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The Impact of Home Literacy and Family Factors on Screen Media Use Among Dutch Preteens

Elisabeth Duursma ¹ · Anna Meijer² · Kees de Bot²

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Abstract This study examined preteens' screen media use and potential differences in media use by child and family demographics among 1464 Dutch preteens. The results demonstrated that watching TV is still a very popular activity among children. However, other electronic media are also popular within this age group as 72 % of preteens had a cellphone. Children who spoke a language other than Dutch and whose parents were born abroad were heavier media users. Children with more books in the home and who read more frequently tended to be lighter media users. Boys spent more time on screen media than girls and were more likely to play videogames while girls preferred using social media. This study demonstrated that child and home characteristics play a significant role in children's engagement with screen media and literacy

Keywords Screen media use · Preteens · Books in the home · Reading frequency · TV viewing · Videogames · Language spoken at home · Families · Social media · Computers · Internet · Tablet

Introduction

Since the introduction of television in the 20th century, many scholars, parents, and educators have raised concern

about the potential negative effects of excessive screen media use. However, screen media have also demonstrated potential for learning (e.g. Bryant et al. 1999; Fisch and Truglio 2001).

The time spent watching TV, using the Internet, and gaming has increased significantly in the past decade (Ofcom 2014), particularly among children between the ages of 11–14 years (Lee et al. 2009; Rideout et al. 2010). Screen media use often starts in infancy and is pervasive in the lives of children and adolescents (e.g., Sigman 2012; Vaala et al. 2013). Despite dramatic changes in electronic technology such as the introduction of the tablet and the increased use of mobile phones, TV is still one of the most common screen media: American children between the ages of 8–12 years spend an average of 6 h on screen media daily (Commonsense Media 2015). Primary school-aged children in the Netherlands spend an average of two hours watching television and 30 min a day using the computer or video games (Kijkwijzer 2016).

The use of social media websites is currently one of the most common activities among children and teenagers (Pew Research Center 2011). Social media websites refer to those websites that allow for social interaction online such as Facebook, Twitter but also YouTube and gaming websites. Although these sites offer entertainment and allow children to communicate with one another, there are also some clear drawbacks to using these sites such as cyber bullying and exposure to inappropriate content (O'Keeffe, Clarke-Pearson, and Council on Communications and Media, 2011). A recent poll by Common Sense Media demonstrated that nine out of ten 13–17-year-olds have used some form of social media and three out of four currently have a profile on a social networking site (Common Sense Media 2012). The same study also reported that 67 % of teenagers had their own smartphone or other device for connecting to the

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Internet and three quarters of 13–14-year-olds had their own cell phone (ethnicity or parental education did not play a role) (Common Sense Media 2012).

Interestingly, most research on screen media use such as the internet and mobile phones has focused on teenagers while it is known that the age at which children use the internet, for example, has been dropping in recent years. In the EU Kids Online study of 2010, children aged 15–16 reported they started using the Internet when they were 11 years old while the 9–10 year old children started using the internet around age seven (Livingstone et al. 2011). There is a trend that reading for pleasure is being replaced by screen media (Bohme and Barton 2013). Reading for pleasure drops in popularity from the tween to teen years with reports of almost three quarters of teens mentioning they spend no time on reading compared to slightly more than half of tweens (Commonsense Media 2015).

Middle childhood and early adolescence (or the ages between 6–13 years) are important periods in children's lives. During this time children learn to make choices and establish pathways for later behavior (Janz et al. 2005; Shiner and Caspi 2003). Where parents were the most influential people in the child's lives, peers become increasingly important during this period. They start to form stronger but also more complex friendships and peer relationships (Centre for Disease Control 2012).

