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Sonia Livingstone, Jackie Marsh, Lydia Plowman, Svenja Ottovordemgentschenfelde and Ben Fletcher-Watson

Young children (0-8) and digital technology: a qualitative exploratory study - national report - UK

Report

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Young Children (0-8) and Digital technology

A qualitative exploratory study - National report - UK

Sonia Livingstone,# Jackie Marsh,* Lydia Plowman,^ Svenja Ottovordemgentschenfelde# and Ben Fletcher-Watson^

London School of Economics and Political Science
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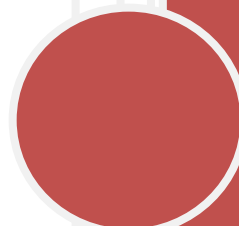# Department of Media and Communications, London School of Economics and Political Science

* School of Education, University of Sheffield

^ Moray House School of Education, University of Edinburgh

This is part of a seven-country European study available at
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Executive Summary

Ten families from London, Sheffield and Edinburgh with at least one child aged 6 to 7 were recruited to examine children's digital technology use, including engagement with tablets, computers, gaming consoles and other devices. Interviews took place in October 2014 and were transcribed and analysed according to an agreed coding protocol.

Key findings

- The young children led active, varied lives in which technology played an important part. Technology use was balanced with many other activities, including outdoor play and non-digital toys. Technology was embedded into daily life, with extended family members and networks outside the home playing a key role in socialisation and communication.

- Tablets had a growing popularity and importance in young children's digital lives, particularly for leisure. The touchscreen interface means that young children were able to access tablets more independently at an earlier age than technologies such as laptops. A primary use was playing games, displacing games consoles as the technology of choice. Gaming was often restricted to a narrow range of titles, played repetitively.

- Children used portable devices to watch films, videos and television programmes, including streaming, on-demand and catch-up services. There was evidence of cross-platform brand recognition, with linked games, films, websites and soundtracks often favoured by children (such as Disney or CBeebies products). The portability of devices has probably led to a decrease in the number of children with televisions in their bedrooms.

- Educational apps were not commonly used by children aged 6 – 7, especially compared with younger children. Digital educational engagement was generally restricted to information gathering using a laptop or computer, creative production (such as drawing apps), instructional online videos and factual programming (via YouTube clips). Where children used digital devices creatively to take photographs or generate video clips, parental mediation was still required to edit and complete the process.

- Parents tended to focus explicitly on deliberate uses of digital devices for learning or fun, but they recognised that these devices were also used to fill the gaps in daily life when parents were busy and children need to be occupied or entertained. Consequently much of young children's use of digital devices was individual in nature, even little noticed by parents. Meanwhile, shared family activities tended to centre on non-digital activities that signalled 'good parenting' (in the eyes of parents) or on traditional media uses such as family television viewing in the living room.

- Parental spending priorities tended not to include app purchasing, favouring instead free apps, physical toys, books and magazines. This may expose children to in-app purchasing and targeted advertising, which are less prevalent in paid-for digital products.

- Children accessed a limited number of websites, usually assisted or overseen by parents or older siblings. These included YouTube, Google, CBeebies and Wikipedia. Children tended to have little or no understanding of the scope of the online world or associated risks. They could be relatively skilled in navigating

some devices or apps but lacked skills in relation to others, and both their skills and limitations often went unrecognised by parents. Moreover, while children were often able independently to figure out how to navigate a device, app or game, we observed more diversified skills and knowledge in those families where parents or older siblings spent time with the younger child explaining or playing on a device.

- Parents' strategies for managing children's internet use were patchy, tending to rely on ad hoc observation or the need to intervene given children's lack of skill. Many parents believed that robust strategies did not need to be developed until children get older, despite evidence that, on the one hand, some children could bypass safety settings while, on the other, some children would welcome new ideas or further guidance about how to use the devices and apps available to them.
- Encountering violence and strong language were of greater concern to parents than sexual content or unwanted contact. Parents would welcome advice on fostering children's online safety. Advice from schools appeared to be limited, nor did there appear to be substantive communication between schools and families on issues relating to technology.

Recommendations

There was evidence of gaps in parental knowledge relating to online risks. This report therefore recommends:

1. Development and promotion of parental and carer education materials. These should encompass safety settings, passwords, privacy protection and content filters, and they should assist with the mediation of unsupervised internet access by young children. Guidelines should be evidence-based and created in collaboration with industry representatives.
2. Development and promotion of communication strategies outlining how parents can talk to young children about managing online risks.

There was evidence of reluctance on the part of parents fully to capitalise on the benefits of children's digital technology use. This report therefore recommends:

3. Development and promotion of information materials outlining the positive benefits of engagement with digital technology, with a focus on educational, creative, communication and social outcomes.
4. Encouragement for schools to take a more active role in promoting creative and educational uses of digital technologies as well as addressing safety matters at home with parents and carers.

Additionally, children aged from birth to eight are active citizens in the digital age, yet there still remained significant gaps in knowledge with regard to their access to and uses of technology. This report therefore recommends:

5. A scaling-up of this pilot project to include larger, more representative national samples across the EU. A larger scale project should address the widely differing experiences and practices of younger children living in diverse circumstances.
6. The development of ethnographic and participatory investigative methods to capture young children's own opinions and experiences in more detail, and allow children's voices and agency to inform the study and recommendations further.

Suggestions for further research

Future studies should consider the wider ecologies of children's digital use, including nursery and school settings and out-of-home engagement such as during car journeys.

Emergent technological trends, from 3D printing to the Internet of Things and Smart Homes, will have wide-ranging implications for children's digital practices, and should be addressed in future research projects. In particular, studies could focus on the ways in which digital technologies capture data about children's activities.

The study identified the need for further research on the most effective ways to develop parents' understanding and practices with regard to the development of their children's critical digital literacy. An intervention study is required which examines the effectiveness of family programmes in enhancing parental support of children's developing digital literacy skills. This should be complemented by an examination of the impact on family practices of online safety advice from educators.

The Digital Home

As UK homes acquire more digital technologies, and as those technologies become more portable and diverse, ever younger children are using the internet at home and school (Figure 1).
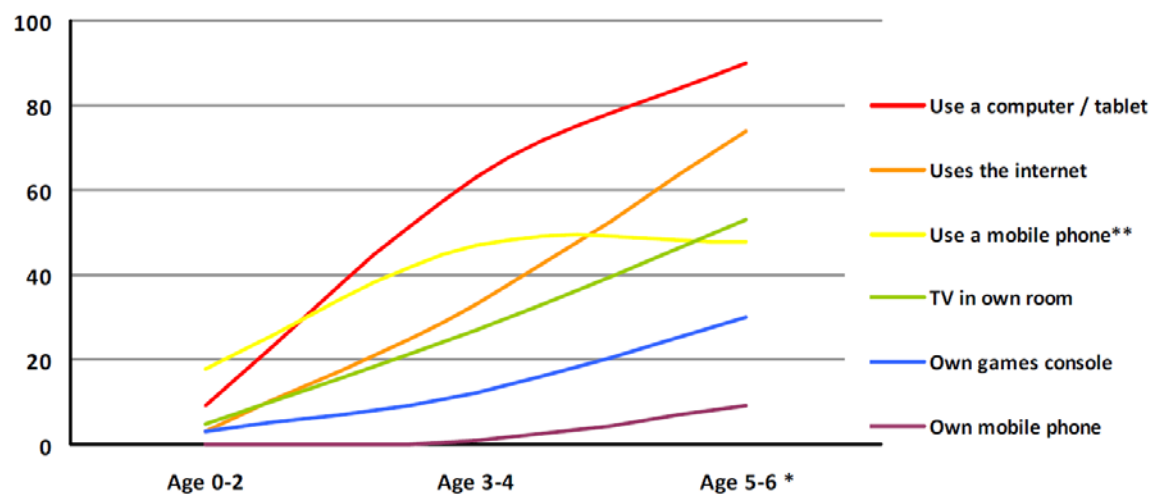
Base: All age 0-4 (200) * Data for 5-6 year olds from CHILDWISE Monitor 2013-14
** Mobile phone use, data for 5-6 year olds from CHILDWISE Monitor 2012-13

Yet research on very young children is sparse, with most knowledge to date focused on older children and teenagers (Olafsson et al., 2014). EU Kids Online's recent review of the available literature drew out some tentative findings (Green et al., 2013; see also Marsh 2005; Marsh, Hannon, Lewis and Ritchie, in press; Plowman & McPake, 2013; Plowman et al, 2012):

- Children engage in diverse activities online using a range of internet-connected devices;
- Online activities can stimulate imagination, fantasy, creativity and play;
- Up to a certain point, these help with learning, reading and navigating information;
- Many children use devices/contents not designed for their age group;

- Children's digital footprints often begin at birth, with unknown consequences;
- Younger children are more often upset about or vulnerable to risks of harm online;
- Children can be very trusting e.g. if invited to meet someone after playing a game.

But many questions remain unanswered about the physical, mental, emotional and social consequences (opportunities or risks) of internet/digital engagement for young children and their families.

This report presents the UK findings from an EC-funded seven-country collaboration designed to inform evidence-based policy development. It draws on findings from interviews and observations with ten families at home, each with a child aged six or seven, and often including younger siblings. Since it is a pilot study, we also reflect on the methodological challenges of working with this age group. The children were just starting Year 2 (in the English system), where curriculum expectations (by end of Year 1) are that pupils:

- Explore information from various sources, showing they know that it exists in different forms;
- Present and share ideas using text, images and sounds;
- Recognise that everyday devices respond to signals and make simple choices when using devices.

Research questions

1. How do children under the age of eight engage with new (online) technologies?
2. How are new (online) technologies perceived by the different family members?
3. What role do these technologies play in children's lives and in the family?
4. How do parents manage their young children's use of technologies?

The National Contexts

England

Since September 2010, all 3 and 4 year-olds in England are entitled to 15 hours a week of free preschool education for 38 weeks a year. Children attend a range of settings including nursery classes in primary schools, state-funded nursery schools private nurseries, voluntary preschool groups and childminders. The Early Years Foundation Stage is the regulatory and quality framework for all early years' settings offering provision for children from birth to age 5. Whilst 5 is the statutory school starting age in England, in practice many children start school when they are 4. [1] On completion of the Foundation Stage, at age 5, children undergo an assessment, the 'Early Years Foundation Stage Profile', which assesses the level of achievement across 17

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[1] In 2011, the government made it possible for all children in England to start school from the first September after her/ his fourth birthday, or take up a free full-time Nursery place instead until the child turns 5. Doing the latter means that parents whose child turns 5 in late spring or summer risk not finding a place in Reception/ Foundation Stage 2 (those terms used interchangeably for the first school class) when their child does turn 5 and the child therefore has to go straight into Year 1 from Nursery the September after they turn 5. In order to avoid that happening, the majority of parents place their child in full-time schooling from the first September after their fourth birthday.

early learning goals, the national outcomes of which are published annually.[2] If children attend state-funded schools, they are subject to the national curriculum, revised in 2014 to focus on a more narrowly-defined set of skills than was the case in the previous curriculum. Testing is recurrent throughout primary school. Children undergo a phonics screening test in Year 1, the outcomes of which are published nationally, and they take part in end of Key Stage 1 assessments at age 7.[3]

Scotland

Most children in preschool education in Scotland are three or four years old, with 96% of four-year-old children in part-time provision funded by the government and provided by the public, private, or voluntary sectors. Children typically spend most of the time in their preschool setting choosing freely from a range of activities provided by the educators. Play, alone or with others, is considered to be an important medium for learning. Primary schooling is organised as a separate level of education over seven years from age 5 to 12. The end of compulsory education is age 16, although secondary education can extend to age 18. Funding is the responsibility of local government councils, which receive government funding and local tax revenues, and make their own decisions about the proportion to spend on education.

The Curriculum for Excellence guides teaching and learning in Scotland for children and young people aged 3 to 18. This gives teachers some autonomy in deciding how to develop children's capacities as successful learners, confident individuals, responsible citizens and effective contributors. The Early Level encompasses children three to six years old and bridges the transition to primary school.

The Families

Family 1

London, UK

Family members

- Father, 51, high digital user (UK1f)
- Mother, 41, high digital user (UK1m)
- Boy, 8, unknown digital usage (UK1b8)
- Boy, 6, high digital user (UK1b6)
- Boy, 3, low digital user (UK1b3)

Narrative

The family lived in the suburbs of London in a small upstairs flat off a main road. The three

This artistic family treats digital activities as more individual in nature, though they also share offline creative activities together.

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[2] This is to be replaced by a baseline assessment from S... undertake when they enter a Reception class, and will f... From Reception classes, children move through Years 1...
[3] From 2016, children of this age will undergo an Englis... which will be published nationally and will enable comp... already occurs at the end of primary school, when child... of which are published school by school and used to dev...

boys shared one room; their grown-up half-sister did not live with them. Both parents completed college and used to be professional artists. They were a single income family, the mother stayed at home with the children and the father worked as a paramedic. The parents' artistic background showed in their living environment. The flat was filled with big boxes of art supplies and craft materials, books, children's games and many DVDs. The family possessed cultural capital, but not economic capital. The family owned five computers or laptops, an iPad, professional photographic equipment, a hand-me-down Nintendo in the children's bedroom, a TV and both parents had smartphones (which UK1b6 is not aware of). Yet the father said he had been 'dragged kicking and screaming into the digital age' and that he just 'learns on the hoof'. The mother had established a calm domestic routine; she particularly valued the internet for researching upcoming creative and craft events to take the family to.

Most of the children's interview was conducted with UK1b6.. In terms of devices, UK1b6 enjoyed playing with the iPad the most, followed by the Nintendo. He presented himself as very invested in technology. He showed great interest in a number of games and could provide detailed descriptions of the games' functionality and depth. His memory and knowledge hinted at a lot of experience in playing these games. The father had taught UK1b6 how to google Children's BBC (CBBC) to find games to play. On the day of the interview, he had just learned a *Scooby Doo* game and was already able to talk about it knowledgeably: "you go on Google, and then you take away the Google. You type in Google, and then you just get it all out, and then you type in CBBC games... I normally do it on computer because then... you get more games, because on iPad you only get ten games." While the two older children had learned to google CBBC, they did not yet realize that the whole world is online. For example, UK1b6 had recently discovered the possibility of online shopping when he watched his mother complete a purchase.

