ENGAGEMENT WITH DIGITAL MEDIA IN HOME ENVIRONMENT AND SCHOOL READINESS IN CROATIAN PRESCHOOL CHILDREN

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Abstract

Our aim was to investigate the use of various digital media for different purposes in home environment and its relation to the level of school readiness, namely graphomotor skills, logical reasoning and letter knowledge in children aged 6 to 7. Children (N=92) were tested for graphomotor skills, logical reasoning and letter knowledge while their parents completed a questionnaire providing us with the data about their own and their children's access to digital media in home environment. Results show low but significant negative correlations between the time spent using a computer on weekends and the number of letters children can identify correctly, as well as between the time spent using a smartphone on weekends and children's graphomotor skills.

Key words: preschool age, digital media, school readiness, graphomotor skills, logical reasoning, letter knowledge.

Introduction

In today's world, young children are often described as digital natives (Prensky, 2001). They live in homes saturated with digital media (DM). Rideout (2017) states that when it comes to children younger than 8 in the United States, 98% of them live in a home with some type of mobile device (smartphones, tablet devices such as iPads, Androids, or similar products), compared to 75% in 2013, and 52% in 2011 (Rideout, 2011, 2013). In Croatia, research shows that 80% of children live in a household with fi e or more digital devices (Buljan Flander, 2017) and most preschoolers use DM to watch cartoons on TV or on a computer (Kotrla Topić & Perković Kovačević, 2015). While children start using these media devices at an increasingly younger age (Zaman & Mifsud, 2017), researchers are still debating on the extent to which such engagements can potentially be harmful (e.g. Vandewater et al., 2007) or beneficial (e.g. Burke & Marsh, 2013).

In this research, we are interested in the association between DM use in a home setting and school readiness in preschool children. School readiness is defined as the social, emotional and cognitive readiness of an individual child to start primary school education (Čudina-Obradović, 2008). It is often assessed by different tests that use nonverbal tasks and it is considered both a minimum requirement for a child to be able to react appropriately to school demands and a good predictor of later academic success and positive adjustment to school surrounding (Lemelin et al., 2007). In Croatia, all preschool children go through school readiness assessment prior to enrolling in elementary school, but there is a lack of research on the relation between school readiness and children's habits of increasingly frequent DM use.

In this research, we focus on the cognitive domain of school readiness evaluated through graphomotor skills, logical reasoning and letter knowledge. Graphomotor skills are fine motor skills that are required for writing and are a significant predictor of later intellectual abilities (Ambrosi-Randić & Glivarec, 2017) and school achievement (Hadžiselimović, Vukmirović, & Ambrosi-Randić 2009). Recent studies show that extensive use of touch screen tablets in preschool children might be disadvantageous for the fine motor development (Ling-Yi, Rong-Ju, & Yung-Jung, 2017). Logical reasoning has been linked to mathematical learning in 6-year-old children, even after controlling for general cognitive ability and working memory (Nunes et al., 2007). Li and Atkins (2004) found that children who had access to a computer at home achieved better results on the measure of cognitive development and school readiness, even after controlling for children's developmental stage and family socioeconomic status (Li & Atkins, 2004). Furthermore, in a recent review of studies on the impact of touch screen devices on

learning and development, Herodotou (2017) found that the majority of studies reported positive effects on mathematics, science and problem-solving, among other things. Finally, letter knowledge at preschool age is found to be a strong predictor of learning to read (Foulin, 2005). Previous research found a positive correlation between computer use at home and letter knowledge, even after controlling other cognitive and environmental factors that are known to predict letter knowledge (Castles et al., 2013).

As mentioned earlier, nowadays, children use a variety of DM in their homes, often simultaneously, so we believe that further research is needed to better understand the connection between media use and school readiness, particularly its cognitive domain which is often related to later academic achievement.

Our first aim is to describe the habits of Croatian preschool children and their parents when it comes to DM (tablets, smartphones, computers and TV) use at home.

Secondly, we investigate the relation between parental and children's use of DM.

Finally, we look at the relation between children's use of DM in a home environment and their level of school readiness, namely graphomotor skills, logical reasoning and letter knowledge.

Methods

This is a correlational study aimed at investigating the relation between children's use of DM (data reported by their parents) and their school readiness skills (data obtained through testing graphomotor skills, logical reasoning and letter knowledge).