Jordan (2004) suggested adopting the ecological approach as a 'useful paradigm' to study children's media use and the impact on their development (Jordan 2004). Bronfenbrenner's ecological approach views the child as a part of nested environments and embedded within different systems which influence the child's life and development at different levels (Bronfenbrenner 1979). The microsystem is the child's day-to-day setting which includes their families, schools, neighborhoods, things they do together, people children live with, and place where they live. In screen media use but also in children's literacy practices, the microsystem can include the place where children have access to media and literacy (e.g., at home, at friend's place) what, and how they engage with it and how this differs by family characteristics. The next level, the mesosystem, refers to the relationships or intersections between microsystems. An example is the relationship between family and school. Screen media use at school is likely to be very different from screen media use at home, as well as the rules surrounding screen media use. Similar for access and use of literacy which is likely to differ in home and school situations. The exosystem refers to social settings that influence children's development but where children do not have a direct influence upon. For example, parents' employment and the media. Parents might work long hours and use screen media as a baby-sitter. Long working hours might also impact whether

parents engage with their children around literacy at home. The macrosystem has to do with the broader cultural contexts that shape beliefs, attitudes etc. For example, the belief that children need to engage with computers in order to be prepared for the future or that screen media use is responsible for an increase in childhood obesity. Similarly around literacy where engagement with books and access to literacy is seen as something to help children do well in school. Cultural beliefs and values could also play an important role here as well.

Screen media use may differ by family and child characteristics. For example, previous studies among boys and girls of various ages found that boys spend more time watching TV (Huston et al. 1999), surfing the internet and gaming (Anderson et al. 2010; Lee et al. 2009). Boys are also more likely to play videogames on a daily basis compared to girls (39 vs. 22 %) (Lenhart et al. 2008), and spend more time on gaming (Dorsselaer van et al. 2005). Girls, on the other hand, tend to spend more time using computers for communication purposes (McQuillan and Neill 2009; Subrahmanyam 2001). Some other studies, however, have reported few gender differences in screen media use (McQuillan and Neill 2009). In the HBSC project, boys and girls spent an equal amount of time using the Internet (including chatting, e-mailing and surfing the web) (Dorsselaer van et al. 2005).

Studies have shown that there are differences in media use by ethnicity. In 2009, 93 % of Dutch-born families had Internet access at home. For non-Dutch born families, this was 96 % (Butter and Önce 2010). Non-Dutch born families such as those from Morocco, Turkey, and the Dutch Antilles tend to visit more websites focused on the ethnic or religious group they belong to (Butter and Önce 2010). When someone in the family does not speak Dutch and/or is lower educated, they are less likely to use the Internet (Butter and Önce 2010). Ethnic group differences are for some part due to differences in education and income. It is also possible that screen media have different functions for specific groups. Socioeconomic status can influence children's screen media use: Paus-Hasebrink et al. (2014) reported that parents in socio-economically disadvantaged environments often lack skills using screen media and therefore they can offer children less guidance in their screen media use. Rules around screen media use are set inconsistently as parents do not know how to guide their children's screen media use. Paus-Hasebrink et al. (2014, p.11) have argued that this lack of guidance might lead to excessive screen media use. In particular, since children in low-income families tend to have more electronic devices in their bedroom and spend more time watching television and using the computer (Nikken and Schols 2015). In the Netherlands, similar to other Northern European countries, people with a non-Western European background are more

likely to be lower educated. Eighteen percent of non-western people living in the Netherlands had only finished primary school, compared to 7 % for western people (Central Bureau for Statistics 2011). Almost a third of Dutch people are higher educated compared to one fifth of non-western Dutch people and approximately 50 % of non-western immigrants work in elementary-based professions requiring few skills compared to 20 % for non-immigrant, Dutch-born people (Central Bureau for Statistics 2011). Their children might be more likely to be heavy media users.

Although little is known about the relationship between language spoken at home and children's media use, Anand and Krosnick (2005) found that in the U.S., children who spoke English reported more use of TV and videogames than those who spoke Spanish. However, as the authors note, this might have to do with the availability of media available in English vs. Spanish (Anand and Krosnick 2005). Children in the Netherlands from families where Turkish or Arabic is spoken could differ in their screen media use from Dutch-speaking families as they are more likely to watch television programs or visit websites in their native language (Butter and Önce 2010).

Recent research has shown that when children are heavy screen media users, they tend to be heavy users across different types of screen media (Houghton et al. 2015; Roberts and Foehr 2008). Having access to screen media increases use. When parents allow television sets or computers in their children's bedrooms, or provide children with tablets and mobile phones, children tend to spend more time on screen media than when children have limited access to screen media (Rideout et al. 2010).