UK1b6 was confident (at school, "I already know how to do all the games") and had a narrative of how games change and develop over time, although his understanding and skills had limits. He saw technology at school as uncertain in its purpose and sometimes it breaks. When on the tablet, UK1b6 got impatient at a game's loading time and tried to swipe the tablet to speed it up – a misunderstanding.

The two older boys both liked playing with the Nintendo, even though they often played separately. They took turns and the older one took precedence; the same happened with the tablet. While there were only a few games the brothers play together, they did play with friends. There was no indication of competitive game play, but the boys fought over use of the technologies at home. UK1b3 found the Nintendo more interesting than the iPad and attempted to join in. UK1b6 gave him a non-functional remote control to occupy him and the little brother thought he was playing along. As his parents said, UK1b3 liked to join in everything he can.

The mother researched software for the children, favouring aesthetically creative or alternative games (e.g. *Monument Valley*, *Machinarium*). She had downloaded and registered the older boys for a learning game, *Komodo*. UK1b6 said that it is not really a game and he struggles with the learning software. UK1b6 and his parents both also mentioned *Monument Valley*, while only the parents referred to *Minecraft* or *Machinarium*. Overall, the parents supported arty or aesthetic games and did not like violent games; UK1b6 appeared to feel the opposite. They disagreed about zombies and other scary characters (e.g. Slenderman), the father saw this as central to narrative, the mother was worried the children will have nightmares. UK1b6 didn't indicate any concerns about unsafe, scary or dangerous content.

If he had to choose, UK1b6 preferred to do offline activities and crafts over digital games both at home and when visiting his grandparents. He hinted that these activities allow

him to be more in control whereas a digital game dictates what he does. While UK1b6 was playing games on the iPad, his little brother didn't look at the screen or want to join in especially. He (UK1b3) had one game on the tablet which the mother had shown him. He didn't play it properly yet, but he enjoyed it.

The parents had introduced rules for technology use. The boys were only allowed to play the Nintendo on the weekends and with the iPad on Fridays and weekends. The mother thought this was now taking up too much time: "that's their thing for the weekend which we've got to try and stop a bit." Despite this concern, UK1b6 sometimes appeared to play before school. The children were obedient, orderly, calm and attentive, unless absorbed into a game. When digital devices evoked conflicts, the father was the one who got angry. Digital activities in this family were considered more individual and tended to be undertaken separately, while family activities were largely non-digital (e.g. board games, parks, activities in public museums, galleries, etc.). The parents chose and set up the media and its content for their children. They saw it as imaginative and entertaining. Yet, there was little convergence between online and offline play, e.g. Lego was a physical game, not also a website; *Scooby Doo* seemed a CBBC game, but perhaps not a TV show.

Family 2

London, UK

Family members

- Father, 39, high digital user (UK2f)
- Mother, 40, medium digital user (UK2m)
- Girl, 6, medium digital user (UK2g6)
- Boy, 5, medium digital user (UK2b5)

Narrative

The family lived in a small flat on a main road in the suburbs of London. It was rather sparse in décor, with few home comforts visible. They were a single income family.

Both parents had completed college degrees. The father worked in academia and while the mother had previously worked in higher education, she currently stayed at home with the children. The family was very lively and talkative; especially the younger child appeared restless and agitated. UK2b5 and UK2g6 each had a Nintendo DS and a LeapPad (of which one was broken), as well as a toy smartphone to share. The children's LeapPad was a learning technology similar to a tablet. However, since the children got their Nintendos, they hadn't used it much. In fact, it was out of battery when we asked them to show us what they could do with it.

Devices were separated between children and parents. The father had a smartphone and each parent had their own laptop; there was no tablet at home. However, the father enjoyed playing Nintendo with the children and the son talked of playing *Angry Birds* on his father's iPhone (something the father did not divulge). While the mother hated the *Super Mario* game (the music irritated her especially), she approved of a pink *Ponyclub*

> Competing with each other on the Nintendo is continually absorbing for the children in this home.

game and believed that caring for a 'living creature' taught her daughter good values ("the more you nurse it, you win prizes and the more you work in the stable, you earn money, and then you can buy things. So I actually really approve of that game, I really like it"). Indeed, she was very conscious of the values she sought to instil in her children, perhaps because they were a church-going family; she also judged other parents and feared being judged as a parent herself. One suspected that, although she was unusually explicit, these fears lurked in the minds of many parents:

> "I don't want to be judged as a mother who doesn't take the time to do art and craft, to sit down and read, to go on nature walks, to you know, so I'm very careful about, that's why I say, I'm careful about how long they can go on the computer for. I don't want to be told that, you know, because some people do judge parents."

Upon our arrival, both children sat on the couch with their handheld Nintendos. The children's favourite game is was *Super Mario* and they played non-stop during our visit. They tended to play sitting next to each other, each on their own device and occasionally watching each other's progress. They competed in terms of how well they performed in a game and which games their parents purchased for them. UK2g6 was older and therefore the boss. Despite the family's clear separation of what's mine and what's yours, the girl was very keen on teaching us how to play *Super Mario* and gladly shared her device. The younger brother was absorbed into the game and he was clear about how it worked: "He's [Mario] a goodie, because he tries to save the princess and you see the princess on World Eight, and when you finish – when you finish all of the levels, you get to see the princess again. But when you've finished all of the levels, then you can actually – you meet Luigi."

According to UK2g6, the parents used their laptops daily. She said that she used to be allowed on the mother's computer, but it crashed and that privilege had now been withdrawn (the mother also told this story, as well as a story of her daughter accidentally turning on the webcam, leading the mother to stop the children using the laptop themselves). The children didn't understand what the internet is; they thought it is a computer. They had no perception of what "going online" meant. The mother said the laptop was used for work (though she did not work) and for researching how to parent, e.g. places to go, things to do, etc. She kept the laptop hidden so as not to bring work into the living space. The mother further explained that she played a reading game with UK2g6 on the laptop and showed both children how to google and find out things: "I use the laptop a lot for the kids; they don't use it, but like I'll sit there and I'll go on YouTube, if they've got homework. Like they had to listen to something about Strauss, the composer, and I got it up on YouTube and then they will sit there and listen to it, and I keep finding things on YouTube for them that are educational." Nonetheless, when asked, the children said it was their father who had taught them how to use the various technologies.

The children were not aware of any rules that restrict their usage of technologies. They were allowed to play until the mother interferes. When this was the case, the children say it was because she was worried about their eyesight, which indeed she was (and about their tripping over wires or having music too loud on headphones). The mother presented a somewhat different account, saying that the children were only allowed to play on the weekends, occasionally a few minutes before school and in situations when a time-filler was needed, such as in the supermarket queue or on long train rides. She also said her son "becomes grumpy and becomes isolated" if he played too much. But she also acknowledged that unless she had "actually set up an art and craft activity for them" then they were likely to play Nintendo.

Overall, the family was digitally limited. The mother was very anxious about safety and violence. She kept a close eye on the children, while the father seemed less concerned. When playing the card game, the children did not recognize some of the devices. In contrast to other families, the children were not interested in a tablet and they instead wanted more games for their Nintendos. There seemed little else to do at home though we saw a few signs of children's activities such as toys, books or art materials.

Family 3

London, UK

Family members

- Father, 51, high digital user (UK3f)
- Mother, 47, high digital user (UK3m)
- Boy, 16, high digital user (UK3b16)
- Boy, 13, high digital user (UK3b13)
- Girl, 6, high digital user (UK3g6)

Narrative

The family lived in a middle class neighbourhood and they were home owners. They were a double income family and both parents had completed college. The father used to work as a band manager in the music business and was now a web designer. Formerly a TV producer, the mother now ran her own small business as a child minder. The father occasionally helped with the family business. There was a considerable amount of technological expertise in the family as well as

A digitally confident family with a very skilled six-year-old girl, though digital activities have not displaced traditional play.

a diverse range of devices, although the father described himself as self-taught. The family owned four computers / laptops, both older brothers and parents each had a smartphone, the boys shared an Xbox, the father had an iPad (widely shared within the family) and there were several devices for listening to music, e.g. an iPad and docking station with speakers, stereo set, CD players, etc. The family's home featured plenty of craftwork, homemade decorations and art material. UK3g6 enjoyed creative activities, as was evident from the homemade art work in her bedroom. There was no technology in her room except a pink children's radio / CD player. She also had a Barbie computer which broke.

UK3g6 loved playing with the iPad – as her parents said proudly, she picked it up really quickly and was soon "zooming around on it". Her favourite games were dress up games which UK3b13 downloaded for her. One of them was in Chinese, but she navigated it based on visual recognition of the icons. She also understood change in technology and spoke of an older version of the game that had recently been updated. Another game worked with the iPad's camera. She was able to use it to take selfies (which requires her to flip the camera) and she could show us where the images are stored on the device and how to access them ("I have this crazy hair app... you take pictures of your face ... and then you can change the top and also you can take pictures as well, and you dress up

people crazily and you do their hair; you can spray paint it any colour you really like".) UK3g6 and UK3b13 had 17 different games on the father's iPad and shared one folder in which all of them were organized. She occasionally played her older brother's games, but did find some of them a bit scary. Sharing the iPad among the children led to conflicts, especially between UK3g6 and UK3b13. The father resolved these by banning the iPad for a day, but the mother worried that technology use is "getting out of control."

UK3g6's other favourite activity on the iPad was watching YouTube videos of princesses, dress up and dolls. UK3g6 also watched Play-Doh videos on YouTube and then made her own Play-Doh creations. She readily identified the app icon, knew how to open it and type in search commands. She explained that she used her finger to select the video she wanted to watch, "just like the mouse on a computer". She realized that some of the videos she watched were uploaded by amateurs. The mother sometimes also turned on the computer for UK3g6 to use it to watch YouTube, but for no other online activities. UK3g6 also enjoyed watching the BBC iPlayer (mostly together with her parents) and playing *Paper Toss* on both the iPad and smartphone. She occasionally used a computer at school and also watched her mother shop online on eBay.

As a child minder, the mother implemented the early years' curriculum from age two for the children she cared for, including teaching children to use the computer and mouse. However, the father and UK3b13 played the most active part in educating UK3g6 about technology. UK3g6 possessed a higher degree of digital literacy than any of the other children in London-based families. For most activities on the iPad, she used appropriate technical language (e.g. the "home screen" on the iPad, "apps", the motion of "swiping", etc.), competently and confidently explained how she navigated the device and could identify various components of apps and how they were organised on the device.

UK3g6 used the iPad on most days of the week. She was not aware of any rules that restricted her usage, except that she was not allowed to use it near bed time. According to her parents, she was only allowed to use it on Fridays and Saturday nights, but throughout the interview they fell into a narrative of their daughter engaging with digital devices on a daily on-and-off basis (and they were glad she uses it in the mornings to occupy herself if she woke earlier than they do). UK3g6 enjoyed the iPad most; she was also very keen on playing with Barbies and PlayMobil. She implied that digital games were structured, while these toys were more open to any form of creative and imaginative game.

Over the course of the interview, it emerged that the parents aimed to introduce cognitive uses of digital devices early but to delay social uses as long as possible; as the mother said, "my biggest fear is that it will take over her everyday living in the sense that her social skills will drop back." However, the parents had different approaches to technology. The father was very enthusiastic about its potential, but was also aware of issues of freedom – for instance, he had taught his 16-year old son how to use the dark net to avoid surveillance. The mother had a lot of anxieties, worries and the desire to control the children's technology use. Overall, this family took an individualistic approach to technology use: while for UK3g6 digital devices were shared in the family, for other family members they were personal possessions and activities. When we asked UK3g6, "is there an activity, maybe on the iPad or on the computer or maybe on the telly that you do together as a family?" her answer was prompt: "Not really, I don't think."

Family 4

London, UK

Family members

- Father, 40's, medium digital user (UK4f)
- Mother, 40s, high digital user (UK4m)
- Boy, 6, high digital user (UK4b6)

These parents overestimate their son's digital skills, while he is mainly keen on FIFA games online to fill up his spare time.

Narrative

The family rented a small, relatively impoverished flat in a middle-class suburb. Their income was above the median but they were clearly not very well off. Both parents were university educated. The mother was from Latin America and worked as a secretary; the father was Polish and was employed as a chef. They worked shifts so as to be there for UK4b6. They were very conscious that neither as British nor a native speaker, and so they had moved to this comfortable community location to give their son a place to belong. They spoke English at home. The flat was cramped and fairly dominated by the son's toys.

The mother was very talkative, so the father struggled to get a word in. She was keen to tell us how much they wanted to discuss digital matters with us, and that this interview was something they have been preparing for and wanted to build on later in reflecting together on how they managed their son's digital opportunities. The mother emphasized her liberal approach to technology, but in fact she communicated a lot of anxiety. The father was indeed concerned about what risks their son might encounter online, thus he used his technical knowledge to research filters and safety tools, and had recently created passwords for the family laptop so that each family member had a separate login (though he did not apply any filters; rather, the son's activities were automatically reported to the parents' joint email account).

The family had a television with Sky TV, one laptop, a Wii, and each family member had a smartphone, although the son's was contested between the parents (his mother gave him her old smartphone and the father was upset about this). UK4b6 loved playing with the Wii. He had seven games; his least favourite was a Lego game and he liked the FIFA football games best – he played the newest *FIFA 2014* game on his smartphone. He had his own passworded account on the family laptop and used it to play CBeebies games. He enjoyed a game called *Treasure Hunt*, but didn't care about any of the other games in particular – though for a while he played *Happy Wheels* till his parents saw it and banned it for its gory violence. He played with the phone and Wii every day and watched cartoons or children's programmes that he had recorded from the TV every night. Although the families of both parents were abroad, Skype wasn't really used – partly because the father didn't like it, partly because the son didn't really speak the language of his relatives on either side.

The parents told us that they were proud of their son's digital competence and emphasized how he could start, search, and select what he wanted to do on the Wii, YouTube, television and recorder. While we observed that UK4b6 was indeed able to independently open and start games on the Wii, laptop and phone, he struggled with

most other digital activities. He had trouble explaining the technical navigation of a game or device without actually being on it. He followed visual markers as they came up, unaware of what the next step or screen would look like or require him to do. When we asked UK4b6 to show us what he could do on the laptop, Google Search was open. He didn't know what it was and when we told him, he said he had never heard of it. He also didn't know what the internet was or a web page. This observation clashed with the mother's narrative of her son's advanced digital skills. According to her, he even converged technology, e.g. when he watched a television programme that he himself had recorded, and then searched for more info on a particular element he liked (e.g. a band, character, etc.) on the laptop via YouTube or Google.

