COST Action IS1410

A Day in the Digital Lives of 0-3s

Final Report

DigiLitEY

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EUROPEAN COOPERATION IN SCIENCE AND TECHNOLOGY

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Executive Summary

The 'A Day in the Digital Lives of Children aged 0–3' project investigated the ways in which digital technologies inform the lives of very young children and their families. Our literature reviews (Kumpulainen & Gillen, in production; 2017) have shown that this is an underexplored area, although of growing significance.

This report summarises the work carried out by researchers as part of the research of DigiLitEY Working Group 1 'Digital Literacy in Homes and Communities'. We implemented a highly participatory and intensive research methodology with 13 families, with the focus on one child in each family. The focal children, eight girls and five boys, were aged between nine months and 34 months at the time of the visits. Families were recruited from Finland (1), Israel (1), Portugal (3), Spain (2), Sweden (2) and UK (4). The research methodology was mainly a qualitative case study approach: 'Day in the Life' (DITL) (Gillen et al., 2007; Gillen & Cameron, 2010) - using a combination of interviews, observational field notes and video recordings to collect data - with the focus being on one day in the life of the child and their family. Additionally, we collected comparable quantitative data in the form of inventories, such as, inventories of technologies available in the home. We now turn to summarising our findings under our four research questions:

1. How does technology inform the daily lives of children aged from birth to three?

All of the children had some form of digital technology in their lives. The households listed between five and thirteen types of digital devices that they owned. Most devices which were used by the children were owned by a parent or belonged to the household, and where children were described as 'owning' their own technological items, these were predominantly electronic toys. Some households had items to which the children had no access, including laptop computers which parents used mainly for work. Children were also discussed as accessing digital media elsewhere, and witnessing a considerable amount of use including in daycare/kindergarten settings. Technology plays a range of

roles in the children's lives and is often integrated into the rhythm of the day with relatively fixed times for various activities. Technology is frequently used to influence the children's mood (i.e. make children happy) or behaviour. The children also had traditional toys and games, and they are indeed important parts of their lives even in cases of children who spent relatively more time with technologies. In some cases, technologies are integrated seamlessly as part of non-technological activities, enhancing their experiences and interaction with the world. Even where children were not using technology themselves, they were frequently interested in observing their parents and siblings in using technologies.

2. What digital literacy skills and competences do children in this age group develop as they engage with technologies?

Children are learning how to use technology for education and entertainment. They are learning how to access the content they are interested in. More specifically, many parents commented on the children's abilities to identify the apps they like to use, open them and find the content they prefer, either unassisted or with some assistance. Some can also drag items over screen, swipe the screen or make alterations such as changing the volume. A few could take a photo, or even make a video with some assistance.

The degree to which technology is used in an educational way varies between the families – in some cases children are using technology to learn about things, e.g. apps and/or educational videos which teach literacy, including a foreign language, or numeracy skills. In these instances, they are simultaneously learning how to use the technological devices and using technology to learn other skills.

Children also learn about digital media and people's relationships with technology through observing others (i.e. parents or older siblings) using devices. Some learn from older sibling(s), through observation and asking for their help before approaching parents. Children will also try to apply skills they have learned from using one device to another.

3. How do parents or carers mediate young children's use of technologies?

Mediation of children's usage of the devices varied greatly, from interaction that was entirely controlled by adults (e.g. parents showing them a YouTube video on a laptop) to completely unsupervised access (e.g. child using smartphone on their own in their room or using a remote-control device). In most cases there is some supervision, and use of 'blocking' technology if children have access to the internet, so they cannot access unsuitable content.

For the children with the lowest levels of technology use, parents limit the number of devices accessible to them in the home. Many parents also 'negotiate' the levels of usage – for example agreeing in advance the number of episodes of a cartoon the child can watch or the length of time they can spend playing a game. In order to mediate their child's use of technology some parents also limit their own use in terms of time and type of activity in front of the child. With children who have higher levels of use, there is sometimes a sense that technology is being used to 'babysit' with less parental supervision or mediation, although some parents use 'remote' monitoring, such as using control settings and receiving emails informing them which content the children have accessed on YouTube.