In this study we examined Dutch preteens' screen media use, and potential differences in media use by child and family demographics. We looked at differences in media use by child gender, language spoken at home, whether or not parents were born outside the Netherlands, frequency of reading and number of books in the home. We also examined whether family factors such as having a parent born abroad, and speaking a different language in the home impacts screen media use. Three research questions were addressed: (1) How much time do children spend on screen media? (2) What are the differences in screen media use across child and family characteristics such as gender, language spoken at home, parent born abroad, reading frequency and number of books in the home? (3) Which relationships exist between different types of screen media use? Based on the research literature we would expect that the level of screen media use among Dutch preteens would not differ much from those in other western countries. However, we would expect differences between having a parent born abroad and access and engagement in literacy activities and screen media.

Method

Participants

The participants in this study were 1464 fifth graders (Mean Age = 10.44, $SD = .62$, range- 7–12) (some of the participating schools were very small and consisted of only one classroom which might explain the wide age range) from 87 elementary schools across the Netherlands. Half of the 1464 children were boys. Most children (96 %) were born in The Netherlands, and 17 % of mothers and 19 % of fathers were born in another country (we did not ask children in which country their parents were born as we assumed not all of them would know). Ninety-five percent of the children reported speaking Dutch at home. However, about one in four children also reported speaking another language at home including local dialects, Frisian (language spoken in the northern part of the Netherlands), Turkish, Arabic and English (see also Table 1). Only 7 % of children did not have any siblings; 47 % had one sibling and 28 % had two siblings.

Procedure

The children in this study were participants of a randomized controlled study on bookreading. A total of 87 schools from rural as well as urban areas in the Netherlands participated in this study, of which 44 were randomized to the intervention. Schools were recruited via an email list for Dutch elementary schools. Parents at participating schools received a letter with information on the study and a request for their child to fill out the questionnaire. No identifying information on children was collected and children filled out the questionnaires anonymously. A total of 1464 children filled out the questionnaire. This questionnaire was part of the pretest of the intervention. We did collect information on the schools such number of children enrolled, SES of families, rural or urban area etc. However, this data was collected separately and therefore no connection could be made between the school and the child questionnaire. This was done at the request of the schools.

Table 1 Language spoken at home other than Dutch

Language	Percentage
Dialect	9 %
Frisian	2 %
Turkish	5 %
Arabic	3 %
English	5 %

Measures

The student questionnaire from the Progress in international reading literacy study (PIRLS 2006) (International Association for the Evaluation of Educational Achievement) was slightly adapted and used to assess preteens' reading attitudes and screen media use (the questionnaire can be requested from the first author). The questionnaire consisted of 35 questions. In addition to demographics (age, gender, country of origin, parents' country of origin), the questionnaire asked about screen media use such as Internet and TV, as well as time spent on reading. For example, children were asked to indicate how much time they spent on specific activities (5 or more hours; between 3–5 h; between 1–3 h; no more than 1 h; I don't spend any time on this), including watching television, video or movies, watching movies on the Internet, playing video or computer games, reading articles on the internet or reading books or magazines. We asked children how often they used the Internet for specific purposes such as looking up information for school. Answer responses ranged from daily, weekly, monthly to never. Since videogames are a popular type of entertainment, we asked children about the type of videogames they played, if they played videogames (these questions were not part of the original PIRLS questionnaire). We asked children about ten different types of videogames: (1) shooting games (e.g., Halo, Doom) (2) adventure or role playing games (e.g., Legend of Zelda) (3) strategy games (e.g., Command and Conquer or Civilization) (4) simulation games (e.g., SimCity) (5) puzzle games (e.g., Angry Birds, Tetris) (6) platform games (e.g., Mario, Rayman) (7) massively multiplayer games (MMO) (e.g., World of Warcraft) (8) sports games (e.g., Fifa, the Need for speed) (9) fighting games (e.g., Street Fighter) (10) party games (e.g. Crash, Boom, Bang). Children were also asked about literacy behaviors such as frequency of reading for pleasure and number of books in the home. Questionnaires were distributed to participating schools by mail and schools administered the questionnaires among fifth graders.