Contrary to the other London-based children, UK4b6 expressed little understanding of improvement in skills over time. His engagement appeared highly reward-driven – if something took longer or didn't tell him he did well (e.g. scoring goals in *FIFA*), he visibly got bored within a matter of minutes and dropped the activity. He also could not articulate how playing football either on a device such as the Wii or a smartphone and with friends outside in the park were different activities. Despite being keen on football, playing the *FIFA* game didn't make him want to go outside and play himself, although he would kick a ball around with the neighbouring children outside. By contrast with children in some of the other families, UK4b6 appeared to lack the curiosity to want to understand technology or wonder about how it works.

Similarly to the other London families, digital activities tended not to be shared experiences as a family and if they are shared, the father seemed to be more involved. UK4f occasionally played with the son on the Wii, but engaging with technology mostly happened on an individual basis. Despite the mother's strong and opinionated presence during the interview, she was almost absent from UK4b6's narrative about his digital world.

The parents didn't watch their son play, and nor did UK4b6 watch them on the laptop and was unaware of what they use it for. Overall, the parents talked down the amount of their son's device use, but as with the other families the devices were commonly used in practice to fill gaps in the day, to deal with domestic difficulties or when the parents needed a moment to themselves. The parents planned to spend the incentive we had given them for their participation on getting a tablet. The son said if he could choose one thing he really wanted his parents to buy for him, it would be another football game for the Wii.

Family 5

Sheffield, UK

Family members

- Mother, 40s, low digital user (UK5m)
- Boy, 12, medium digital user (UK5b12)
- Girl, 10, medium digital user (UK5g10)
- Girl, 6, low digital user (UK5gi6)
- Girl, 6, low digital user (UK5gii6)

Narrative

This single parent family consisted of a mother and her four children, including twin 6-year-old girls, who all lived in a Victorian terrace. The father lived nearby following the parents' divorce and the children spent one night a week and alternate weekends at their father's house. Household income was around the national median. The mother was university educated and described the family as White British. She volunteered at a special needs school one or two days a week. The mother planed an active week for the children, taking them to swimming and gymnastics and ensuring they went out for regular walks at weekends. The family loved baking together. The mother allowed the twins to use the iPad as a treat if they had finished their tasks towards the end of the week and at weekends. The family went to the cinema more regularly now that the twins were older and they tended to watch family comedies and Disney films. There was a television, a DVD player, two smartphones (UK5m's and UK5b12's), one laptop, one X-Box, three CD Players, an MP3 player, a Nintendo DS, a radio and an iPad in the home.

> The 6 year-old twin girls play *Minecraft* with their older brother and sister, the four of them playing the game together as they watch and advise each other.

The mother did not want technology to dominate the children's lives and she regulated its use by all the children, allowing the older two to use technology more frequently than the twins. The nursery they attended enabled the children to use computers from an early age, but the mother described the twins as not being very interested in their use at that stage. Now she estimated their technology use at an hour a day during the week and two to three hours a day at the weekend.

The children's interview was conducted primarily with the twin girls, UK5gi6 and UK5gii6. They were very close and sometimes completed each other's sentences. UK5fi6 was more confident than UK5gii6 and occasionally answered on behalf of her sister. The girls used to enjoy playing the free games website *friv.co.uk* on the family laptop, but since the mother bought an iPad, they have primarily used that and have lost interest in *FRIV*. As all of the family used the iPad, time on it is strictly limited. The children used a timer and allowed each other to play on the iPad for approximately ten minutes each at any one time. The twins played a number of games on the iPad but spent most of their time playing either a *Frozen* game or *Minecraft*. The mother described *Minecraft* as being like a modern board game as all four children played it together, with those not in control of the iPad watching and advising the person playing the game. UK5gi6 and UK5gii6 were confident in using the *Frozen* game and *Minecraft* independently, demonstrating an ability to control the iPad and navigate key aspects of the games. UK5gi6 and UK5gii6 liked to play games on the mother's smartphone, but they particularly liked making videos of themselves role-playing and dancing using the video camera.

The older brother played a FIFA game on his X-box in the cellar and the twins rarely played on this, enjoying games such as skiing when their older sister played with them but when she moved off Xbox play, they also lost interest. The twins loved to listen to their older sister's musical choices on Spotify, dancing along to the tunes. UK5gi6 and UK5gii6 liked to listen to the *Frozen* soundtrack on a CD player they had in their bedroom and also enjoyed Capital Radio, which the mother played in the car.

UK5gi6 and UK5gii6 watched more television when staying at their father's house than they did when at the mother's house. The main technology use at the father's house was

television and the use of his smartphone to play games. The twins watched television both together and with the whole family. UK5gi6 and UK5gii6 were influenced by their older siblings' choices when watching television, so they watched *Wolfblood* with them (a fantasy/supernatural series aimed at teenagers) and *Tracey Beaker*. The twins watched the two main UK children's television channels, CBBC and Milkshake together, but they also enjoyed viewing programmes that they used to watch regularly on CBeebies (a preschool television channel). The whole family enjoyed viewing family-oriented programmes together, such as *Strictly Come Dancing* and *British Bake-off,* but the mother stated that they didn't like 'reality television' programmes such as *X-Factor*.

The mother had conducted online searches with UK5gi6 and UK5gii6 as part of a homework task on explorers, but she found it frustrating, as it was difficult to find information pitched at their age group. She was concerned about the children finding inappropriate content online and also about them accessing information that was incorrect, feeling that information found in an encyclopaedia or a book was more reliable. She did use a password on her smartphone and iPad (although not successfully, as the children knew the password) and had been shown how to place a firewall on her phone during a school session for parents, but she was not aware how to manage safety systems otherwise and would value gaining this knowledge.

Technology played only one part in what is a rich and stimulating play life for the twins. UK5gi6 and UK5gii6 loved to role-play. For example, they take on the characters in *Frozen*, re-enacting the scenes and singing the songs, and they also liked to play school, with their older sister taking on the role of the teacher. The twins also enjoyed writing in journals and drawing and painting. They didn't play with toys as much as their mother would like them to do, but they did play with a farm set and Playmobil. Reading was a favourite activity, with over 100 children's books in the house.

Family 6

Sheffield, UK

Family members

- Mother, 30s, high digital user (UK6m)
- Step-father, 40s, high digital user (UK6f)
- Boy, 16, high digital user (UK6b16)
- Girl, 6, high digital user (UK6g6)
- Girl, 5, high digital user (UK6g5)

Narrative

The family lived in a semi-detached house and had a household income that was just above the median. The mother worked shifts as a carer for people with alcohol and mental health problems. She had recently completed a degree in social care. The step-father had been educated to college level and was self-employed as a painter and decorator. The mother described the family's ethnicity as Afro-

This family enjoys using a range of technologies, both separately and together, with Facebook being a source of interaction around news and photographs.

Caribbean. The house was focused on the children's interests, with a cat and two rabbits having the run of the garden. The family liked to have movie nights together, where they watched films chosen by the youngest girls. They also liked to eat together at local restaurants. The children had an active life, going swimming and playing with friends, visiting grandmother and occasionally staying at their father's house. There were four televisions, a DVD player, three smartphones (the mother's, step-father's and UK6b16's), one computer, a laptop, an X-Box, Wii and Sony Playstation2, a CD Player and a radio in the home.

UK6g6 and UK6g5 used a range of technologies over the week. The mother found it hard to estimate the amount of time spent on various technologies over a week, as it differed so much, but the descriptions of use suggested that the girls used technology for more than an average amount of time. They enjoyed television, watching programmes about witches aimed at teenagers, and also liked films, particularly Disney princess films, including *Frozen,* which they have watched repeatedly. The family recently got Netflix and so the children enjoyed watching films on that. UK6g6 also used catch-up services if she missed films and programmes that she had wanted to see.

UK6g6 could use the mother's smartphone for hours at a time. She downloaded free apps and liked to play games, her favourite current game being *Temple Run*. She liked to listen to music on the phone and has downloaded her own songs, with R&B being popular along with the *Frozen* hits. There was music playing in the house all day, as all the family enjoy music.

UK6g6 liked to watch her favourite singers on YouTube. UK6g6 enjoyed taking photographs of various things, people and artefacts using her mother's smartphone, and then sent some of them to her mother's friends. She has even taken one of her mother asleep and sent it on to friends. UK6g6 and UK6g5 made lots of films on their mother's smartphone of their role-play, and they interviewed each other in role as fantasy characters, such as witches.

UK6g6 used the family laptop early in the morning, before everyone else got up. She sat on the mother's bed sometimes as she used it, downloading and playing games, but also writing stories. The mother tried to play educational games with UK6g6, but suggested that she got bored with those and moved on to more entertainment-focused uses of the laptop. UK6g6 spent a lot of time looking at her brother's Facebook page, with him guiding her. The mother also shared information about what friends and family are doing on Facebook. The girls liked to find photographs of themselves on Facebook.

UK6b16 played videogames such as *Call of Duty* and UK6g6 played with him. However, the mother said that UK6g6 didn't stay on the game very long as it was not appropriate for her. She would pick a character and gun, but then exit the game before any violence occurs. Similarly, she played a car-racing video game, but spent most of her time choosing and designing a car.

UK6g6 owned a range of toys and artefacts that related to her online interests. For example, she liked to watch *Winx*, an American television programme about fairies, and played online games and owns toys related to it. The mother stated that UK6g6 asked for toys that she has seen advertised on television and so she has ended up with five toy laptops. Two of these were displayed on the visit and UK6g6 and her sister used them to play phonics and number games.

Although UK6g6 spent a lot of time using technology, she also had a range of other interests. She enjoyed reading, but found reading difficult and relied on memory to retell stories. UK6g6 liked to play with her friends in the street and she enjoyed gardening. The mother did not have significant concerns about online play, as she said UK6g6

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always called her if she came across something she did not understand or did not like and indeed she said that she was more concerned about UK6g6's safety when playing out than when online. She had set parental controls on her phone so that YouTube, for example, could not show inappropriate content. The mother's main concern was about ensuring that too much time was not spent with technology, but she suggested UK6g6 had a balanced life.

Family 7

Sheffield, UK

Family members

- Father, 40s, low digital user (UK7f)
- Mother, 40s, low digital user (UK7m)
- Girl, 7, low/ medium digital user (UK7g7)
- Girl, 4, low/ medium digital user (UK7g4)

Narrative

The family lived in a detached house and had a household income that as above the median, but not high. The mother worked part-time as a psychotherapist and the father worked part-time delivering organic fruit and vegetables. The father used to work in land development in London but tired of the lack of ethics in the field and so moved north to take up a part-time job and lead a less pressurised life. He felt that the new way of life suits the family better. The father described the family's ethnicity as White British. The mother did not participate in the interview and the father described her as not being very interested in technology. He was the one who oversaw the children's media use. The father described the children as 'outdoorsy kids' and stated that technology was not widely used in the family. The family enjoyed walking in the countryside, visiting grandparents who lived in the city and visiting the local farmer's market and parks. The family owned a television, a DVD player, two smartphones (the mother's and father's), one computer and two laptops, a Playstation, a CD player, MP3 player and an iPad Mini.

> This family enjoys both individual and collaborative uses of technologies, such as communicating with distant family members using Skype and Facetime.

The family enjoyed watching films together and preferred high quality, independent children's films, such as *The Fox and the Child*. The father suggested that the children did enjoy popular films, such as *Monsters Inc* and *Frozen,* but they moved on to new interests regularly. UK7g7's favourite activity was reading books, which she would do until midnight if her parents didn't make her turn off her light. UK7g7 and UK7g4 watched television together, enjoying CBeebies and CBBC, public broadcasting channels. They also enjoyed watching nature programmes, comedy programmes and family programmes such as *Strictly Come Dancing* with their parents.

The family had an iPad Mini, which UK7g7 and her sister enjoyed using. The girls played games on it, such as *Angry Birds*, *Monsters Run* and *R C Plane*. They also enjoyed playing the same games on the father's iPhone. UK7g7 had played *Monsters Run* frequently for several months, becoming very competent in playing the game, but had become bored with it. UK7g7 played games on other platforms (e.g. Wii) at friends' houses and asked for the console when she returned home, but then forgot about it.

The father identified how the children worked out the password for his phone eighteen months ago and they now accessed it independently. He had now put password protection in for purchases, as he was concerned about them buying goods online. UK7g7 had been interested in apps since she was three and used to play with drawing apps and the compass on her father's iPhone, working out quickly that the arrow always pointed North. UK7g7 used the iPhone to take photographs from a very early age and understood how to frame images from the age of three. UK7g4 also took photographs using the same phone, although was not as discerning in topic as UK7g7. UK7g7 used the iPhone to take videos of natural phenomena such as birds and the sea. UK7g7 liked to send text messages to family members and she had also uploaded photographs to her father's Twitter feed.

The girls enjoyed listening to music videos on YouTube and they linked the iPhone up to the television so they could watch the videos on the large screen. UK7g7 also plugged her father's smartphone into a Bluetooth-connected speaker stand and took it around the house, dancing to music, with Katy Perry and Bruno Mars being particular favourites. The girls enjoyed listening to a Mozart CD at bedtime, a CD that they have listened to daily since birth (a Don Campbell compilation, marketed as enhancing children's intelligence).

The children used the iPhone and iPad mini to access the internet with their father, using Wikipedia to identify facts, or search the web using Safari. This hardware was also important in communicating with family members in Wiltshire, London and Australia using Skype and FaceTime. These activities were also undertaken on one of the family's computers, but less often. The father stated that the family didn't have rules, as UK7g7 managed technology use well, although he felt that he would have to have rules with UK7g4 as she got older, as she was more interested in technology than UK7g7.

Much of UK7g7 and UK7g4's time was spent engaging in a range of playful activities including outdoor play, imaginative play, drawing and painting and technology played a relatively small, but important, part in their lives.

Family 8

Edinburgh, UK

Family members

- Father, 40, low digital user (UK8f)
- Mother, 40, low digital user (UK8m)
- Girl, 7, low/ medium digital user (UK8g7)
- Boy, 4, low/ medium digital user (UK8b4)

Narrative

The family lived in a semi-detached house in the suburbs of Edinburgh. The father was a secondary school teacher, while the mother was currently retraining, and was away on a course during our visit. The family was comfortably off, but led a consciously low-tech life, favouring outdoor activities. They owned a laptop, a television, a DVD player, a CD player and amplifier, a VTech Power Xtra toy laptop, a digital camera, and both children had CD players in their bedrooms. The mother had recently purchased a smartphone, although the father had not, describing himself repeatedly as a "technophobe" and "Luddite".