Several families demonstrated and reported issues with parents not agreeing on levels of mediation or approaches in mediation, and some children were demonstrably mediating their own use independently of adult support, although the families had made the devices accessible to children.

4. What are parents' or carers' perceptions of and attitudes towards the current and potential future use of technologies by their young children?

The parents all acknowledge that children need to learn how to use technologies although not necessarily at their current young age. They hope for and expect them to become skilled users while they also have concerns for their future use, especially when children start to use social media. Some parents think that children should be exposed to and acquire different skills at this young age. On the other hand, some parents feel strongly

that children's use of technology at a young age should be very limited – they prefer them to learn through traditional toys and games, and to interact with people. However, many of the parents recognise that digital technologies and the content they deliver create joint reference for children to socialise and play together, hence and strengthen the peer culture. If children are not able to access this peer culture, they may be excluded which again can threaten their peer relationships.

Many parents felt that their teaching of digital skills would help to limit any potential 'damage' caused by children accessing technology in an uncontrolled way outside the home. Where they expressed concerns these were mainly around the internet – access to unsuitable material – and social media, especially the potential for contact with undesirable people and issues such as online bullying. There were also some concerns around excessive technology use interfering with the child's development, with too much screen time affecting concentration levels and keeping them away from traditional, 'creative' play and education. There is also a sense of social 'embarrassment' for some parents in admitting technology as if this reflects negatively on their parenting skills. However, most parents seem aware of the potential benefits of technology, and keen to identify those aspects of it which will be 'good for' the children, such as educational videos or apps which develop motor skills. For many, achieving a desirable balance in what they consider to be an appropriate use of digital technologies by their children is not a simple matter.

Introduction

The 'A Day in the Digital Lives of Children aged 0–3' project aims to identify the way in which digital technologies inform the lives of very young children and their families. Most research focusing on the benefits and challenges associated with children's use of technology has, so far, mainly targeted 9-16 years olds (e.g. (Byrne, Kardefelt-Wither, Livingstone, & Stoilova, 2016; Livingstone, Haddon, Görzig, & Ólafsson, 2011; Mascheroni & Cuman, 2014). Over the past few years, however, the digital practices and literacies of children under eight have been the focus of relevant research, and the area of study is rapidly growing (e.g. (Chaudron, 2015; Chaudron, Di Gioia, & Gemo, 2018; Sefton-Green, Marsh, Erstad, & Flewitt, 2016) while a wide range of media may be accessible from infancy (Marsh et al., 2015). Children are going online at younger ages, too, which may involve risks as well as providing new developmental and learning opportunities (Byrne et al; 2016). And, their digital practices and skills developed at home have important implications for their learning in school (e.g. Sefton-Green, Marsh, Erstad, & Flewitt, 2016). Different networks of researchers involved in the area of study propose that increasing the body of research on younger children especially children aged under five continues to be a priority (Ólafsson, Livingstone, & Haddon, 2013).

The research programme A Day in the Digital Lives of children aged 0-3 responded to the call, focusing on children below 36 months of age and centring on video recording and observing one full day of a child's activity, rather than relying on parents' (self-)reports or retrospective interviews with them as is often the case in existing studies. Our study is transnational, involves children of varying ages within this group and takes a dynamic view of culture. The research team is multidisciplinary, including from Media and Communications Studies, Education and Cultural Psychology. Data was collected in 2017-18. This full report follows up on our summary report: Gillen, J. et. al. (2018) A *Day in the Digital Lives of Children aged 0-3. Summary report by DigiLitEY COST Action IS1410 Working Group 1 "Digital literacy in homes and communities"*.[1] The purpose of this report is to describe the empirical findings of our project overall; further publications will develop analyses and theoretical considerations. Furthermore, we anticipate that in the future

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[1] http://digilitey.eu/wp-content/uploads/2018/06/DigiLitEY-A-Day-in-the-Digital-Lives-FINAL.pdf

further studies will be undertaken, indeed in Finland one further case study is already underway.