Table 2 Percentage of children who spent time during an average day on the following screen media

	Watching TV, movies, videos	Watching movies on the internet	Playing computer games	Reading stories on the internet
5 h or more	6 %	2 %	4 %	.2 %
3–5 h	12 %	4 %	9 %	1 %
1–3 h	44 %	19 %	29 %	7 %
<1 h	36 %	57 %	40 %	35 %
I do not spend time on this	2 %	17 %	18 %	55 %
Missing	1 %	1 %	1 %	1 %

Results

Almost all children (97 %) in this study had a computer, an iPad/tablet or laptop at home. Sixty-one percent of children had their own TV, 72 % had their own cellphone or smartphone, and 80 % had a video game console or gaming computer.

Table 2 shows how much time children spent each day on different screen media such as watching TV and playing videogames. The majority of children in this study were not heavy media users with almost half of the children watching between 1–3 h a day of TV, movies or videos and about 18 % spending 3 h or more on this activity. Watching movies on the internet was less popular, with more than half of the children (57 %) reporting to spend less than an hour on this activity and 17 % no time at all. About a third of children spent between 1–3 h playing computer games and 9 % even reported spending between 3–5 h daily. Reading stories on the Internet was not a popular activity: 35 % spent less than an hour each day and 55 % did not spend time on it at all. Forty-one percent of children reported using the computer daily for social media such as Facebook or chatting, while 25 % did this once or twice a week.

Differences in Screen Media Use by Child and Family Characteristics

We used χ^2 analyses to examine relationships between different demographic variables and screen media use among preteens. Based on these findings, we selected several predictor and outcome variables to run multiple regression analyses.

χ^2 results showed that boys spend significantly spend more time on screen media than girls (see Table 3). We also looked at differences in screen media use with regard to home language other than Dutch. Children who spoke another language than Dutch at home or spoke Dutch and another language spent more time watching TV, movies or videos and watching movies on the Internet (see Table 3). Speaking a different language at home did not have a