"I tend to think that the world they're going to be part of is going to be so heavily digitalised anyway; they're going to spend a huge amount of their lives in front of screens, I'm not sure they need to be steeped in that kind of culture by me yet."

Most of the children's interview was conducted with UK8g7, with UK8b4 joining in enthusiastically. They were both very active, constantly running around the room, jumping on furniture and showing off gymnastic moves. UK8g7 repeatedly cited sports as her favourite activities, rather than a physical object or digital device, while her father noted that drawing and craft activities tended to hold her attention. Board games were a feature of family time, although the children tended not to play them together. UK8g7 also enjoyed playing with loom bands, but the range of physical toys presented to the interviewer was limited, despite an array of toys in both the sitting room and bedrooms.

Technology use was very limited, for all four family members. Television was restricted to 30-60 minutes of "Telly Time" each evening, with another short window in the morning at weekends. The children owned around 20 DVDs, which they had watched many times. The parents rarely watched television or films with them. BBC iPlayer was used "very occasionally", but programmes were generally recorded from the television. UK8g7 used YouTube on the laptop to view clips of animals, and UK8b4 had been allowed to watch short clips of Pixar's *Cars* when younger, although this seemed to have been due to a brief obsession with the film, now channelled into *Cars* toys and role play. The only consistent interaction with the laptop was for checking weather reports each day during holidays and at weekends, reinforcing their outdoor lifestyle.

Aside from television and DVDs, their main access to digital entertainment was via their cousins, who "have loads of iPads". UK8b4 also had access to tablets at his nursery. Notably, neither child knew the names of the iPad apps they had played, although their descriptions were detailed enough to permit identification. UK8g7 had played *Temple Run* several times on her mother's new smartphone, and knew it by name. The CD players in their bedroom were generally used for listening to storybooks on CD, with 10-15 stories in UK8g7's bedside drawer. She also had a digital camera ("not an expensive one, because it's likely to get lost, but it's a proper little digital camera") which she enjoyed using. However, she appeared to have struggled with it at some point, deleting images accidentally, so she restricted herself to taking images, leaving uploading and printing to her mother.

The father provided an eloquent justification for their low-tech lifestyle, stating that children would be exposed to screen culture for much of their lives, so there was little need to push it on them now. He saw the future as inevitably "digital", but was waiting for his children to request devices before purchasing anything, which they had not yet done. The mother had helped UK8g7 to use the VTech toy laptop, and allowed her to watch her working at the laptop, but there was little evidence of modelling behaviours in relation to digital devices, nor of an engagement with educational games or apps.

Overall, the family were unusually low users of technology. Their television was regularly used, and cited as the favourite device by both children, but was old-fashioned and small. Digital technology was only for use when bored or unable to go outside. Social media was barely mentioned, and there were no games consoles, handheld devices, MP3 players or tablets in the home. As the father stated several times: "I do feel like a bit of a Luddite… I think there are other ways of keeping myself busy."

Family 9

Edinburgh, UK

Family members

- Father, 51, medium/high digital user (UK9f)
- Mother, 46, low digital user (UK9m)
- Girl, 6, medium digital user (UK9g6)

Narrative

The family lived in a small terraced house in suburban Edinburgh. Both parents were in full-time employment, with the mother working as a secretary and the father in fibre-optic communications. The family owned two televisions, a DVD player, two laptops (one exclusively for the father's work), an iPad Mini, two iPods, a Wii (barely used and missing both controllers), a digital camera and two smartphones. The daughter had a LeapPad (now broken). The daughter's devices (iPod, camera) tended to be hand-me-downs from her mother.

The family were active and enjoyed outdoor play, but positively disposed to technology. Like Family 8, tablet and phone use was primarily for games, rather than educational activities. The child's usage was variable – the mother suggested that her daughter went through phases of favouring certain devices, and this seemed to be confirmed by the daughter. For example, she had to ask for the passcode to the iPad, having not used it for some weeks. She demonstrated some sophistication in her use of the laptop, citing specific search terms for the loom band videos she liked on YouTube, and her mother suggested that she could engage with sites such as CBeebies on her own. The daughter also made a clear distinction between digital devices and "stuff that doesn't use battery". UK9g6 was very keen to show off her expertise, but also expressed frustration with some apps. She was melodramatically frustrated with loading times, and when it went wrong. There was an element of performing to the new adult in the room.

Rules were few, but firmly adhered to: an hour of television before bed, and perhaps some time in the morning at weekends. UK9g6 expressed some disquiet about the lack of parental controls on the laptop, but not because of inappropriate content: "I think there should be [a password] because if someone asks to have a look at your computer, they might open it up and try to steal stuff off your computer." She seemed unaware of the meaning of "online" versus apps or games. The mother is unconcerned about her usage, noting that "she uses the technology, but it's not the most important thing in her little world." For example, the family used FaceTime to speak to UK9g6's godfather in the USA, but the mother reported some reticence to engage.

School was identified by both interviewees as a key site for finding out about new apps and games – teacher recommendation was a common source for new content. This may make the family positively disposed to technology – it had cachet and legitimacy when recommended by an education provider, rather than a peer. However, teenage children of the mother's friends often showed her how to use new apps. Overall, the family viewed technology as positive, as part of a varied programme of leisure activity. Educational potential, aside from a stargazing app, had not been explored, and digital devices were seen as modes of entertainment.

> "It's through school that I think she's learned to navigate through websites and things, not through us really teaching her."

Family 10

Edinburgh, UK

Family members

- Father, 50, medium/high digital user (UK10f)
- Mother, 49, medium digital user (UK10m)
- Boy, 7, high digital user (UK10b7)
- Boy, 9, high digital user (UK10b9)

Narrative

The family lived in a small terraced house in the suburbs of Edinburgh. They were high earners, and well educated: the mother recently completed a PhD and had two part-time jobs; the father worked freelance from home. The house was well-kept with a small garden. The sons shared a bedroom, crammed with toys and books, while the sitting room downstairs was neater. Technology was generally restricted to usage downstairs. The family owned a desktop computer (located in the

> "*Minecraft* is something [else] – they build on the worlds that they've created. The infinite possibilities in particular of that style of game – I think it's more creative."

home office for the father's work), a laptop (for the mother's work), a television with TiVo and Virgin On Demand, an Xbox 360, two Kobo Arc tablets, two Nintendo DSs, a Blackberry, a Kindle, a smartphone and a radio (broken). Previously, they had a Leapster. The broadband router was kept out of reach, and only switched on when required.

The parent interview was mainly with the mother, but the father joined in towards the end. They expressed a clear desire to monitor usage by both children, mainly in order to ensure they did not encounter violence or swearing. YouTube was viewed via the TV, mainly for music videos, but they used a parental lock. Sexuality was not yet an issue, and was treated less seriously: "[the son's friend] typed in 'naked ladies', so they were all sort of giggling about that." The father self-identified as an early adopter, although he disliked tablets and generally shunned social media, along with the mother. The children seemed to have a similar antipathy for Facebook, Twitter, etc. Surprisingly, both parents had their own Xbox games, such as *Batman: Arkham Asylum* [rated 15].

The family favoured free apps, with occasional purchases for *Minecraft* on the Xbox. In-app purchasing and access to credit accounts was a cause for concern. They also demonstrated an obsession with breakages, making the children transport their tablets in the original box when out of the house, and banning use in bed. Rules relating to time spent on *Minecraft* or tablets were strict, and the children complied.

The family were generally high digital users, with a nuanced understanding of many issues relating to digital use. Their choice of the Kobo Arc tablet perhaps suggested a willingness to carry out research before purchasing. As with families 8 and 9, tablet use was overwhelmingly seen as for gaming, rather than educational outcomes, although the parents noted benefits such as hand-eye coordination which they believed sprang from gaming.

Findings

How do children under the age of eight engage with new (online) technologies?

Digital technologies played an important role in young children's lives, and they generally embraced them with enthusiasm and pleasure. Globalised popular cultural texts and artefacts permeated young children's use of digital technologies, with the most widely used games, texts and artefacts being those that are popular in many countries (Disney films and games, *Angry Birds*, *Minecraft* and so on.) If the family owned a tablet, this is generally the most popular device with children, followed by handheld devices such as a Nintendo DS or the parents' smartphone. The most common form of engaging with these was for a range of games, followed by YouTube (or similar) and some learning

software. Listening to music, visiting familiar/favourite websites and the production of photographs and videos were also popular. Often the activities observed were highly repetitive – the same game would be played over and over, or the same site visited, or the same search terms entered into YouTube. These might change over time, but at any one time, children liked to repeat just a small handful of activities, or even just one game.

The type of medium, form of engagement and amount of time spent with any technology largely depended on the domestic context, i.e. which devices the family owned and where they were located, and what the family dynamics, habits and rules were. In other words, the meaning of a device (its affordances in a particular family or for a particular child) was not fixed but depends on context and inclination.

It also depended heavily on parental interest and modelling: children were close observers of their parents' activities online as well as offline. The parents were not always aware that this happens but children paid attention to the mother doing online shopping for example, or how an older sibling played games on a digital device.

Most children revealed a confident facility in using devices. For example, UK3g6 was delighted to show us the functionality of the iPad: "this is how you turn the sound up. Sometimes it doesn't work, it plays this weird music. So you can take pictures by pressing that and you get the pictures from here … And then if you go back and go on here again, and then you go back,… if you press that you take a picture of yourself … That's also my game and that's my dad's game … And you can also get stuff off eBay and I watch *Bake-Off* [on the BBC iPlayer] on here."

Some just used a device for a few games, others could use a range of apps. Games machines, smartphones and laptops tended to be used for just one or two games or activities while the tablet was more used for multiple functions, suggesting that the design of the device makes a difference to what children can do. UK3m, who taught preschool children IT skills, observed that, "you need a lot of patience to teach a three year-old to use a mouse" because of the challenge of hand-eye coordination, something that was much easier on a tablet than a computer.

Parents seemed tempted to infer more skill from observing a single activity than was warranted when we tried out different activities with a child. In other words, functional skill in using a device should not be confused with depth of understanding or critical awareness. In all these regards, children's levels of digital skill and literacy varied considerably. While some children were able to say something about the relation between software and hardware, how apps were acquired or updated, others were less able to articulate this (though it is hard to know just what they understood).

Children under seven worked with an interface that they could barely read (though they seemed to recognise basic words – Play, OK, Click, Next). Nor could they write much; this mattered mainly when trying to use search boxes. As UK1f said, "spelling is an issue, obviously, because they're, you know, they're young, and they'll phonetically put it in. Sometimes they'll get it, you know." Children seemed willing to undertake trial-and-error searching (via Google or YouTube). More generally, visual stimuli or audio commands were the primary markers for how all children navigated any technology.

To facilitate most digital activities, parents were needed to set up, initiate or act as proxy users. For instance, in the majority of cases, parents would search for and select appropriate websites, download apps, file/arrange the desktop and type search terms into Google or YouTube – as well as fixing any problems. UK1m said, "I think I usually need to show them, they might try but they often press something that they weren't meant to, I think, and they don't know how to get back." In principle, older siblings could play a

similar role but in practice, the majority of children and parents talked about this being a parental responsibility.

The interface design matters. Once a child was on YouTube, they could select from the list of suggested links on the right of the screen. (Parents tended to see this as skilled independent use by the child, with seemingly little awareness of what content might appear in the YouTube menu, although UK1f was worried that the boys might find 'Pikachu on acid' when searching for *Pokémon* videos). Set-up on the tablet or laptop also mattered – once a parent had downloaded games or apps and shown the child where they were kept, children could generally locate and use these unaided. Children's skills in navigating games, sites or search interfaces were variable, as expected given their age and cognitive development.

A few children were keen on the camera function of the phone or tablet, even using apps that edited 'selfies' to comic effect. Some children created videos using their parents' phones and these were often of imaginative role-play scenarios. For example, one mother reported that her twin daughters "like taking photos of just anything. So a bowl of fruit, or just anything, the shelf, and they'll take videos of each other doing little sketches, or doing a guided tour around a room" (UK5m). Other parents reported children videoing role-play scenarios, or interviews with each other in role as imaginary or television characters. The subject matter of children's photographs often appeared to be quite random, although UK7f said his 7-year-old daughter was more discerning than his 4-year-old daughter and liked to take photographs of natural objects and wildlife, which mirrored her interest in nature programmes on television. In many families, the shared viewing of photographs was also a significant activity, which included children viewing and sharing photographs on smartphones and iPad and with other family members via text-messaging (and in one case using a father's Twitter account). In one of the Sheffield families, Facebook was an important resource for sharing family photographs and the young children engaged in this activity.

While games were generally the most-preferred activity, music was also a key driver of children's uses of technology. Listening to pop music on smartphones using MP3 files or the streaming service Spotify and replaying favourite music videos on YouTube were popular activities. UK7f reported that his seven-year-old daughter would "hear something on the radio and say 'Oh can you check it out on YouTube, there's bound to be a video, there's bound to be a music video'. So we go to YouTube and we check it out. And we put up with the adverts." Older technologies such as CD players were generally confined to bedrooms; joint family music was generally shared through smartphones plugged into speakers or connected through Bluetooth in shared spaces. Digital radio was prevalent in children's lives, particularly at breakfast time or on car journeys. Television programmes and films were watched across a number of platforms including television sets, smartphones, tablets and console players.

Although we witnessed lots of enthusiastic use of digital devices, it should not be assumed that these activities dominated or were always preferred over others. Children also talked with enthusiasm about playing with friends, doing creative or craft activities, engaging in sports or playing outside, playing board games with their family or undertaking shared or solitary imaginative/fantasy games at home.

How are new (online) technologies perceived by the different family members?

For children, the opportunities offered by digital devices were fairly straightforward: fun and relaxation, something to share with siblings or friends, something to pass the time pleasurably when alone, something to test yourself against (getting to the next level, trying out a new challenge), and possibly something for informal learning (although we did not ask the children directly about learning). Most appreciated seemed to be the fact that a device always patiently awaits and is ready and available for any moment when the child wished to play a game, check something out or fill some time.