Participants

The study included 92 participants, 39 girls and 53 boys, who came to elementary school for school readiness testing. The age span is from 6 to 7 years of age (M=6.3, SD=.374). Approximately one half of both mothers and fathers have high school education (47.8% and 46.5% respectively) with the other half reporting higher level of education. In almost two thirds of the families in the sample (59.8%), parents report good socio-economic status, and one third (35.8%) report having higher socio-economic status.

Procedures

The elementary school psychologist approached all the parents who brought their children for school readiness testing, asking them to participate in the research. One of the parents (either mother or father) filled out a questionnaire prepared for this study, providing us with data regarding their own and their child's use of DM, parental education and the family's socio-economic status. Children were tested in what was a standard testing procedure for all preschool children who were to start school in September that year. They completed the School readiness test with the school psychologist (Hadžiselimović, Vukmirović, & Ambrosi-Randić, 2008) and the speech pathologist administered the letter recognition test.

Measures

School readiness test
School readiness test is a group-administered test containing 40 tasks. It is constructed for children aged 6 to 7. The first 20 tasks form a measure of graphomotor skills, and the second 20 tasks form a measure of logical reasoning. The test has a fairly good prognostic validity of 0.70 for academic success and adjustment in the first grade of primary school (Hadžiselimović et al., 2008).

Letter recognition test
For the purpose of this study, we printed cards measuring 5x5 cm, with each card containing a different letter of Croatian alphabet, printed as block capitals. The letters were arranged in the alphabetical order and presented to the child one by one, starting with the first letter of the child's name. Total score on this test is the total number of correctly identified let ers.

Parent Questionnaire
The questionnaire was devised for the purpose of this study. Parents reported how often their child watches television or uses a computer, tablet or smartphone on weekdays and over the weekend, using a scale with predefined ranges: 1 – less than an hour a day, 2 – from 1 to 3 hours, 3 – from 3 to 5 hours, 4 – more than 5 hours, or they could choose an answer saying their child has no access to such a device or is not allowed to use it. They also provided information regarding the purpose of children's use of digital devices and access to the Internet.
Furthermore, parents stated the average number of hours per workday and per the weekend that they themselves spend using a smartphone, laptop, desktop computer, tablet or television, regardless of the purpose of use.

Statistical analysis

Data were analyzed using the Statistical Package for Social Sciences (SPSS) for Windows, version 21 (IBM Corp., 2012). When analyzing measures of children's use of DM, we used non-parametric statistical methods (Wilcoxon signed ranks test and Spearman rho correlation coefficients) because those measures had a distribution that differed from normal. Parental measures of DM use showed a normal distribution of results, so when analyzing those data, we used parametric statistical methods (t- test). All the tests were two-tailed and conducted at the 5% level of statistical significan e.

Results

Use of digital media by children

When it comes to the time children spent using different digital devices, data were collected separately for working days and weekends. The results are presented in Figure 1.

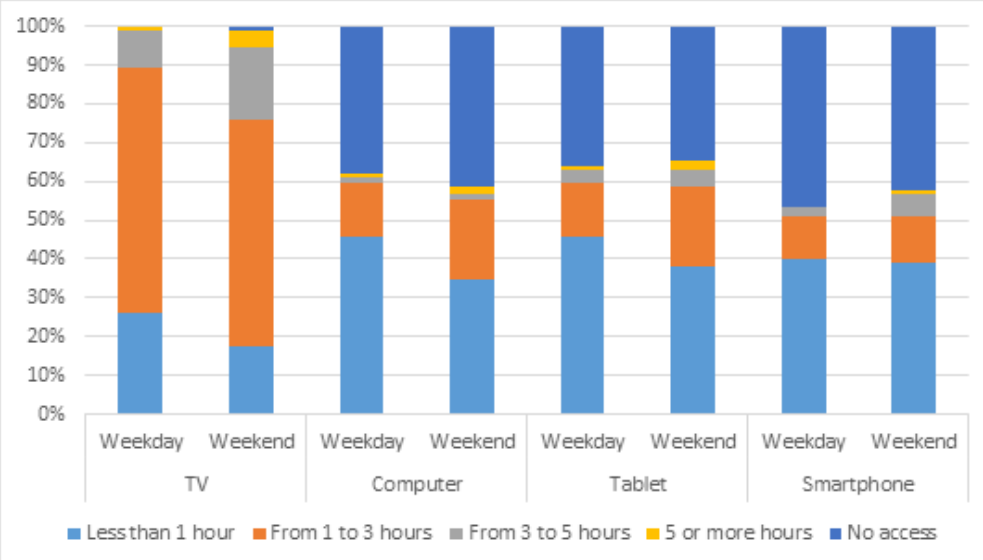

Figure 1. Percentage of children who have access to different DM for different time limit, during weekdays and weekend