Table 3 Chi-square results screen media use and child and family characteristics

	Child gender	Speaking other language at home	Parent born outside Netherlands	Number of books in the home	Frequency of reading
	χ^2 (df)	χ^2 (df)	χ^2 (df)	χ^2 (df)	χ^2 (df)
Watching TV, movies or videos	5.79 (4)	17.56(4)**	30 (4)***	13.49 (4)***	11.22 (4)*
Watching movies on the internet	4.97 (4)	18.85*** (4)	41.54 (4)***	49.20 (4)***	26.19 (4)***
Playing computer games	108.95*** (4)	6.77 (4)	7.17 (4)	21.26 (4)***	23.73 (4)***
Playing videogames	218.04*** (4)	7.17 (4)	20 (4)***	24.01 (4)***	34.44 (4)***
Reading stories on the Internet	113.99*** (4)	1.89 (4)	17.15 (4)**	2.61 (4)	8.04 (4)
Playing shooting games	413.36*** (3)	8.86 (3)*	15.74 (3)***	21.8 (3)***	62.42 (3)***
Playing adventure and role games	66.18*** (3)	1.57 (3)	13.76 (3)**	1.65 (3)	1.04 (3)
Playing strategy games	133.41*** (3)	6.72 (3)	16.88 (3)***	4.28 (3)	9.70 (3)*
Playing simulation games	149.97*** (3)	5.59 (3)	1.72 (3)	1.77 (3)	10.06 (3)*
Playing puzzle games	133.78*** (3)	2.74 (3)	4.79 (3)	14.43 (3)***	42.89 (3)***
Playing platform games	2.14 (3)	2.76 (3)	9.03 (3)*	10.98 (3)*	31.92 (3)***
Playing MMO's	145.62*** (3)	8.40 (3)*	14.23 (3)**	3.12 (3)	3.03 (3)
Playing sports games	271.85*** (3)	4.58 (3)	19.72 (3)***	7.26 (3)	30.64 (3)***
Playing fighting games	262.30*** (3)	14.68 (3)**	36 (3)***	15.24 (3)***	28.46 (3)***
Playing party games	162.77*** (3)	3.04 (3)	3.28 (3)	12.22 (3)***	18.33 (3)***
Computer use at home	15.03*** (3)	2.05 (3)	2.06 (3)	1.46 (3)	5.74 (3)
Computer use at school	4.58 (3)	14.15 (3)**	19.20 (3)***	7.31 (3)	.41 (3)
Computer use somewhere else	35.93*** (3)	2.6 (3)	6.28 (3)	2.63 (3)	22.25 (3)***
Computer use looking up info for school	21.09*** (3)	3.65 (3)	21.54 (3)***	4.01 (3)	21.87 (3)***
Computer use looking up info on sport	86.35*** (3)	7.59 (3)	42.30 (3)***	11.11 (3)*	.80 (3)
Computer to download or listen to music	7.44 (3)	11.87 (3)**	19.53 (3)***	8.77 (3)*	1.98 (3)
Computer to look up information on hobbies	12.81*** (3)	9.99 (3)*	18.95 (3)***	7.45 (3)	10.84 (3)*
Computer use for social media	36.22*** (3)	14.58 (3)**	15.61 (3)***	16.14 (3)***	7.68 (3)
Own cell phone	8.80*** (2)	10.91 (2)**	31.46 (2)***	6.67 (2)*	14.17 (2)***
Own TV or stereo	10.41*** (1)	2.95 (1)*	8.56 (1)**	.62 (1)	15.79 (1)***
Own game computer	32.24 *** (1)	0.4 (1)	.00 (1)	.03 (1)*	17.31 (4)
Use cell phone for calling	7.21 (4)	27.02 (4)***	46.36 (4)***	12.48 (4)*	17.31 (4)**
Use phone for sending text messages	20.23*** (4)	30.93 (4)***	45.53 (4)***	24.46 (4)***	22.30 (4)***
Use phone to chat, email or social media	12.61*** (4)	22.86 (4)***	51.92 (4)***	39.69 (4)***	41.33 (4)***
Use phone to listen to music	8.42 (4)	36.03 (4)***	47.97 (4)***	37.47 (4)***	21.59 (4)***
Use phone to download music	11.65* (4)	43.87 (4)***	58.62 (4)***	40.61 (4)***	31.37 (4)***
Use phone to make movies	22.32*** (4)	32.26 (4)***	46.64 (4)***	17.15 (4)***	17.73 (4)**
Use phone to watch movies	9.87 (4)*	29.19 (4)***	42.40 (4)***	26.52 (4)***	36.79 (4)***
Use phone to look info on internet	8.64 (4)	29.06 (4)***	65.54 (4)***	22.62 (4)***	18.01 (4)***
Use phone to play games	15.02 (4)***	26.11 (4)***	38.54 (4)***	10.20 (4)*	21.79 (4)***

significant effect on playing computer games, except for fighting and MMO games. Furthermore, we examined whether having at least one parent born outside the Netherlands could impact screen media use. Children who had at least one parent born abroad were more likely to watch TV, movies or videos, to watch movies on the Internet or read stories on the Internet (see also Table 3).

When children had more books in the home (at least enough to fill one book case), they were less likely to watch TV, movies or videos (see Table 3). Reading for pleasure also affected screen media use: those children who enjoyed reading for pleasure spent less time watching television, films or videos than those reading less (a few times a month or less). Readers also spent less time playing computer

games, however, they did spend more time on reading articles on the internet (see Table 3).

Videogames

Table 4 shows the differences in the popularity between the different types of games: adventure/role playing games, platform games and party games were more popular than massively multiplayer games, fighting or shooting games. We also examined gender differences: girls were less likely to play any type of videogames, except for simulation, puzzle and party games which girls tended to spend more time on (see Table 3). Home language also played a role with certain games: adventure games, MMO's and shooting games, were more frequently played among those speaking another language at home or Dutch AND another language (bilingual children) (see Table 3). Children with at least one parent born abroad were more likely to play any type of video game except for simulation, puzzle and party games. Frequent readers did not spend as much time on shooting games as infrequent readers but more time on MMO's and party games. When children had more books in the home, they were less more likely to play puzzle, party and platform games and less likely to likely to play shooting games.