For parents, articulating the opportunities offered by the devices they were actively bringing into the home was more challenging. They were aware of the at-times hyperbolic claims for their educational benefits but not necessarily convinced by them. Indeed, while parents could see the immediate entertainment value of games they were unsure if other benefits were on offer. As UK1f said, "that's purely games really… they don't look to it as …a learning sort of tool, even though they're learning subliminally from it."

When asked what the children were learning, the parents volunteered navigation, use of buttons and search, making quick decisions, perhaps the patience required for repetitive play; but they did not think the children understood the wider online world that the screen could link them to. In UK2, the parents saw the learning possibilities as those the software directly teaches (e.g. a phonics game, handwriting practice, good values). The father in UK3 offered a more naturalistic account: "no-one's taught them, it just comes naturally because … they've evolved with the technology." UK6m felt that the use of the internet expanded her children's general knowledge: "I also think that certain things that they go on are actually teaching them some things that parents don't explain to children as well about little things in life, and they come and ask questions after, you know. I mean because if she does go on something and she'll say 'Mummy why has that happened?' and then you start to explain things."

Parents were vaguely aware that their children may not share the same perception of the opportunities but preferred not to dwell on these differences in perceptions, recognising that children favoured fun over learning activities. Many seemed unaware that their children learnt by observing parents (e.g. that a phone can be used for shopping) or that they learnt from their parents' practices rather than principles (e.g. that a tablet is good as a babysitter or time-filler).

The media-savvy UK1f could think of better ways to design the child-computer interaction, saying "it would be quite nice if, in technology, although I don't really see it happening if they, if they're on a website like CBeebies or something and they didn't encourage them to play different games, if it would say, right, why don't you go off and make this? But I don't see they're ever going to do that really." But generally, few parents thought much about how the devices could be differently designed, perhaps making them more child-friendly.

Most children had little or no perception of risk associated with any devices or content other than the parents' repeated arguments of interventions (e.g. it is bad for your eyes, you get dizzy/ill if you play for too long). They were aware of the risks of breakage, however, and occasions when something had been broken remained in the family narrative long after. They were also aware of their parents' concerns about the risks associated with digital devices but they did not seem to feel these as significant in and of themselves; they merely represented the kind of familiar parental anxiety linked to the imposition of limits on what they were allowed to do as children.

Parents saw risks largely in terms of amount of use and the other activities that were being displaced, rather than dangers of content or contact. Amongst the parents, individual concerns varied widely: a sense that this technology was somehow out of one's control was foremost in their minds; they were also aware of their own levels of digital literacy (if high, this gave them confidence, but more were aware of their own limitations). Some (UK3f, UK8m) were concerned about the damaging effects of instant gratification, or the fact that children became so absorbed in the technology that they ignored those around them. Some were concerned that children would no longer appreciate books (UK1f, UK3m) while others were heartened that their children still liked books (UK2m, UK5m).

In terms of content risks, we heard of few experiences with sexual content but quite a lot of talk from parents about violent, scary or gory content. Strong language also caused anxiety. Sometimes this was a concern to the parent but not the child, sometimes for both. Most parents did not spontaneously talk about specific commercial risks or about an over-commercialised environment, but when it was raised by the interviewer they recognised the concern and could talk about it as potentially problematic. UK7f reported that his seven year old daughter disliked pop-ups so much that it put her off the game: "She's like, 'Oh I hate these pop-ups, I don't want that game, I don't want that thing', and she'll inadvertently press it because the X to get rid of these pop-ups is tiny, deliberately so. So she'll press it and then you're at the app store 'Buy, buy, buy' and she's like, 'Oh dad, get rid of it'."

The London team heard little from children and parents about contact or conduct risks – actual or potential (except for the mothers in UK2 and UK3). In Sheffield, both children and parent in one family mentioned this as a potential risk, but did not seem overly concerned, with the mother suggesting that she had more concerns about offline contact: "I've got more fears about when they're out and about actually than them actually being online…Yeah, I've got more fears about that, because at least you know that they're in the house. And I actually…I always get my children to know that even if they end up having a conversation, they're not leaving this house to go and meet some stranger, you know." (UK6m)

Parents were quite keen to talk about "where it's all going". They offered sci-fi visions of the digital future, and several had heard of driver-less cars, smart homes, geolocation chips or surveillance technologies. There was some interest in the convenience and personalised lifestyle this could offer but many visions of the future were dystopian. It seems they fear the loss of the life that they themselves lived as children, even sometimes fearing for society's humanity. These changes also led parents to reflect on their own childhood (e.g. UK2m: "the way I was brought up, I didn't approve of any sort of digital equipment"; UK3m: "She doesn't play outside. I did, as a child. You know, I'd be out all summer …"). While the father in UK4 was teaching his teenage son to use the darknet to avoid government surveillance, the mother in UK2 welcomed the idea of geo-chipping her children to know that they were safe. She also recognised that future employment will increasingly demand IT skills and is glad the school has begun to teach coding: "I don't want them to be behind the rest, I do sometimes think, maybe we should learn more, so that they can learn faster and be ahead of the game."

What role do these new (online) technologies play in the children's and parents' lives?

New (online) technologies have become a prominent feature in most family members' lives. The commonalities across families were more salient than the differences. Nonetheless, some aspects of family philosophy or style were manifested also in the ways that parents and children had appropriated the devices into their lives – an artistic family selected aesthetically-alternative games, for instance; a technologically-savvy family had a daughter with a high level of digital skills; a child in a family that liked outdoor experiences used technology to capture images of nature.

There was less consonance between parental values and children's activities when it came to practices of use. Parents with many safety and health concerns, for instance, were not necessarily effective in limiting their children's use. Parents who talked of losing control over the technologies (or their children) were not necessarily more controlling in practice. Indeed, parental anxieties – which are fairly high in the UK, often caused by media panics about smartphone addiction, technological innovation and its supposed threat to youthful innocence – were striking. They appeared to fuel a lot of talk about technology, but only a partial translation into family practices. Many parents felt that they would welcome guidance on managing children's online safety and technology use.

Smartphones were generally regarded as personal property, though many children would confidently ask their parents when they wanted to use them. Laptops and tablets varied – they could be defined as personal or shared property, depending in part on how many the household possessed. The young children were the least likely in the family to own any device personally, except a handheld games machine, MP3/CD player or games console, and they knew well which household devices they were allowed to use, and whether or not explicit permission was required.

New (online) technologies were not perceived as an integral part of shared family life in most families. Rather, engaging with a digital device was considered as an individual activity, unlike offline family activities such as going to the park or playing a board game. As UK1b6 explained, although he and his brother played the same games, "most of the time we play by ourselves." We saw only a few shared digital experiences between parents and children. Two of the families in Sheffield discussed playing online and/or videogames together. In one Sheffield family, all four children regularly played Minecraft together and the mother described this as a modern type of board game. Siblings tended to play together more often and while this is rarely initiated by the parents, they were ready to step in to deal with conflicts or to enforce rules about taking turns.

Thus while digital devices were commonplace in the family home, they were not necessarily integrated into shared family life. Devices were often considered to be personal, and each activity online seemed to be predominantly engaged with on an individual basis. In most families, it was reported that the children negotiated well amongst themselves in order to attempt to manage access fairly, although parents sometimes had to intervene to distribute access to and time on any device equally or implement punishments, such as the removal of the device for a day or so. In families with more than one child, there appeared to be an older/younger sibling effect, i.e. acquired skills and knowledge were often transferred to the other sibling(s). Conflicts could often only be resolved by parental intervention, leading, in UK10, to the purchase of a second device: "It was just a hassle for us when we had to share one tablet. UK10b9 got his first. So we really needed to get one each" (UK10b7).

Occasionally, parents shared an activity with the child to either guide them for learning purposes or for a new device or game. After this initial parental guidance, however, some children played alone without any immediate or regular supervision by their parents. Children seemed sensitive to whether a parent's pleasure in sharing an activity with them was genuine or dutiful (the need to show or guide or demonstrate or check up on, rather than share fun). We heard of and observed only a few spontaneously shared digital activities in the family for pleasure, although we were only in the home for a short time.

Often online activities were treated as stand-alone activities with little evidence of convergence and cross-over from one device to another, from the online to the offline or vice versa. Especially in the London families, it could not be assumed that children who saw something on television would go online to find out more about it, or that a child who listened to something on YouTube would then try and do/make/play it themselves afterwards. However, in some families we did witness cross-over from online to offline, as children played out scenarios from online games or sites, or played with toys related to online interests. In one Sheffield family, children searched the internet for a song they were learning for a school assembly and in all three families, children played online games that related to films and/or television programmes they had watched and enjoyed. Offline activities informed online communications with family members in two families who used Facebook, Twitter, Skype and FaceTime to share stories and photographs. There was also some cross-over between devices in one family, who used Bluetooth to display on their television the YouTube videos they played on the father's smartphone. The same family also managed photo-sharing across various devices. The Edinburgh families described online to offline crossover, usually relating to instructional videos on loom bands or football skills on YouTube, although the reverse was explicitly avoided; in one example, a child discussed the option of placing action replays from *FIFA14* online: "I don't really want to be on YouTube, because I've heard myself [recorded] on the iPad, and I sound a bit like a toddler" (UK10b7).

Genuine family activities shared between parents and children seem to be mainly offline, such as going out, eating together, playing board games or doing craft activities. Children positively enjoyed these shared offline activities and tended to rank them higher than time spent with digital devices. For parents, too, such activities were a source of pride, for they saw them as evidence of good parenting. For the interstices of daily life, however, portable digital devices were viewed favourably, often serving the role of time-filler and dealing with boredom on car journeys, in waiting rooms or in the supermarket queue.

How do parents manage their younger children's use of (online) technologies?

Noting that parental mediation strategies identified in the research literature include active mediation and co-use as well as restrictive strategies such as rules and limits (Livingstone & Helsper, 2008), we looked out for a range of mediating activities on the part of parents. As noted above, we saw relatively little co-use (except when explicitly guiding the child), though we did hear of some instances of shared game play between parents and children.

Some parents were keen to tell us of their rules almost as soon as we entered the home. It seemed to be part of demonstrating good parenting that they could display their rules and restrictions up front. Expectations of parents were also uppermost in the minds of quite a few parents, particularly since they realised they did not meet their own (or others') expectations:

"I think what happens, and I don't know if you've found this in the other families, we both work fulltime, there are days that we are absolutely exhausted and we just want that one hour to help us with some rest, and then sometimes when we get lazy we'll ask him, 'okay, do you want to play one hour?', but it's never more than one hour, I feel extremely guilty about that, 'do you want to play one hour on the computer or research things or check your game or play on your phone?'..." (UK4m)

Many parental rules were restrictive. Some were quite creative – in UK3, "on Sunday the internet shuts down at 6 o'clock" and the children are told that since the computers are all networked together, "what you can see in your computer… I can see on mine". Similarly, UK10 switched off their broadband modem for much of the day. Some parents had little to say about the benefits of digital activities. They had few ideas about which activities, sites or games they wanted to encourage or how they, as parents, could mediate their child's digital activities and engage positively, whether sociably or imaginatively. In other families, parents had quite definite ideas about what they saw as the benefits of digital activities and emphasised knowledge acquisition, educational provision that could be accessed through mobile technologies at a point of need, hand-eye coordination and enhanced communication skills.

Within the family, the parents appeared to play different roles. Fathers tended to be more laissez-faire or more involved in facilitating than restricting children's engagement with technology for fun. Mothers appeared more often to guide, manage, limit and control their children's use of technology, although some fathers did undertake this role (e.g. UK7f). This included a range of activities from researching and selecting games or websites that accorded with the family's values to imposing rules about when and for how long certain devices could be used (e.g. UK1, UK2, UK5).

Mediation of online use was varied. One family used technical tools to monitor their child's activities on the family laptop. None of the London parents had installed filters, however (such as the active content function or the safety feature on YouTube – although UK3 were considering it after a friend's child typed 'hot male' for Hotmail). Two of the Sheffield families had used filters on smartphones but not on laptops and computers, whilst one parent reported filters on all devices. In two of these families, parents insisted that children did not go online at home without their own involvement. In the same families, the children talked about work they had undertaken at school on internet safety. Children outlined how they had been introduced to the e-safety programme Hector's World, with one child commenting that, "If it like comes up with something really scary, we press on him and there's like a nice picture under the sea" (UK5gi6). One Edinburgh family employed safety features on YouTube, both for tablets and TiVo on the television. Another Edinburgh parent noted that, "We can't supervise games all the time, so they have to be age-appropriate." Parents suggested that these issues would be important to consider in the future: "Sometimes when they come to me and ask to do an image search on really quite innocent subjects, you'll be scrolling down and there's something really inappropriate. You have to deal with it. Increasingly, there's the importance of getting parental locks on these things." An Edinburgh father suggested that their children could not access unwelcome material because of the level of their writing skills: "They're both still at a point where they maybe have to check what the spelling is. So that's another way we're always checking, able to monitor what's going on. Although I would say when UK10b9 gets to high school, he'll have his own room, he'll probably have his own computer in the room, and that's really where parental locks will be coming into play. At the moment, they don't – there's no need for it."

Parents had rules that manage their children's use of technology. The most common rule distinguished restricted weekday use from more flexible weekend use. Parents tended to

claim that early mornings and bedtimes were more restricted than other times, but conversations with both parents and children suggested that these rules were less often followed, and generally without sanction (UK2b5: "I am very cheeky around Nintendo…I always try to get Nintendo at snack time. Sometimes I try and sneak in under the table at snack time"). It was clear that digital devices were used to fill in all kinds of 'gaps' in the family timetable – with children overtly or tacitly picking them up when parents were busy, tired, cooking, shopping, driving or otherwise engaged. For example, UK7f said, "particularly in the winter time, we come home from school and nursery and they're tired. I've got to cook dinner, it's easy for them to sit for an hour, maybe, and they might do five hours in a week Monday to Friday… maybe an hour and a quarter. Sometimes they stretch it to two."