Research Questions

The aim of this project is to answer the following questions:

1. How does technology inform the daily lives of children aged from birth to three? 2. What digital literacy skills and competences do children in this age group develop as they engage with technologies?

3. How do parents or carers mediate young children's use of technologies?

4. What are parents' or carers' perceptions of and attitudes towards the current and potential future use of technologies by their young children?

Methodology

The researchers visited 13 families, with the focus on one child in each family. Some had older siblings or a younger baby in the family. (See Table 1 for the summary of case families). The focal children, eight girls and five boys, were aged between nine months and 34 months at the time of the visits. Families were recruited from England, Spain, Israel, Finland, Sweden and Portugal. Seven of the families were already known to the researchers – either personally or via previous research participation – whereas the rest were recruited through personal or academic contacts. While recruitment was undoubtedly challenging, owing to the demands made on the family, diversity of families recruited was achieved in terms of socio-economic status, ethnicity and size. Some families were particularly enthusiastic about contributing to the research; all recognised that participation involved a substantial commitment.

The researchers used the 'Day in the Life' (DITL) methodological approach (Gillen et al., 2007; Gillen & Cameron, 2010) - using a combination of interviews, field notes and video recordings to collect data - with the focus being on one day in the life of the child and their family. Ethical considerations are integrated into every stage of the research; at the same

time formal ethical approvals have been sought for the project locally according to the regime, for example as regards institutional or regional requirements.

Video-recording a full day of a child's activities helps build a holistic and profound understanding of young children's engagement with digital media and parents' mediation strategies. It also allows a multiplicity of lines of analysis, including discrete and even new areas for investigation that are not possible to be anticipated in advance. A combination of different methods such as video recording and subsequent interviews can be revelatory as to tensions, for example in this project how one family stressed their resistance to technologies at the same time as video recording revealed their embedded nature in family life.

In this study, researchers carried out a preliminary discussion with the parents (either in person or by telephone) followed by three visits to the family which took place in 2017/ early 2018:

1) During a familiarisation and pilot visit the research team meets the family, fully explains the project and gains initial consent for the research, while stressing that this will be an ongoing process. The researcher also gathers basic demographic, health and lifestyle information working with a common interview schedule and also pilots videoing of the child's activity for about an hour.

2) During the main 'Day in the Life' the child's activities are recorded for a minimum of six hours in total, turning the video off during periods of sleep, bathroom activities and whenever the family wish. Almost all the time, two researchers were involved in this process, one researcher video recording the activities while another took field notes.

3) A few weeks later the lead researcher returns in the 'Iterative Stage' review and discusses the recordings with the parents. The researchers have compiled extracts from the day, totalling around half an hour in length. They discuss this data with the family, while (audio) recording this discussion. The purpose is to review and discuss the clips (thereby including the parents in the initial analysis process) as well as to ascertain their attitudes to technology and thoughts and concerns about their children's usage of it. As instruments for this final interview, two materials were used:

3a) About a half hour compilation video of clips where the focal child is in some relation to digital technology, selected and compiled by the researchers who conducted the visit.

3b) Interview prompts to help cover the common issues related to the parents' attitudes to technology if they have not emerged during the discussion of the compilation video.

In addition to these, we all completed a survey regarding the technological devices owned by the family, devices and applications accessed by the child, and the competences demonstrated by the child. The researchers completed this during the various stages of the research.

To help the comparative analysis among cases, a common report was drawn up and completed by each research team. This report consisted of a summary of the process of data collection (recruitment, the first visit, the 'day', and the final interview), responses to the research questions, and appendices that included the summary or transcription of the interviews with the parents and the completed survey. The lead researchers from each country also met physically in Lisbon in February 2018 to share analyses and since then various team members have met, face to face and remotely, in various combinations to discuss results, analyse, present conference papers (e.g. Sandberg & Jorge, 2018) and develop our writing.

Researcher reception

Most of the researchers found that the families were welcoming and although some children were initially unsure about having someone else around, they all became accepting and some were very curious and keen on having another person visiting. Researchers aimed to cause as little disruption to the family's normal routine as possible, and in the majority of cases felt that they had achieved this. Children were often interested in the camera equipment at the start of the process, but most researchers noted that they felt that the family carried on with their normal activities despite being observed and filmed. For example, one researcher claimed, "What we have on video is a regular day of this family during weekends... We tried to interfere as less as possible and I think it was achieved".