Computer Use

Table 5 demonstrates that three quarters of the children in this study used the computer at school on a regular basis and 92 % frequently used the computer at home. Computers were often used to download or listen to music or for social media. Boys used the computer significantly more at home than girls (see Table 3). Home language also played a significant role: those speaking another language than Dutch at home were less likely to use the computer at school, reading articles on the Internet, more likely to download or listen to music on the computer, find information on hobbies or other things, or use social media (see

Table 3). Those children whose parents were born abroad reported using the computer at school less frequently than those with parents born in the Netherlands, but they used the computer more frequently to read articles on the Internet, look something up for school, or look something up on sports, hobbies or other interests, to chat, use Facebook or other social media (see Table 3). Children with lots of books in the home spent more time reading articles on the Internet but spent less time looking up things on sport or using the computer for social media such as Facebook or for chatting or emailing (see Table 3). Children who read more tended to use the computer somewhere else (outside their home) less frequently but used the computer more often to look up things for school or for hobbies or other interests (see Table 3).

Ownership of Screen Media

Boys were more likely to have a gaming console and TV or stereo while girls were more likely to own a mobile phone (see Table 3). Children who spoke a language other than

Table 5 Frequency of using computer at different places and for different purposes

	Often	Never	Missing
At school	75 %	24 %	1 %
At home	92 %	8 %	0 %
Elsewhere	24 %	75 %	1 %
To look up information for school	40 %	60 %	0 %
To look up information on sports	23 %	76 %	1 %
To download or listen to music	59 %	40 %	1 %
To look up information on hobbies or other interests	31 %	68 %	2 %
Use for social media (e.g., Facebook, chatting)	66 %	33 %	1 %

Table 4 Frequency of type of videogames played

	Never or almost never	Often	Missing
Shooting games	69 %	22 %	9 %
Adventure/role playing games	71 %	20 %	10 %
Strategy games (e.g., command and conquer)	80 %	9 %	11 %
Simulation games	72 %	19 %	9 %
Puzzle games	81 %	8 %	10 %
Platform games (e.g., Mario, Rayman)	65 %	25 %	10 %
Massively multiplayer games (MMO)	80 %	10 %	10 %
Sports games (e.g., Fifa, the need for speed)	62 %	29 %	9 %
Fighting games (e.g., street fighter)	76 %	14 %	10 %
Party games	64 %	28 %	8 %

Dutch at home or who had a parent born abroad were less likely to have their own stereo or TV but more likely to have a mobile phone. Of all the children, only 4 % reported not having a computer, laptop or iPad at home and 72 % had their own cellphone or smartphone. When children had lots of books in the home, they were less likely to have a mobile phone, or a gaming console. Children with at least one parent born abroad or those who spoke a language other than Dutch at home were more likely to have a cell phone (see Table 4 and Table 5). Children who enjoyed reading were less likely to have a mobile phone, TV or stereo or gaming console.

Cell Phone Use

Of those children owning a cellphone, 17 % used it daily for calling and 24 % did so weekly. Cell phones were more frequently used for texting (24 % daily and 15 % weekly), social media (26 % daily and 11 % weekly) or listening to music (36 % daily and 16 % weekly), downloading music (18 % daily and 15 % weekly), taking pictures or making movies (20 % daily and 18 % weekly) or looking at pictures. Girls were more likely to use their cell phones for texting, social media, downloading music and making movies and boys for playing games. Language spoken at home did influence how children used their cell phone: Dutch-speaking children used their cell phone less frequently to chat or send text messages, for social media use, to listen to music, to download music, to make movies, to watch movies, to look up things on the Internet, or to play games than non-Dutch speaking children. Children who enjoyed reading or those who had lots of books in the home were less likely to use a mobile phone for all the identified different purposes.

What Predicts Screen Media Use?

Finally, we examined which child and family characteristics predicted different types of screen media use, using linear multiple regression models. We selected predictors based on the significant χ^2 results. The following variables were used as predictors in all of the regression models: (1) child gender (2) speaking another language at home (3) parent born abroad (4) frequency of reading (5) having many books in the home. Categorical variables were coded as dummy variables, so for example having at least one book case or more filled with books in the home was coded as having many books in the home. The same was done with frequency of reading: children who read at least daily or weekly were coded as frequent readers and reading monthly or fewer were coded as infrequent readers. We looked at whether these variables were able to predict time spent with different screen media including watching videos or TV,

watching movies on the Internet, playing computer games as well as playing different types of videogames. We ran a total of 15 regression models which are displayed in Table 6.