Parents tried to limit the time spent on devices, with provision as a reward and removal as a punishment. As a result, the devices become all the more desirable to the children. One mother, however, suggested that this approach did not work for her, as it was too difficult to ensure compliance: "I might say, 'If you don't behave yourself when we get home, you're not…' but it doesn't really work because there's so many places for them to go and hide." Meanwhile parents confused young children when setting time limits, since the children were generally too young to have a clear sense of time. Parents' management in terms of content varied. While some provided parental guidance on how to find and play games (e.g. showing the children how to google CBBC), others were unaware that their child knew how to access the Google Playstore and download new games. All children were allowed to engage with technology without immediate parental supervision, although some parents reported checking regularly on children's activities. Parental concerns were primarily about the extent of use and the extent to which it was likely to displace other activities. Further concerns included eyestrain, disrupting bedtime or sleep, affecting schoolwork (though only for older siblings, e.g. in UK3). Some worried about unexpected charges on the mobile or through apps (e.g. UK2, UK4) though none had actually experienced this. Parents seemed confident that their children were too young to have been exposed to sexual or pornographic content, though several were worried about scary or violent content giving children nightmares or exposure to content they were too young to understand (e.g. "Pikachu on acid", UK1; or "adult things [that] have children's icons", UK2m).

Children had an understanding of how parental rules were age-appropriate, recognising as legitimate that older siblings could do more, use different devices or play different games because they were older, even though they might complain about this on occasion. There was an issue around time-based restrictions on use, since children under seven lack a clear sense of time and so may not understand parental injunctions.

While parents tended to overestimate their children's digital skills (tending to generalise from facility with one device to others, as noted above), it seemed also that they tended to underestimate their children's digital use in terms of time spent or range of activities or devices used when parents' and children's accounts were compared. This might be because so much digital use was to fill time when the parent was otherwise engaged.

Overall, schools were trusted to deliver the needed technology exposure and parents took their lead from the school, in some cases taking advice from teachers about suitable apps. On the other hand, the demand from the school to parents seemed fairly low. Parents were aware of some of the ways that the school used technology (for a reward, to practise certain skills, via a school intranet) but did not see this as particularly interesting, noteworthy or problematic. Some had been invited into the school for a briefing on, say, the school's intranet, but they tended to be unclear on how this worked or whether it

could be judged successful. UK3m was clear that she would prefer a verbal interaction with her child's teacher rather than an email one.

Surprising findings

One of the interesting findings that has emerged in this study was the disconnect that sometimes occurs between parents' and young children's accounts of technology use. This is often the case with older children and young people (e.g. Valentine, Marsh and Pattie, 2005; Livingstone and Bober, 2006; Livingstone and Helsper, 2008), but since young children often had their parents or carers close by in the home, it is more surprising that this gap existed also for them. For example, one of the Sheffield mothers outlined how she ensured that her children could not access devices independently: "The devices, I do have control in that there are pass codes, so I have to put the password in before they can start using them. So none of them know my – even the 12 year old can't use the iPad without me putting the control in, so it has to come through me before they can put it on" (UK5m). However, one of her six-year-old twin daughters entered the password for the iPad when asked by the researcher to demonstrate her use of the device. Her mother was surprised to see her on the device when she entered the room, and the child blamed her mother for revealing the password when she herself used the iPad:

UK5m:	How did you get on to that?
UK5gi6:	I don't know.
Researcher:	She put a password in.
UK5m:	Oh! Have you…?
UK5gi6:	It's straight up the middle.
UK5m:	So you figured it out. Right, we've got to change that again now.
UK5gi6:	Well it's your fault 'cos you're, like, showing us.

A further point of interest was the way in which *Minecraft* was creating opportunities for numerous siblings to play together simultaneously. Whilst family use of virtual worlds has been noted in previous studies (e.g. Marsh, 2011), that has tended to be simultaneous use of a site using two separate accounts on two different devices, with avatars meeting on screen. In this study, two families (UK5, UK10) played together on *Minecraft* using one device and were able to save the separate *Minecraft* worlds of family members on the same iPad.

Another surprising finding relates to the lack of explicitly educational apps and games. The primary purpose of tablets was generally for gaming, in contrast to tablet use by younger children and preschoolers. There may be several factors at play here:

1) Parents of preschoolers may be more likely to download educational apps, such as number or spelling games, as a preparation for school. Older children saw tablets as part of leisure time, and may seek to avoid educational products.
2) Fewer preschoolers possessed their own tablets, suggesting that content is curated by adults. With the older age-group, the tablet was more likely to be for

their exclusive use, meaning that they chose their games, rather than being presented with a selection by a parent.

3) The target age-group was three or four years old at the launch of the iPad and competitor products, meaning that they were already too old for the plethora of educational preschool products now available. They and their parents therefore did not associate tablets with educational ends, and may not be aware of the range of products in this genre.

4) Books, especially encyclopaedias, were presented to the researchers on several visits, yet the equivalent apps (by mainstream publishers such as Dorling Kindersley) were absent. There may be a perception by parents of 7-year-olds that 'book learning' cannot be delivered on a tablet, whereas parents of younger children may be seeking out more educational apps as their children grow, such as astronomy, dinosaurs or the human body, since they were already accustomed to digital education.

Finally, the mothers in both UK2 and UK4 used YouTube to show their young children poverty – they wanted them to understand how lucky they were and how difficult life could be in other parts of the world.

Method

Procedure and research ethics

The UK research was based on a contract between LSE and the European Commission, with subcontracts from LSE to the University of Sheffield and the University of Edinburgh.

Research ethics approval was requested and obtained from LSE for all three of the research locations. This covered the whole research design and implementation, with detailed provision for the following:

- Processes of recruitment via schools or day care centres, and incentives offered (this varied by location);
- Obtaining informed consent from both parents and children, plus reminders to all participants that they could refuse any questions and withdraw at any time (see Annex);
- Use of cards and play materials to put children at their ease;
- Use of a camera to record devices in the home but no photos were taken of faces or other identifying details without explicit consent;
- Confidentiality was offered conditional upon the researcher identifying no grounds for considering a child to be at risk – a protocol was also developed should a child be considered potentially to be at risk;
- Anonymity (via anonymised transcripts and reports, and encryption of all personally-identifying data including audio-recordings– these were retained only for the duration of the project);
- Data sharing – only anonymised data transcripts and codes to be shared within the national and comparative project;
- Risks to the researchers (addressed by two researchers visiting the home together);
- Offer to the family – a financial incentive, JRC goodie bags for the children in each family, a copy of the report was promised to all (and several expressed a desire to receive this in due course).

The research teams in the three locations across the UK (London, Sheffield and Edinburgh) separately recruited participants. They each visited families at home, implementing the interview schedule and observational protocol as agreed for the European comparative project overall. They shared insights on design and implementation throughout the research process, and have collaborated in the writing of this report. Minor variations in procedure across the three locations are noted in what follows. Since this was a pilot study, the challenges of methodology are also noted below, along with recommendations for further research.

Recruitment

Participants were recruited via a mix of strategies including letters sent home from primary schools (see Annex) or via daycare centres, and through indirect but personal connections when recruitment via more formal means proved difficult within the tight time-scale of the pilot project. In Edinburgh, snowball sampling produced a group of participants from the same school and suburban area.

Participants were selected based on a combination of criteria. We were particularly interested in families with children aged 6 or 7 (year 2 in the English school system, P3 in the Scottish school system), ideally with one or more younger siblings. While we were keen on finding families from low socio-economic backgrounds, this was not always feasible due to the timescale of the project. Finally, families were also selected according to their availability to accommodate the researcher's visit in a timely fashion.

Each family received a shopping voucher as a financial incentive for their participation. The research team further offered to provide material and arrange a talk on children and digital technologies if there was wider interest amongst the family's school community. The children were invited to keep the card game used during the child interview. At the end of the visit, we gave each family one of the children's goodie bags the European Commission (JRC) had provided. The Edinburgh children also received a 'Young Researcher' certificate that included their name 'for taking part in research with the University of Edinburgh' and these were very popular.

The sample

Location	Family code	Family income	Family Member Code	Sex	Age	Year school/ max level of education	Ethnicity (using categories from the UK Census)
London	1	Medium	UK1m	female	41	Completed college	White British
			UK1f	male	51	Completed college	Other mixed background
			UK1b3	male	3	Kindergarten	Other mixed background
			UK1b6	male	6	Year 2	Other mixed background
			UK1b8	male	8	Year 4	Other mixed background
London	2	High	UK2m	female	39	Completed college	White and Asian
			UK2f	male	40	Completed college	Other White European
			UK2b5	male	5	Year 1	Other mixed background
			UK2g6	female	6	Year 2	Other mixed background
London	3	High	UK3m	female	47	Completed college	White British
			UK3f	male	51	Completed college	White British
			UK3g6	female	6	Year 2	White British
			UK3b13	male	13	Year 9	White British
			UK3b16	male	16	Year 12	White British
London	4	High (but clearly not well off)	UK4m	female	40s	Completed college	Latina
			UK4f	male	40s	Completed college	Other White European
			UK4b6	male	6	Year 2	Other mixed background
Sheffield	5	Medium	UK5m	female	40s	Completed college	White British
			UK5b12	male	12	Y12	White British
			UK5g10	female	10	Y11	White British
			UK5gi6	female	6	Y2	White British
			UK5gii6	female	6	Y2	White British
Sheffield	6	Medium	UK6m	female	30s	Completed college	Black British
			UK6f	male	40s	Completed college	Black British
			UK6b16	male	16	Completed secondary	Black British
			UK6g6	female	6	Y2	Black British
			UK6g5	female	5	Y2	Black British
Sheffield	7	Medium	UK7m	female	40s	Completed college	White British
			UK7f	male	40s	Completed college	White British
			UK7g7	female	7	Y2	White British
			UK7g5	female	5	Y2	White British
Edinburgh	8	Medium	UK8m	female	40	Completed college	White British
			UK8f	male	40	Completed college	White British
			UK8g7	female	7	P3 (Eng Y2)	White British
			UK8b4	male	4	Kindergarten	White British
Edinburgh	9	High	UK9m	female	46	Completed secondary	White British
			UK9f	male	51	Attended college	White British
			UK9g6	female	6	P3 (Eng Y2)	White British
Edinburgh	10	High	UK10m	female	49	Completed college	White British
			UK10f	male	50	Completed college	White British
			UK10b9	male	9	P5 (Eng Y4)	White British
			UK10b7	male	7	P3 (Eng Y2)	White British

Implementing the interview and observation protocol

Generally, families were welcoming, relaxed and willing to share their experiences with digital technologies. Parents were happy for their children to be interviewed separately, although they were generally just about within earshot, and also for the researchers to take photos of their home and devices. The elements of each interview were identical: introduction, ice-breaker activity, parallel interviews with the parents and child(ren),

child-guided walk around the house and drawing activity (while the parents were still being interviewed), closing and final questions with the whole family. Each family visit lasted between 1.5 to 2 hours.

The visit started with a short introduction to explain the purpose and scope of the study, answer any questions, give each family the shopping voucher and ask them to sign the parental consent form.

Families differed in their apparent need for an ice-breaker task (using the European Schoolnet activity book in which children were invited to place stickers depicting cartoon images of typical daily activities onto a time line of the day). In some families no such task was needed as the children were already very relaxed and open; in other families, the task was attempted but only partially worked. This was because children aged six or seven, and most certainly any younger siblings, are not yet old enough to understand the concept of time. They struggled with identifying the hours of the day and could only manage with significant help from adults. In addition, the images on the stickers were tricky to identify and/or not the right images, e.g. images of a tablet, listening to music, the family having dinner, etc. were missing.

After the joint exercise, which had the merit of getting everyone chatting about their lives, the interviewers interviewed parents and child(ren) separately (either with two researchers visiting the home together, or with one researcher making two visits to the home). Parent interviews were generally lively – the question of how digital technologies were integrated into family life, and associated hopes, concerns and practices proved a welcome topic of conversation. Parents were aware that they were revealing their values and private practices in the interview, but at the same time this topic was not seen as intrusive or embarrassing (even when parents discussed conflict between themselves) and the legitimacy of researching digital activities at home was accepted. The only difficulty for some of the parent interviews was the tendency of one parent to dominate, or to speak for both, requiring the interviewer to exercise some tact in hearing from the other parent.

In some child interviews, more effort was required by the researcher to ease them into the topic and to get comfortable with the researcher. We first asked them to indicate their willingness to be interviewed on an age-appropriate child consent form. All children agreed to partake and we started the interview by playing a card game with them. Each card showed an image of a digital device or other toy and we asked the children to pick out those they have at home. Subsequently, we asked them to order the cards according to how much they liked playing with each device or toy. These were then photographed as a record and the children invited to keep the cards. (See Edinburgh Appendix EA.1: children were given stickers of smiley faces to put on the cards representing the devices they liked best.) The card game was a successful activity to engage children. However, some of the visuals were difficult to identify, such as the old-fashioned image of a tablet or MP3 player. Overall, it served well as a prompt and point of reference for the remaining interview questions.

We then asked the children to show us what they can do with a device of their choice. We watched them navigate the technology (e.g. the family tablet or parent's smartphone) and documented their activities with photos. The parent interview tended to take longer than the child interview and, eventually, children became noticeably bored and impatient with our questions.

The media/technology tour of the home was used in most family visits, whether just with the child or with parents and child together, though this depended on available time and circumstances. In some families, children were invited to draw their digital activities (e.g.

while waiting for the parent interview to conclude). While the drawings revealed the children's knowledge of a device (though limited by the child's drawing abilities), observing the children navigate their preferred device was most useful for gaining insights into their skills and understanding of the technology.

The interviews generally worked well, although the schedule was very long, forcing the interviewers to be selective in which questions they asked. The observation protocol was a good point of reference, but not very applicable in the conversation with a child, as sustaining the interaction was already demanding, or with the parent, as writing during the conversation might have undermined parental confidence.

Many of the suggested questions were not posed in an age-appropriate language and needed significant rephrasing and simplification. We also found that the interview technique is only feasible for children of five years or older. One of the London families had a three-year-old child who was too young to participate very much or focus on our questions or games.

At the end of our visit, we reconvened with the whole family, expressed our gratitude for their participation and answered any remaining questions.

Recording

Researchers from the London and Edinburgh teams visited homes equipped with two audio recorders, a camera and note pads, as well as colouring pencils for the children. All interviews were audio-recorded. In addition, the researchers took notes, where practical, of behavioural patterns, themes in the family's narrative, the set-up of the home and presence of devices as well as other non-audible observations while on site. The Edinburgh team also took contextual photographs of the street outside (excluding the participants' house), some of which are shown above. After each family visit, the researchers backed-up the audio files, discussed the research techniques and collated interview notes, leading to enriched data and useful comparisons of the parent and child interviews (see Plowman, 2014, for a discussion of these co-constructed research accounts).