However, in a few instances, researchers observed possible changes to the family's behaviour – for example in a one-parent family where the researcher explains that, "d*espite stressing that it should try to be as normal as could be, I felt that the mother took advantage of having an adult in the house to look after the boy, or maybe she felt she would interfere less; and she may have felt that there was a desire to show that the young boy used the tablet."*

In all cases we are aware that what occurred was not an impossible ideal of a recording of a day that would have been the same without the research but we can claim that some practices, values and attitudes are made accessible by this research method.

Summary of findings

The findings from the study are organised in a form of response to each research question posed to the study.

RQ1 How does technology inform the daily lives of children aged from birth to three?

All of the children had some form of digital technology in their lives. The households listed between five and thirteen types of digital devices that they owned (see Table 1). We have to say "types" since, for example, there may have been more than one smartphone in a family. This includes a television set (a standard set or a so-called Smart TV connected to internet), smartphone, tablet or e-reader, and PC or laptop (See also Table 2 for the summary of the digital devices owned by the case families). The focal children of the study had access to many of the devices, but usually not all. For instance, Oscar's family had five devices – one of the families that possessed the least types of devices – and Oscar only has access to two of them, that is, the TV set and a CD player only available in the car. He also could access a broken iPad (not counted as one of the five types of devices), but he does not have access to iPhones, PlayStation and PC/laptops. However, 14-month-old Lily in the UK had access to all nine types of devices in the family, including the TV, iPad, PlayStation, and iPod.

Most devices which were used by the children were owned by a parent or belonged to the household, and where children were described as 'owning' their own technological items, these were predominantly electronic toys such as battery-operated dolls or cars. For instance, Wanda – 9 months from UK – did not have any digital toys herself, but she had an electronic walker, electronic story book and electronic singing / dancing bunny character. In a few cases, children owned a tablet, such as Lily: she had a tablet which had been her mother's, and was 'adapted' for her with a pink frame and handle. In the case of Tomás, although the parents bought a tablet for their children, he did not use it very much, not because his elder siblings occupy the use of it, but he prefers his parents' iPad and smartphones.

Some households had items to which the children had no access, including laptop computers which parents used mainly for work – several parents commented that the children associated the household PC or laptop with work. This was the case for Vicente, in Portugal, although he did inherit a tablet from his older brother. There were also devices such as computer gaming systems which were owned by older siblings and to which the younger child had limited or no access, such as Oscar in Sweden.

Children were also discussed as accessing digital media elsewhere, and some instances of this were captured directly in our data. For example, Charlie visited his grandparents' home during the day and used his calculator and blood pressure machine. Some parents talked about their children's access to digital devices in other places, such as Matias (from Portugal) seeing a film on a tablet at his nursery, or Vicente, playing with a PlayStation made available for children to use at a hospital. Parents sometimes commented on practices in their children's kindergarten or other experiences and even their own connection with it. For example, Dana's mother in Israel said, "*Even in preschool, although they don't formally use screens, the teachers use their smartphones all the time.*" Charlie's mother, in England, said, "'*Staff all have iPads' and parents are used to being sent clips via Tapestry- the online learning journal software. I absolutely love it. When I was at work, I was addicted to it….*"

The lowest level of usage by a child involved just watching TV/ YouTube cartoons which were put on by the parents, which all children in the study did as part of their 'day.' Most children had a higher level of usage than this, not only selecting which programmes or videos to watch but including some usage of games or apps on tablets or smartphones (see Table 3). A number of parents used applications for learning (e.g. matching shapes, learning numbers/ letters/ words etc.). Many also engage in audio or musical play, such as listening to nursery rhymes and storybooks (e.g. Roser), or playing keyboards (e.g. Dana). Children were also involved in activities such as video calls with relatives. Wanda's mother, for instance, called Grandmother through WhatsApp once a day when she was making tea, and Wanda would engage in the video call.