The results confirmed earlier χ^2 results demonstrating that child gender was a good predictor of different screen media use, in particular playing videogames (boys were heavier screen media users). Having a parent born abroad also significantly predicted screen media use. Children who had at least one parent born abroad were heavier screen media users. Regression results demonstrated that frequent readers and those who had more books in the home spent less time with screen media.

Discussion

In this study, we examined screen media use in Dutch preteens. Despite new technologies, ‘traditional’ screen media such as TV and videogames remain very popular. Children in our sample tended to watch less TV than children in the U.S.: in our sample, the vast majority (82 %) of Dutch children watched less than 3 h of TV a day, and one third of children watched less than 1 h a day compared to 2–4.5 h a day watching TV for American children (Rideout et al. 2010). Recent data found that Americans tend to be the most heavy screen media users in all western countries (Statista 2015).

Certain child and family characteristics are related to screen media use. Gender plays a role as boys are more likely to be heavy media users and tend to spend more time playing videogames. This is consistent with prior findings (Commonsense Media 2015). In our study 80 % of girls reported having access to a gaming console at home, compared to 87 % for boys. In addition, this sex difference in gaming is most prominent in children around the age of 12 (American Academy of Pediatrics 2011). There may be several explanations for this difference. First, boys may be attracted more to videogames than girls, as the games fulfill a need for action and competition that may be stronger in boys than in girls. Secondly, many videogames are aimed at boys’ interests. Videogames, especially with violent content, have been associated with violent behavior and decreased prosocial behavior, and causality has been implied (Anderson et al. 2010). Videogames can increase aggressive behaviors by means of, for example, increasing arousal and negative affect, and also by means of teaching/settling violent behavior patterns and knowledge structures in children’s brains (aggression related perceptual and social schemata) (Anderson et al. 2010). Thus, with boys spending more time playing videogames than girls, this may create or sustain differences in violent behavior patterns.

Table 6 Multiple regression results predicting screen media use

Outcome variable	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
B															
Predictors															
Gender (male = 1)	-.03	-.01	-.47***	-.71***	.05	1.04***	.40***	.49***	-.53***	-.33***	-.00	.49***	.91***	.73***	-.62***
Home Language (0 = Dutch)	-.10	-.09	-.00	-.03	-.11*	.08	-.06	-.02	.09	.00	.00	.02	.02	.09	.04
Parent born abroad	-.21**	-.18**	-.00	-.17*	-.29***	.15*	.20**	.20***	.05	.06	.20**	.19***	.25***	.28***	.14*
Frequency of reading	.25***	.21***	.17**	.22***	-.13**	-.23***	.05	.07	.02	.21***	.11*	.00	-.09	-.18***	.00
Lots of books in the home	.03	.21***	.15**	.12*	.01	-.11	.05	.11*	.05	.05	.17**	.10	-.00	-.06	.18**
R ²	.04	.05	.08	.16	.05	.29	.05	.11	.09	.02	.02	.10	.21	.19	.11

* = .05, ** = .01, *** = .001

Outcome variables

- 1: Hours watching TV, movies or videos
- 2: Hours watching movies on the Internet
- 3: Hours playing games on the computer
- 4: Hours spent playing video games
- 5: Hours spent reading articles on the Internet
- 6: Hours spent shooting games
- 7: Hours playing adventure or role games
- 8: Hours playing strategy games
- 9: Hours playing simulation games
- 10: Hours playing puzzle games
- 11: Hours playing platform games
- 12: Hours playing MMOs
- 13: Hours playing sports games
- 14: Hours playing fighting games
- 15: Hours playing party games

Having a parent born abroad was a significant predictor for engagement in screen media, and in particular with violent videogames in our study. U.S. data has shown that children from low-income families tend to spend more time on screen media (Commonsense Media 2015). A recent study on Dutch families showed that children of lower educated parents engaged more time with screen media than children of higher educated parents (Nikken and Schols 2015). Although having a parent born abroad is not an indicator for socioeconomic status or education, in the Netherlands many immigrant parents tend to be of lower socioeconomic background and lower educated (Hertog et al. 2014). In particular, non-western immigrants to the Netherlands (e.g., Turkey, Morocco), are significantly lower educated than the Dutch born population (Hertog et al. 2014). In the Netherlands, approximately 32 % of the population has a university degree compared to 21 % of the immigrant population (Hertog et al. 2014). Research has shown that in particular Moroccan youth in the Netherlands tend to focus on autonomy, material wealth, and defending yourself on the streets as a response to cultural changes within Dutch society (Butter no date). Engagement with more violent videogames might be part of this response and spending a lot of time with screen media and engagement with violent videogames might be more accepted in their families.