The Sheffield researcher also audio-recorded the interviews and took photographs and videos using an iPad. Notes were made following the interviews on reflections regarding the families and their use of technologies. Interviews were transcribed and coded in HyperResearch using a mixture of inductive and deductive codes.

Discussion

In this section, the findings in relation to access and use of various devices, skills and learning and parental mediation are discussed in relation to other studies, with variations from previous research being considered in the light of the methodological and sampling approaches taken to the present study.

Devices, access and usage

Television was still the most widely accessed device for children of this age. The most recent Ofcom survey found that 99% of children between 3 and 7 watch television programmes on a traditional TV set. Less than 10% ever use a different device such as laptops, tablets or smartphones to watch programmes (Ofcom, 2014). In this study, some children did watch television through on-demand and catch-up services on tablets and smartphones, but for most of the time they watched films and television on large-screen sets placed in living rooms. There has been significant rise in SmartTV ownership in households with small children across the UK, growing from 12% in the homes of 5-7 year olds in 2013 (15% for 3-4 year olds) to 38% in 2014 (38% also in the homes of 3-4 year olds) (Ofcom, 2014). The numbers seem quite high, yet the findings from this study did not provide evidence of SmartTV popularity, with only a minority of families owning one and parents and children not mentioning them as a device they would like to own. This may be related to the socio-economic and educational profiles of the parents in the study.

In the UK, watching television is the most frequent use of media amongst 5-7 year olds (83%), followed by books, magazines and comics (40%) and tablet usage (29%) (Ofcom, 2014), a pattern seen in this study. Amongst children under five, BBC CBeebies dominates TV viewing and the most frequent viewing time is in the early mornings before school (Childwise, 2014). In this study, the over-6s appeared to have moved from CBeebies to CBBC, although a few watched CBeebies with younger siblings. Many families reported family viewing of popular programmes such as *British Bake Off, Strictly Come Dancing* or *X-Factor*. There were also reports of family viewing of films, both at home and at the cinema, indicating that the affordances of the television screen, around which family members may easily cluster, offered more opportunities for co-viewing than the smaller screens of computers, laptops and tablets.

The Ofcom survey (2014) found that the tablet is the one media device that has grown most in popularity amongst 5-7 year olds over the last year, with 54% using it in 2014 as compared to 39% in 2013. In this study, the majority of children in families that owned a tablet stated that it was their favourite device, and when families did not own a tablet, then games consoles or televisions were mentioned as children's favourites. This contrasts with the Ofcom (2014) report, which indicated that games consoles / players still outdo tablets in usage amongst 5-7 year olds (66%). This may be due to the socio-economic profile of the families in the current study, given that social class differences in console game use have been reported in previous surveys (e.g. Marsh et al., 2005).

According to Ofcom (2014), 34% of 5-7 year olds and 11% of 3-4 year olds across the UK own their own tablets. In this study, however, only in one family (UK10) did the children own tablets, and they were low-cost devices. In all of the other families, children shared tablet use with other family members. It is not clear why this pattern might be the case within the families interviewed in this study, although it should be noted that whilst all of the households had income levels at or above the national median, this did not appear to lead to extensive purchasing of technologies in some families. Instead, ownership of

technologies was related to parents' views with regard to the role and value of technology within society, as has been found with other studies (Plowman et al, 2012, Plowman, forthcoming).

The most common use for the tablet was to play games, primarily for entertainment rather than for educational purposes. Popular games included running games such as *Temple Run*, aim-and-shoot games such as *Angry Birds,* and games related to popular films such as *Frozen* or *Monsters Inc*. Also popular in some families was the multiplayer sandbox game, *Minecraft*, which is widely played, with a reported user base of over 100 million (Makuch, 2014). Previous studies of this age group's use of online virtual worlds have identified other sites that have been popular, such as *Club Penguin* and *Moshi Monsters* (Marsh, 2011; 2014). The use of these sites was not prevalent in the present study, which may reflect the socio-economic profile of the families. Alternatively, it may be due to their lack of use in the schools attended by the children, given the effect of the viral marketing of these sites that takes place in playgrounds, as this may lead to a clustering effect in relation to popular cultural interests (Marsh, in press). A further point of interest in relation to the apps that were played was that whilst a few families reported children using overtly educational apps, such as those that focus on learning sound-letter relationships, these were not as widely used as has been reported in studies with younger children (Plowman et al, 2012). The potential reasons for this are outlined above.

Many of the games played on the tablets were also played on smartphones. While only one of the children in the study owned his own smartphone, the majority of children reported using parents' smartphones regularly. This is in contrast to the Ofcom (2014) study, which found that only 22% of 5-7 year olds regularly use a mobile phone (Ofcom, 2014). Childwise (2014) finds that one in three preschoolers (35%) uses a parent's mobile phone, half of them twice a week or more, which is more in line with the findings in the present study. Children used the smartphones primarily to play games, take photographs and videos and access YouTube and popular websites such as CBeebies, which is also the case in other studies of young children's use of technologies (e.g. Marsh, Hannon, Lewis and Ritchie, in press). The preference for the smartphone rather than tablets to take photographs and create videos may relate to the more accessible size of the smartphone for this age group, which enables small hands to manipulate it effectively.

In 2014, for the first time tablets are the most used device among both 3-4 year olds (40%) and 5-7 year olds (37%) to go online, followed by laptops (26% for 3-4, 35% for 5-7) (Ofcom, 2014). This was not the case in all of the families in this study. In a few families, children primarily played apps offline and undertook most of their online activities on a family computer or laptop that was stationed in a shared living space. This was due to parents' concerns about children's online access. Childwise (2014) report that 20% of preschoolers use the internet, 2-3 times per week on average and spend just over an hour online. When preschoolers are online, 75% use it for gaming and 55% watch TV programmes and video clips. Not surprisingly, parents indicate that their children's favourite websites are CBeebies, YouTube and Disney, with YouTube growing the most in popularity (Childwise, 2014). Our findings definitely align with this – not only for preschoolers, but also for older children. Other popular sites included CBBC, Google and Wikipedia.

There has been a small decrease in the positioning of devices in children's bedrooms, with Ofcom (2014) reporting that amongst 5-7 year olds, the presence of TVs (35%) and game consoles/players (27%) in the bedroom have overall decreased by two percentage points each as compared to last year, while internet access through a laptop or computer (44%) in the bedroom has remained stable. In the majority of the families in this study, children

had no devices in their bedroom with the exception of a CD player / radio, although some parents reported technology use in bedrooms through the mobile use of laptops and tablets. It may be that as technologies become more mobile, there is less need to station devices permanently in particular rooms.

Ofcom (2014) report suggests that screen use for age 3-4s is as follows: 14 hours of TV, 6.6 hours on the internet and 6.1 hours gaming per week. For 5-7s, they report 14.6 hours of TV, 12.5 hours on the internet and 9.3 hours gaming. While the children in this study did engage in use of a wide variety of technologies, with some demonstrating this level (or more) of screen use, this was only one aspect of a rich and diverse set of activities, which also included playing with non-digital toys, playing with friends, playing outdoors, taking part in swimming, music and dancing lessons and so on. This is similar to previous studies of young children's digital lives (Marsh et al., 2005; Plowman & Stevenson, 2012). Childwise (2014) finds that 67% of preschool children take part in some form of organised offline activity such as swimming or music. Children from higher socio-economic backgrounds are more likely to take part in these activities, which may be the reason why these activities were so prevalent in the families in this study.

There was evidence in many families of 'transmedia play' (Herr-Stephenson and Alper, 2013), that is, play with the same narratives or characters across a range of media. In addition, this play often took place fluidly across online and offline domains. To children, on- and offline activities are not mutually exclusive or happen at the expense of one or the other. This pattern will only increase in the years ahead, given developments in technology, which includes play with toys and apps that utilise augmented reality (Burke and Marsh, 2013). In a study of children's engagement with physical objects that interact with online games (characteristic of the 'Internet of Things' (IoT)), Manches et al. (forthcoming) found that data can be collected about children's online practices in this way:

> "The more IoT objects are able to capture children's interactions with everyday things, the more they are able to build a comprehensive picture of children's day-to-day lives. The point here is that the IoT has the potential to generate powerful data about children's lives, in a way that has some similarities with the ways in which companies capture data about adults' lives from their online interactions. There is a need, then, to monitor what data is being captured on children's activity, and how this is being used."

> (Manches et al., forthcoming)

This will obviously be an important issue to address in future research projects, along with research that considers the implications of other technological trends in the years ahead, such as 3D printing and the use of robots.

Skills and learning

Whilst the focus for much of the use of technologies was on fun and entertainment, some educational purposes were revealed. Ofcom (2014) report that a laptop is the preferred device to find information across all age groups of children and teenagers. For many of the families in this study, computers were used for this purpose rather than laptops, although the reason for this finding is not entirely clear. Laptops in many families tended to be used for gaming and video viewing as we found for tablets.

The majority of children in this study did not currently use a child-targeted electronic gadget with a screen, such as the Leapfrog LeapPad for teaching children digital skills.

Whilst most children in the study had used these devices previously, these were generally now broken or in storage, having been outgrown. Childwise (2014) report that 59% of 3-4 year olds own them and they have been used by preschoolers in previous studies of young children's use of technologies (Marsh, Hannon, Lewis and Ritchie, in press; Plowman et al., 2012). One six-year-old child had five toy laptops and these appeared to be used primarily for literacy and numeracy games. This child had, according to her mother, difficulties in reading, so this may be the case for the extended use of these devices in her case.

All of the children demonstrated independence in accessing and using a range of devices. Childwise (2014) finds that by the age of three, 63% of children know how to use a touchscreen phone or tablet and 40% can play on a games console. Children aged six and seven also demonstrated a range of other skills, such as the ability to input passwords, navigate multimodal screens and manage sub-menus and folder structures.

The EU Kids Online (2014) report highlights that it has not been established that children under nine years old have the capacity to engage with the internet in a safe and beneficial manner in all circumstances, especially when it comes to this age group socialising online, either within age-appropriate virtual worlds or as under-aged participants on sites intended for teenagers and adults, such as YouTube). The findings from this study suggest that children loved YouTube and parents allowed its use and the majority of children had limited to no awareness or ability to understand the scope of the online world and its risks.

The EU Kids Online (2014) report also emphasizes how the variety of mobile technologies enhances access to and enjoyment of the internet for all children. At the same time, privacy and safety settings for the multiple devices that children are using can be complicated for both parents and children and often involve different operating environments even in apparently similar technologies. In many of the families in this study, parents clearly struggled with this. Some did not use search filters at all, some used filters on smartphones but not on laptops and only a few parents seemed aware of the safety features on YouTube. Some parents stated that they would be looking into this as their children grew up, seeing it as inevitable but not yet necessary. While some children did access the internet alongside their parents, all children were able to access devices independently and this enabled them to access the internet. Whether they did so or not was dependent on a wide range of factors, but it was also the case that there was potential for children to access the internet without the knowledge of their parents.

Parental mediation

Ofcom (2014) defines four categories of strategies for parental mediation which parents enforce to different degrees: (i) various technical tools including content filters, PINs and passwords and safe search, (ii) talking to their child(ren) about managing online risks. (iii) rules or restrictions around online access and use and (iv) supervision when online (see also Livingstone and Helsper, 2008). Ofcom (2014) reports differences amongst parents with regard to the strategies used. For 3-4 year olds, 16% of parents use a combination of all four strategies, 35% a combination of three, 34% a combination of two and 14% simply supervise the child when online. For 5-7 year olds, 33% of parents use a combination of all four strategies, 31% a combination of three, 21% a combination of two and a small minority selects only one of the strategies. Surprisingly, 5% of parents do not mediate their child's digital engagement at all. For the families in this study, the majority appeared to focus on strategies (iii) and (iv). Only a few families mentioned talking to children about managing online risks and, as has been indicated, use of filters

was uneven and use of passwords did not prevent some children from accessing devices independently. The variation in findings may be due to the fact that the Ofcom survey included parents of children aged up to fifteen, whereas this study focused on the parenting of children aged under eight.

When online, Ofcom (2014) report that 50% of 5-7 year olds are only allowed to use sites approved by parents. This was certainly the case for many of the families in this study, although, as has been indicated above, there may have been opportunities for children to navigate the internet unsupervised. Ofcom (2014) also suggest that 60% of parents of 5-6 year olds (57% for 3-4 year olds) say they are nearby and regularly check what a child is doing online, 59% say they sit beside them to watch and help (71% for 3-4), 30% say they ask about the activities 27% for 3-4), and 17% check the browser history (14% for 3-4). None of the parents in this study mentioned browser history or discussing activity proactively; they tended to rely on the child's lack of skill or reported that they monitored children's activities by looking over their shoulders or using the internet alongside them.

According to Childwise (2014), 93% of mothers supervise their preschool children online, as compared with 55% of fathers. Older siblings also play an important role, with 24% supervising their preschool sibling online. In general, where there is an older sibling in the family, 43% of them get involved in the younger child's engagement with technology. In the majority of families in this study, it was mothers who supervised their young children's online use, whilst many fathers were responsible for setting up systems, such as downloading new products and creating parental locks. The majority of older siblings were involved at some point in their young brother's or sister's use of technology, even if this involvement had diminished in recent years due to their broadening interests outside of the family as teenagers.

Family engagement with young children around technologies is a key aspect of their experience. As other studies have demonstrated, intergenerational communication and play with technologies is a part of young children's digital lives, with children engaging in activities such as playing online games and making video calls (using Skype or Facetime) with grandparents and extended family members, (Marsh et al., in press; McPake et al, 2013).

In relation to young children's digital lives, therefore, the findings of this study are in line with previous studies, which have indicated that young children's media use is shaped partly by parents' beliefs, values and ethnotheories (Marsh et al., in press; Plowman et al., 2012), in addition to other influences, such as the extended family, peers and institutions such as nurseries and schools.

How could the study be improved?

Given the timescales involved, all teams had difficulties with recruiting families from low socio-economic backgrounds. A different recruitment strategy in which parents are met informally or at a school event first and then invited to participate may be more effective.

During the family visit, it was difficult to manage the interview and capture observations of the setting and the children's activities, especially the details of their engagement with various technologies. Managing the situation with more than one child and more than one parent was challenging at times.

As 6-7 year olds often have siblings a few years younger than themselves it is important to adopt non-interview based strategies suitable for involving preschool children in the

research. A combination of ethnographic and participatory methods such as video diaries, drawing and puppets are suitable for this age range.

