. Well-child follow-up visits can be used as an opportunity to counsel families on this issue. Reliable information sources should be provided. Further studies are necessary to investigate the influence of video games on the neurobehavioral development of preschoolers.

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Declaration of Competing Interest

The authors declare that they have no conflicts of interest.

Authors' Contributions

SSY, KY contributed to the conception or design of the work. NC, MEN, AO, DY, OT, SC contributed to the acquisition of data. SSY contributed to the analysis and interpretation of data for the work. SSY, NC, MEN prepared the manuscript. All gave final approval and agree to be accountable for all aspects of work ensuring integrity and accuracy.

Availability of data and materials

For access to the files, please send an e-mail request to siyalcin@hacettepe.edu.tr.

Ethical approval

Ethics Board of Non-Interventional Clinical Research from Hacettepe University approved the protocol. All procedures in the study complied with the 1964 Helsinki declaration and its later amendments or comparable ethical standards. Informed Consent was obtained from the mothers included in the study.

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