These results stress the importance to educate parents, in particular those born abroad and those of boys, on the importance of monitoring and managing their child's screen media behavior. It is well known that screen media can have negative effects on children's sleep (Magee et al. 2014), can cause attention problems (Rosen et al. 2014), increases the likelihood of being overweight or obese (Sission et al. 2010) and lowers academic involvement and performance (Gentile et al. 2011). Lemmens et al. (2011) reported that Dutch adolescents who spent much time playing violent games, displayed increased physical aggression. Therefore parents need to be informed about these risks and help prevent excessive screen media use. This is particularly important with preteens as almost three quarters in our study had access to a mobile phone and might be more engaged with screen media than is known to parents.

Children who had more books at home were lighter media users. Having many books (at least one book case full) in the home is a stronger predictor of children's later educational success than parental educational level (Evans et al. 2010). Even when children have only 20 books it increases their educational attainment (Evans et al. 2010). Having access to books facilitates reading for pleasure which in turn benefits children's reading attainment and writing ability, breadth of vocabulary, positive reading attitudes but also general knowledge, better understanding of other cultures, community participation and a greater

insight into human nature and decision making (Clark and Poulton 2011; Clark and Rumbold 2006). As found in other studies (Commonsense Media 2015), we also found that frequent readers tend to be lighter screen media users. Girls were also more likely to be engaged in reading than boys: in this study 44 % of the girls said they read for pleasure every day compared to 25 % of the boys.

Screen media might fulfill different purposes for those children who enjoy reading. In our study we found that when frequent readers engaged in screen media such as videogames, they had a preference for specific games: they preferred adventure/role playing games, simulation, puzzle, or party games over shooting or fighting games. These types of games possibly require different skills and might align more with their interests than fighting or shooting games.

Children with more books in the home made more use of social media. It is also possible that social media fulfills specific needs for children who enjoy reading, different from other types of screen media. Van den Beemt et al. (2011) reported that young people give meaning to interactive screen media in a diverging manner instead of as a homogeneous group (van den Beemt et al. 2011). Future research will have to examine the characteristics of social media users and investigate which children prefer which type of screen media. In a study conducted by Common Sense media American teenagers ages 13–17 said they using social media had a positive impact on their social and emotional lives (O'Keeffe, Clarke-Pearson, and Council on Communications and Media, 2011). However, most teenagers did prefer to communicate with their friends by talking to them face to face (O'Keeffe et al. 2011).

Finally, this study found that children who are heavy screen media users, tend to spend a lot of time on different types of media. For example, those children who spend several hours a day watching TV, also spend more time playing videogames. As screen media use has increased dramatically in the past decade, children spend more time on different types of screen media including mobile phones, tablets, and computers. In the U.S., children between 8–18 years spend an average of 7.5 h a day using screen media. Since they are often 'media multitasking', they actually spend a total of 10 h and 45 min a day according to the Kaiser Family Foundation study (Rideout et al. 2010). It is important to educate parents on how to implement rules around screen media use in order to avoid excessive use as this can have negative effects on child development.

Limitations

Data on time spent on different screen media was collected using global time estimates and no information is therefore available on average time spent on different screen media.

In addition to this global measurement of time, self-report data, especially from children, may be relatively inaccurate (Subrahmanyam 2001). We also did not collect information on family characteristics such as parental education and SES. However, future studies should take these into consideration to get a more complete picture of screen media use. We did not ask about the content of screen media use, except for videogames. However, this could help explain who uses what and why. The PIRLS does not include any questions on tablets or iPads and future studies should consider including this as well considering the fact that they are becoming more common.

Compliance with ethical standards

Conflict of interest The authors declare that they have no competing interests.

Informed consent Informed consent was obtained from all individual participants included in the study

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