The study focused on devices within a domestic setting, but neglected the use of such devices outside the home or in transit, such as in-car DVD systems or iPod docks, tablet use in cafes and when travelling or digital cameras on holiday. Questions relating to digital usage for leisure outside the home may produce some interesting findings.

We might want to consider ethics more comprehensively. It is generally considered good ethical practice to obtain consent from children as well as parents, and so the UK teams opted to make use of simple consent forms. One ethical dilemma highlighted by family 8 was parents putting pressure on their child to participate, regardless of their signs of reluctance. In this case, the girl's uncertainty stemmed from her shyness and she enjoyed the experience once this was overcome. If the purpose of the first visit is for familiarisation only, children can see the researcher(s) welcomed in the house as a guest and recognise them on the second visit.

It was not possible to examine issues relating to vectors of identity such as gender, ethnicity, social class and disability, given the limited sample. This would need to be addressed in future studies.

Given that children in England and other countries in the EU (e.g. Estonia) are now learning to program at this age, it would be interesting to examine what, if any, impact this might be having on types of activity and favoured devices.

Methodological recommendations for future research

The observation protocol and interview guides were helpful points of orientation for each team to implement the study. However, the timetable for the project was very ambitious and left limited time for recruitment and analysis.

Based on the pilot findings, more research is needed to identify and test different methods and activities that engage children aged five and younger. In addition, to make optimal use of the breadth and depth of insights that family interviews offer, different methods are needed to capture observational data. The codebook was very complex and could be streamlined in a future study.

We would need some categorisation of high, medium and low digital use across the nations. This needs careful consideration as research shows clearly that high levels of ownership do not equate to high levels of use – for preschool children, at least (Plowman et al., 2012).

If children's competence and skills in using digital technologies are going to be assessed, we need standardised measures and should undertake more than one visit to each family.

Future directions for research on this topic

This pilot study has indicated that there is a great deal of information to be gained from research that involves both parents and children reflecting on the same issues. There is a need to scale up the project to include larger, more representative national samples. Some of the questions pursued in this study need addressing at this broader level.

In addition, it is clear that the influences on young children's use of digital technologies extend beyond the home, to extended family members, neighbours, peers and institutions such as nurseries and schools. In Scotland, for instance, 87% of 6 year olds have one or

more grandparent living nearby (within 20-30 minutes' drive) and grandparents are a key source of regular informal childcare for parents (Jamieson et al., 2012).

This study included children aged under six, but they were not the key respondents in all of the family interviews, There is a need to address the differences in experiences and practices for children of different ages e.g. 0-1, 2-3, 4-5 and 6-7.

Further participatory methods should be included in future research, in order that children's voice and agency can inform the study in greater depth.

Research is needed that traces children's practices across home and school domains and examines the impact of school input on online safety on family practices.

Finally, the study identified the need for further research on the most effective ways to develop parents' understanding and practices with regard to the development of their children's critical digital literacy. An intervention study is required which examines the effectiveness of family digital literacy programmes in enhancing parental support of children's developing digital literacy skills.

Conclusions

The children in this study led active and varied lives in which technology played an important, but not overwhelming part. Use of technology was balanced with many other activities, including outdoor play and play with non-digital toys. Technology was embedded into everyday family life and included intergenerational interactions around technology. Extended family members and networks outside of the home play an important part in socialisation with regard to children's technology use.

This study indicated that tablets have a growing importance in young children's digital lives. Although the children in this study rarely owned them, many used parents' or siblings' tablets, or had access to them outside of the home. For the families in this study, tablets appeared to be displacing games consoles as the gaming device of choice. The touchscreen interface meant that young children were able to access tablets more independently at an earlier age than they can other technologies, such as laptops and computers. Tablets were used for a variety of purposes, including creative production (for example through the use of drawing apps), but a primary use was the playing of games. Children also enjoyed watching moving image media (films, videos and television programmes) on them. Generally, only free apps were permitted for download, suggesting that spending priorities may not extend to app purchasing, favouring instead physical toys, books or magazines. Parents had not yet realised that paid-for apps may be better value in as much as there may not be the same risks of in-app purchases or advertising content. There was a notable lack of use of educational apps, especially when compared with younger children and families generally did not engage with providers such as Dorling Kindersley (apps such as the human body, dinosaurs, times tables), preferring book encyclopaedias.

The games played on tablets were also frequently played on parents' smartphones. A narrow range of games may be played repetitively until children got bored of them, or became competent at them and completed all levels, at which point they moved on to a new game. Smartphones were also used for viewing moving image media. These activities also took place on computers and laptops. Frequently, games played and videos watched across these devices related to children's popular cultural interests, such as Disney films or popular music. Some children were competent at using smartphones to take photographs and create short videos, although it was often parents who managed these

(e.g. deleting unwanted media and uploading photographs and videos to desktop computers or laptops).

There was evidence from this study that young children were watching television across portable media such as laptops, tablets and smartphones, using on-demand and catch-up facilities. There was an increasing use of streaming services to access films and music (e.g. Netflix, Spotify). The portability of devices meant that children access media in a range of spaces, including parents' and siblings' bedrooms, so there was less reliance on TV sets and DVD players in children's bedrooms than has previously been the case.

Whilst young children did access online sites, many of them had limited understanding of the risks associated with online use. Parents' strategies for managing children's online use were patchy in nature and many parents believed that they needed only to develop further strategies when children get older. There was sometimes a disconnect between a parent's and a child's accounts of technology use and when this related to access to devices through the use of passwords, it highlighted the need for use of filters. Encountering violence and strong language were of more concern for many parents than sexual content or contact issues. Some parents suggested that they would welcome advice on fostering children's online safety. Advice from schools appeared to be limited nor did there appear to be substantive communication between schools and homes on issues relating to uses of technology.

Whilst these findings are of interest, they are based on a limited sample and, thus, the study has identified the need for more extensive research in this area. It is clear that children aged from birth to eight are active citizens in the digital age, yet there still remain significant gaps in knowledge with regard to their access to and uses of technology. If Europe is to meet the societal and economic challenges of the decades ahead and to promote more equitable access to the literacy resources of a digitally mediated community, then urgent action needs to be taken in relation to the issues identified in this pilot study.

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Annex

School Invitation Letter (London version)

Dear XX (Headteacher)

<u>Study of Young Children (0-8) and Digital Technology</u>

I am a professor from the London School of Economics and Political Science who is working with the European Commission to study young children and their families' experiences with digital technologies such as smartphones, tablets, computers and games. By learning about the views, experiences and concerns of families, we hope to help create a better internet for children.

I am writing in the hope that you could suggest some families to participate in this study.

We are looking for a few families with <u>a child in Year 2</u> (aged 6 or 7) and one or more younger children. We wish to visit these families at home in the coming few weeks. I attach a letter of explanation for the families. Ideally, they would not be selected for any special reason – the aim is to have a mix of families (in terms of family composition, ethnicity, etc.), preferably from less-than wealthy homes.

The goal of this study is to gain a better understanding of how children between 0 to 8 years old engage with (online) technologies, and to identify potential benefits and risks associated with their (online) interactions with new technologies. The study is pioneering in Europe, and will include 60 families in total, and is also being conducted in Belgium, Finland, Germany, Italy and the Czech Republic. The project has received ethical approval from the European Commission and the LSE, and I have an enhanced CRB check.

I hope I may call you in the next day or two to discuss this possibility? Easiest might be if a year 2 teacher could send the parent letter home with a class one day this week, and we see which parents get in touch with me? Or, a year 2 teacher might perhaps select some of the less wealthier families for me to approach? I would be happy to offer the school something in return – a presentation to teachers or parents maybe, or some feedback on the findings to the school and/or parents?

I understand that this is a busy time of year, but really hope that this is of interest to you. I would be happy to discuss any questions you may have. Thanks for your kind attention.

Yours sincerely, etc.

Parental Consent Form (London version)[4]

Dear Parent

Research Project Title: Young children (0-8) and Digital technology

You are being invited to take part in a research project. Before you decide it is important for you to understand why the research is being done and what it will involve. Please take time to read the following information carefully and discuss it with others if you wish. Ask us if there is anything that is not clear or if you would like more information. Thank you for reading this.

What is the project's purpose and who is funding it?

The European Commission (Joint Research Centre - Institute for the Protection and Security of the Citizen) is financing and conducting a research project to explore young children and their families' experiences with digital technologies. Seventy families are included in the study. We will look at how families use these technologies and the potential benefits and risks. The results of this study will inform future research and recommendations on the benefits and challenges of young children`s use of digital technologies.

Why have I been chosen?

We are approaching parents of children in Year 2, often those who also have a younger child or children. We will recruit 4 families in total.

Do I have to take part?

It is up to you to decide whether or not to take part. If you do decide to take part, you can still withdraw at any time without it affecting any benefits that you are entitled to in any way. You do not have to give a reason

What will happen to me if I take part?

The research project will be conducted from September to December 2014. You, as parent(s), will be contacted by Professor Sonia Livingstone from the London School of Economics and Political Science who will arrange to conduct the interview with your family at home.

The family visit will be for around 1.5-2 hours. Interviews will be audio-recorded and the researcher will take notes as well during the interview.

We would like to talk to any of your children present during the interviews, but our primary interest is your 6/7 year-old and any younger children.

First we will talk with parents and children together. Then we would like one researcher to talk to your child/ children separately, using age appropriate tools such as cards games or toys. At the same time, the other researcher will interview the parent(s). The researcher may ask if he/ she can observe your child using digital technologies, if this is acceptable to you.

What are the possible disadvantages and risks of taking part?

There are no risks associated with taking part. A potential disadvantage is the time your family will devote to the interviews.

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[4] A similar version of this form was used in Sheffield and Edinburgh.

What are the possible benefits of taking part?

Families will benefit from the discussion with the researcher in reflecting in more depth on their own use of digital technologies. You and your children can ask us questions too, if you wish. When the study is complete, we will send you a short report of our findings.

What if something goes wrong?

If something happens which means you cannot take part in or wish to withdraw from the interview, please inform the Principal Investigator, Professor Sonia Livingstone (s.livingstone@lse.ac.uk; tel. xxxx)

If you wish to express a concern or complaint about the research team, you may contact Mrs. Stephane Chaudron, coordinator of this international study and researcher at the Joint Research Center (JRC) of the European Commission – Stephane.chaudron@jrc.ec.europa.eu, +39xxx.

Will my taking part in this project be kept confidential?

All the information that we collect about you during the course of the research will be kept strictly confidential and anonymous. Your personal data won't be revealed by the researchers to anyone else and you will not be identified in any reports or publications.

Will I be recorded, and how will the recorded media be used?

You and your children will be recorded using a digital voice recorder. The recordings will be stored encrypted in a temporary repository of the University for the time necessary to produce an anonymised transcript version. As soon as the transcript is available, the audio recording will be permanently deleted.

Photographs may be taken of tools, devices and children's digital-related activities but not of any faces, so no-one will be identifiable.

What will happen to the results of the research project?

The research team conducting this research at the London School of Economics, which is the guarantor of the anonymisation process. The research project may lead to publications (reports, journal papers, chapters in books) and conference presentations. You and your children will not be identifiable in any publications and presentations.

Once anonymised, the interview and observation materials may be reviewed by the research teams conducting this research at KU Leuven (Belgium), Masaryk University Brno (Czech Republic); University Medical Center Mainz (Germany), Future School Research Center (Finland), Università del Sacro Cuore Milano (Italy), Moscow State University (Russia), University of Edinburgh (UK), London School of Economics (UK), University of Sheffield (UK); and any other University that may join the research project, and also by the Coordinating research team at the Joint Research Center of the European Commission supporting the study.

Who has ethically reviewed the project?

The European Data Protection Supervisor and the London School of Economics Research Ethics Committee reviewed this research project and found it to be acceptable according to applicable national and European legislation (European directive 95/46/EC) and university policies designed to protect the rights and welfare of participants in research.

Contact for further information

Prof. Sonia Livingstone (s.livingstone@lse.ac.uk; tel. xxxx).

Signing the informed consent form

I have read (or someone has read to me) this form and I am aware that I am being asked to participate in a research study. I have had the opportunity to ask questions and have had them answered to my satisfaction. I voluntarily agree participate to participate in this study.

I am not giving up any legal rights by signing this form. I will be given a copy of this form.

I have received £100 as a High Street Voucher.

Printed name	**Signature**
	Date and time
Printed name	**Signature**
	Date and time

Investigator/Research Staff

I have explained the research to the participant or his/her representative before requesting the signatures above. There are no blanks in this document. A copy of this form has been given to the participant.

Printed name of person obtaining consent	**Signature of person obtaining consent**

Child Consent Form

Finding out about your digital life

[Tick one box ✔]

I am happy to take part in this project and to answer questions about how I use digital technologies

I am not happy to take part in this project and I do not want to answer questions about how I use digital technologies.

My name is……………………………………

To be completed by researcher:

Date:

Participant identification number for this project:

Finding out about your digital life

I would like to ask you some questions about how you use digital technologies, such as computers, laptops, mobile phones and so on. I will record your answers on a voice recorder.

I want to find out about how you use these and what you think about them. We are also asking children in other countries in Europe the same questions, so we will be able to think about what is the same and what is different about children using technology in different countries.

If I ask you a question that you do not want to answer, that is fine, just don't say anything, or tell me that you don't want to answer it.

If I say something you don't understand, please ask me to explain it.

We can stop the interview at any point and you can go to do something else. Please do not worry about that, just let me know.

Your name or photograph will not appear in any writing about the project and they will not be put on a website.

Please let me know if you are happy to take part by putting a tick in the box next to the smiley face on the next page, or if you do not want to take part, put a tick in the box next to the sad face.

Edinburgh Appendix

EA.1 – Icebreaker card game images

Family 8 (participants UK8g7 & UK8b4)

Items selected: radio, MP3 player, toy car, VTech toy laptop, Playmobil, TV, ball

(identification as given by child)

Note: UK8b4 also selected the radio, toy car, Playmobil, TV and ball, but did not select any of the digital devices.

Family 9 (participant UK9g6)

Items selected: MP3 player, Playmobil, smartphone, TV, LeapPad, tablet, iPod, radio, Barbie, laptop, games console, toy car

(identification as given by child)

Family 10 (participant UK10b7)

Items selected: games console, TV, tablet, Playmobil, ball, iPod

(identification as given by child)