As such, technology plays a range of roles in the children's lives and was often integrated into the rhythm of the day. Some might watch a cartoon or play a game after a meal or nap, or before bedtime. This was exemplified by the family of Anna from Sweden. After she

woke up before breakfast, she sat on a mattress on the floor watching videos in English on YouTube. After dinner, the whole family removed all toys from the living room and prepares to watch a public Swedish TV programme for children 'Bolibompa' before going to bed. This preparation also included Anna putting on her silver, sparkling skirt, that she always wears on top of her pyjamas when watching Bolibompa.

The digital activities as above could be both a social/family activity, e.g. watching YouTube with siblings or parents, or a solitary one, such as playing with a game on his or her own. Technology was frequently used to influence the children's mood or behaviour, i.e. putting on a cartoon to cheer them up or calm them down when they are upset (e.g. Gloria, when she started to cry having a sour yogurt after a nap), or letting them watch TV to facilitate feeding (e.g. Dana), or giving them a smartphone to 'play with' if they are impatient in a restaurant or waiting room (e.g. Roser).

The children also had traditional toys and games, and they were indeed important parts of their lives and the 'day', even in cases of children who spent relatively more time with technologies during the 'day'. So Dana in Israel for spent part of the morning playing with truck and car toys as well as reading a book together with her mother and her siblings. However, in some cases the toys were influenced by technology, such as soft toys or pillows featuring characters from their favourite TV cartoons (e.g. Vicente from Portugal has a small pillow from Paw Patrol). The children were often observed or reported to repeat songs or phrases from videos or games, even when away from technology (e.g. Dana from Israel).

In some cases, technologies were integrated seamlessly as part of non-technological activities, enhancing their experiences and interaction with the world. Emma's mother used internet searches to find related craft activities for her to do, and Emma liked her parents to take photos of her to capture her experience. For example, when she "*climbs somewhere she hasn't climbed before... she may say, 'Mom come and take a photo.'.. and she wants me to see the photo and... 'wow,I did it!'*" (Mother of Emma). This kind of activity was n important part of how Emma processed her own experiences and achievements. In the case of Charlie, his parents commented on how technological activity can stimulate imaginative play. After watching Octonauts' episode [a video programme] about pirates, *'We went upstairs and we played pirates for about an hour and a half and then we went*

and got some pirate books out and that just directed our morning in a way that it wouldn't have gone' (Mother of Charlie).
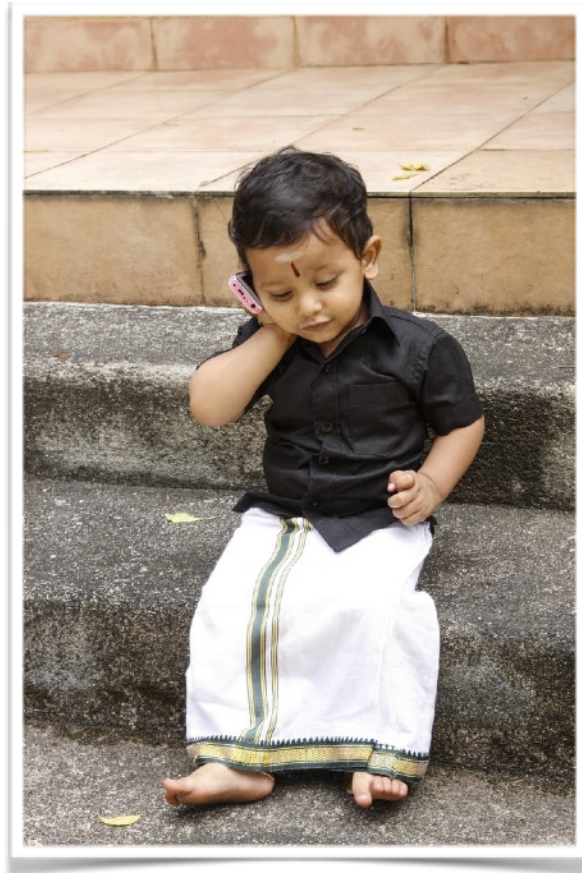
Researchers noted that even where children were not using technology themselves, they were frequently interested in observing their parents and siblings. For example, Gloria from Spain, whose only 'usage' of technology was being shown cartoons and music videos on a laptop and DVD player, nevertheless observed many uses of a laptop, smartphone and e-reader by her parents.