Almost all the parents in the sample report that children spend at least some time during a working day watching television, with two thirds of children in the sample spending from 1 to 3 hours on this activity (63%), while 26.1% of children watch television less than an hour a day. There is also 10.1% of children who watch more than 3 hours of TV a day. During weekends, the time spent watching television significantl increases and although there are still two thirds of children in the sample who watch

TV from 1 to 3 hours, there are more children who watch it more than 3 hours a day (22.8%), and less those who spent under one hour in front of the TV (17.4%).

Around two thirds of children have access to a computer on weekdays and weekends, and they generally spend more time using it on weekends than on weekdays.

About one third of children in the sample does not have access to a tablet in their home. Those that do, spend more time using it during the weekend than during weekdays. Most children use it less than an hour a day (71.2% of those having access to it on weekdays and 58.3% of those having access to it during weekends), but for approximately 10% of them this time increases to 'between one and three hours a day' during weekends.

Smartphones are the devices which children have the least access to, compared to other devices (46.7% and 42.4% children do not have access to it during weekdays or during weekends, respectively). Among the children who do have access to smartphones, there is again an increase in the amount of time smartphones are used on weekends compared to weekdays.

Finally, we calculated an aggregate measure of children's total use of different media devices, separately for weekdays and the weekend. We then compared those results using Wilcoxon signed ranks test, which showed that during the weekend, children use DM significantl more than during weekdays (Mweekdays=5.62, Mweekends=6.37, Wilcoxon S-R test=-2.214, p=0.027).

We also wanted to know more about the purposes of children's DM use. Parents report that more than two thirds of children in the sample (72.8%) have Internet access at home. Those children most often access the Internet using tablets (64.2%), but they also use laptops, smartphones or desktop computers (46.3%, 44.8% and 41.8% respectively).

When accessing the Internet, half of the children do it mostly with parental help and supervision (51.5%), 37.9% access it sometimes supervised and sometimes unsupervised, while 10.6% of them access the Internet mostly unsupervised.

When online, most children watch cartoons (74.6%) and play games (70.1%). About half of the children use the Internet to go on YouTube (58.2%) or for studying (46.3%), and only a quarter of them use it to communicate (14.9%) or find information using search engines, e.g. Google (19.4%).

Parents' use of digital media

When adding the time spent on each DM device during weekdays or the weekend, parents spend significantl more time using different DM devices during the working week than on weekends (Mweekdays=6.7, Mweekends=5,06, t=4.729, df=89, p=0.000).
Correlation between the parents' and children's measures of DM use during weekdays and during weekends show that children whose parents spend more time using digital devices during the weekend spend more time using such devices both on weekdays and on weekends (Table 1).

Table 1.
Spearman rho correlations between amount of time children and parents spend using DM on weekdays and weekends.

	1	2	3
1 Children – weekdays	-		
2 Children – weekend	.768**	-	
3 Parents – weekdays	.283	.182	-
4 Parents – weekends	.503**	.379**	.600**

** p<0.01, *p<0.05

Relations between children's use of DM and school readiness measures

Descriptive data for the letter recognition test, graphomotor skills and logical reasoning are presented in Table 2.

Table 2.
Descriptive statistics data for the school readiness measures

	N	Min	Max	M	SD
Letter recognition	84	1	30	22.67	7.771
Graphomotor skills	92	.50	28.35	18.05	6.809
Logical reasoning	92	6	20	13.78	3.217

In Table 3, we see that there is a significant moderately negative correlation between the time children spend using a computer during weekends and the number of correctly identified letters. This means that children who spend more time on the computer during the weekend identified less letters from the alphabet. There is also a moderate but significant negative correlation between the time children spend using smartphones during the weekend and their graphomotor skills, showing that children who use smartphones for a longer time during weekends have poorer graphomotor skills.