Some of these uses were simply observed by the child – the parents jointly using the laptop and discussing the contents on the screen in her presence as the case of Gloria. Others were described by the researchers as "directly targeted towards her", such as being recorded by a parent using their smartphone. Even when the technology is not being used as such, it is often present, for example, the television being on in the background (such as the case of Lily and Roser), or the parent's smartphone always being present even if not currently in use.

RQ2 What digital literacy skills and competences do children in this age group develop as they engage with technologies?

These children were learning how to use technology for education and entertainment. They were learning how to access the content they are interested in and how to make choices about their technology use. More specifically, many parents commented on the children's abilities to identify the apps they liked to use (e.g. YouTube or a particular game on a tablet), open them and find the content they prefer, either unassisted or with some assistance (see Table 4 Skills and capabilities with applications). Some could also drag items over screen, swipe the screen (e.g. to change photos, turn the 'page' of an e-book), or make alterations such as changing the volume. A few could take a photo, such as Emma, who liked to do so particularly, as well as engaging in creative activities and internet searches with some assistance. Charlie could make videos of himself using his parent's smartphones and send them through WhatsApp to his friend's parents to share with his friends.

The degree to which technology was used in an educational way varies between the families – in some cases children are using technology to learn about other things, e.g. apps which teach literacy or numeracy skills (E.g. Lily and Anna), or educational videos on YouTube (e.g. Dana). Some parents used the internet as an educational tool, for example getting children to suggest an animal to search for, and showing them the pictures they have found – so they are gaining awareness of how to search online as well as about the animal, as the case of Emma. She also suggested her parents do internet searches on things she sees, for instance in nature, and showed her the results to learn about them. In these instances, the children are simultaneously learning how to use the technological devices and using technology to learn other skills.

Both researchers and parents commented that children learn about technology usage and people's relationships with technology through observing others (i.e. parents or older siblings) using devices. For example, they know how to unlock a smartphone and find an app on it, even though they haven't directly been taught how to do this: "*We never teach her, we never give her our device, but when she has the device, she knows how to unlock it, she know [sic] how to find the YouTube*" (Father of Lily). For those who have elder sibling(s), they learn by observing what the siblings do and they ask for their help first

before asking parents (e.g. Vicente). Children will also try to apply skills they have learned from using one device to another, such as trying to unlock an unfamiliar smartphone or tablet (e.g. Lily).

Researchers observed that the young children's skills were still developing. For example, they might sometimes watch a video with the screen rotated the wrong way. Tomás, when using his mother's smartphone sometimes clicked on the advert and opened a website by mistake. Then, he needed to get help to close adverts, as he was not able to do this yet. In the learning stages, children are seen to mimic behaviour, for example: "*He knows how to turn the TV on, but he cannot make choices of the programs. But he pretends to when using the remote control*" (Mother of Oscar). Parents would support a child's use, for example Charlie made a short WhatsApp video to send to a friend who had moved away, supported by his mother.

Some parents, especially when reviewing the video footage in the iterative stage, commented on changes in children's attention levels. This is sometimes suggested to have been impacted negatively by technology, as suggested by Dana's nursery school. However, there were also comments about increased levels of concentration with age, such as children being able to concentrate on a game or interact with an app for longer (e.g. Vicente). Some parents also commented on the evolution in children's digital activities and skills. For instance, Oscar in the iterative stage visit was using the smartphone a lot and showed good skills in navigating on the screen while on the 'day' his primary digital activity was watching TV programmes.

RQ3 How do parents or carers mediate young children's use of technologies?

Mediation of children's usage of the devices varied greatly, from interaction that was entirely controlled by adults (e.g showing them a YouTube video on a laptop) to completely unsupervised access (e.g. child using smartphone on their own in their room or using a remote-control device). In most cases there is some supervision, and there is use of 'blocking' technology if children have access to the internet, so they cannot access unsuitable content. For instance, Dana's parents have installed software provided by the internet service provider, to prevent access to unsuitable sites.