Table 3.
Spearman rho correlations between the time children spend using DM on weekdays and weekends and correctly identified letters, graphomotor skills and logical reasoning

	2	3	4	5	6	7	8	9	10	11
1 TV weekday	.274*	.106	.064	.602**	.317*	-.081	.045	-.11	.048	-.056
2 Computer weekday	-	.067	-.203	.126	.584**	.163	.056	-.188	-.176	-.018
3 Tablet weekday		-	.423P	.127	-.099	.727**	.249	.19	.187	-.158
4 Smartphone weekday			-	-.034	-.116	.103	.735**	-.051	-.146	-.155
5 TV weekend				-	.402**	.25	.131	-.048	-.007	-.04
6 Computer weekend					-	.225	.217	-.286*	-.265	.001
7 Tablet weekend						-	.447**	.153	-.01	-.179
8 Smartphone weekend							-	-.118	-.311*	-.098
9 Letter recognition								-	.400**	.355**
10 Graphomotor skills									-	.377**
11 Logical Reasoning										-

** p<0.01, *p<0.05

Discussion

The study aimed to investigate the habits of DM use among Croatian preschool children, and to achieve better understanding of how such use is related to their school readiness. Our focus was on preschool children because they are less represented in the research literature, and because compared to older children, they spend quite a lot of time at home and with their parents (Plowman, 2015).

Our results show that television is still the primary form of screen exposure. This is in accordance with previous research conducted for children in this age range in various European countries (Ofcom, 2017; Genc, 2014), as well as in Croatia (Kotrla Topić & Perković Kovačević, 2017). Two thirds of our participants watch from 1 to 3 hours of television a day during weekdays and a little more during weekends, which is very similar to data from other countries (Kozuchova & Baskova, 2013; Genc, 2014). However, while Kozuchova & Baskova (2013) found that increased number of hours spent watching TV decreased school performance in older children, we found no significant correlations between watching television and school readiness variables in preschool children.

Furthermore, our results show that two thirds of children in the sample have access to a computer at home, which is not surprising since most parents indicated they had a fairly good living standard. Other media devices are less represented, with the smallest number of children having access to smartphones. Children use DM significantl more during weekends compared to weekdays, as previous studies also show (Genc, 2014).

As for the Internet use, two thirds of children have access to the Internet at home. They mostly go online with at least occasional parental help and supervision, with only 10% of them using the Internet mostly unsupervised. Vittrup et al. (2014) emphasize that parental help and surveillance in media use is important because at this age, children are still unable to critically evaluate complex uses and meanings of different media. Activities children most often engage in while online are watching cartoons and playing games. Similar findings come from previous studies (Livingstone & Bober, 2005).

We found a moderately negative relation between computer use during weekends and the number of correctly identified letters. Although determining the exact nature of such a relation is beyond the scope of this study, we might hypothesize that children who use computers more during weekends spend less time engaged in other activities with their parents, which might include activities that promote literacy skills, including letter recognition. Previous research found positive correlations between computer use and letter recognition, but for children younger than in the present study (Castles et al., 2013), as well as positive correlations between computer access at home and math and reading scores, but

for school aged children (Attwell & Battle, 1999). Also, it might be that children of different age use media devices in a different manner and for different purposes, which might contribute to their emerging literacy skills, but it can also be that their interactions with DM have different effects considering the stages in their cognitive development. There is also a moderately negative correlation between smartphone use during weekends and graphomotor skills. This finding is important, since those skills are required for writing. Previous experimental research on touch screen use found that extensive use of touch screen tablets in preschool children might be disadvantageous for the fine motor development (Ling-Yi, et al., 2017).

Our results also show that children whose parents spend more time using DM during weekends spend more time using such media both on weekdays and on weekends. This is no surprise, since previous research shows that parents' habits in this domain are strongly related to their children's use of media devices (Nikken & Schols, 2015). This result is interesting however, since we previously reported that parents spend more time using DM during weekdays than on weekends. A possible explanation is that during weekdays, they use such devices for work as well as pleasure and during weekends, there is a greater chance their use is related to pleasure activities, and it might be that such use refl cts their perception of DM, specificall regarding their children's use of such media. Also, it can be that children use DM at the same time as their parents.

In conclusion, our research shows that some aspects of preschool children's use of DM might be negatively associated with their school readiness, namely letter recognition and graphomotor skills. Further research is needed to analyze the exact nature of these relations and the possible effect of DM use on school readiness.

Limitations of the study

The main limitation of the study is the sample which is not representative in terms of level of parental education and socio-economic status. Another limitation is that the data on children's and parents' use of DM come not from observations, but from parental estimates, and previous research points to the lack of parental awareness of their children's media usage (Rideout et al., 2003). Finally, the study did not look into the specifics of use in terms of content for each DM device, which might be of importance in the interpretation of results. For future research we would also recommend considering parental attitudes towards different types of children's media use.

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