For the children with the lowest levels of technology use, such as Anna in Sweden, parents limit the number of devices accessible to them in the home. For example, mother of Matias only allows him to watch a TV for a short while on a specific channel, and the use of smartphones are only tolerated when they are at a doctor's and she wants him (and his elder sister) to stay still and quiet. The parents had bought a tablet for his elder sister, but once they had seen her watching YouTube videos uncontrolled for many hours without taking a break, they decided to ban the usage of technology at home as much as possible.

Many parents also negotiated levels of usage – for example agreeing in advance the number of episodes of a cartoon the child can watch or the length of time they can spend playing a game (e.g. mothers of Dana and Gloria). Parents will often sit with a child when they are using a device, but the researchers occasionally identified some problems with mediation in these situations – e.g. the child may struggle to pay attention to what the parent is telling them because their attention is on the technological device. A strategy that Tomás's mother used was to give him the phone when the battery is already low so it runs out naturally as he does not seem to get tired of using it. Anna was allowed to use an iPad at times when her parent did not want her to go to sleep.

In order to mediate their child's use of technology some parents also limited their own use. Petra's mother deliberately left her phone in another room when not needed so that Petra does not see her using it and is less tempted to ask for it. Charlie's mother tended not to use social media when children are around, partly to curb Charlie's interest. She said, "*Whatever you were trying to do he'd be trying to do it too*." Wanda's mother did not allow

the father to play X Box games in front of the children so that they are not exposed to inappropriate, i.e. violent content: "*He plays all the shoot them up games, I won't let him down here with it*".

With children who had higher levels of use, there is sometimes a sense that technology is being used to 'babysit' with less parental supervision or mediation, although some parents use 'remote' monitoring, such as putting control setting and receiving emails informing them which content the children have accessed on YouTube (e.g. parents of Tomás). Petra's mother commented that she tends to allow TV viewing 'when I'm preparing tea or where you know I've got lots of hot pans on the go and I think '*I sort of need you not to be hanging off my leg*" and also, "*When she has her very early rises (..) quarter past 5 sometimes … we come in and put the telly on and lie on the sofa and she can potter around so we are still horizontal*".

Parents intervened if they feel there is a problem, such as children becoming possessive over technology, arguing with siblings over devices, or spending too long on one activity. On the day of filming Tomás' father tried to mediate between the two boys over them wanting to watch different films on TV. Not succeeding to come to an agreement, he put the one the brother wanted to watch (Zootropolis) first and then later Lion King, Tomás's choice. The parents of Lily encouraged her to take breaks from technology gently through physical interaction, e.g. cuddling when she has spent 'too long' watching videos on the tablet. Roser's parents turned his younger brother away from the TV, noticing how strongly his attention was caught by it.

Several families demonstrated and reported issues with parents not agreeing on levels of or approaches in mediation. Occasionally it is suggested that the mother is 'more old-fashioned" than the father who is claimed to have a 'no holds barred approach' (this characterises the families of Roser and Charlie). While Roser's father thought it should be a collaborative process where the children learn how to use technology safely, the mother held the opinion that they need to strictly control it and delay the usage as long as possible. In contrast, Dana's father claimed his wife uses screens too much for Dana, although he appeared to be reconciled to the situation, as it is the mother who spends most of the time with children at home. In the case of Matias' parents, some technological activities by children are not shared between them although they are in general agreement.

For instance, Matias' mother did not know until the iterative stage interview that Matias' elder sister (aged 6) plays a game on her father's mobile phone.

There was some evidence of children starting to mediate their own technology usage – for example Gloria asking to 'get down' from their chair when she got bored of watching a cartoon. Or they shifted to engage with non-technological activities themselves (e.g. Petra and Emma). Emma's mother told the researchers: *"She could just stop and do something else... it's not that the child watches five hours in front of the TV if you would just give the chance."*

RQ4 What are parents' or carers' perceptions of and attitudes towards the current and potential future use of technologies by their young children?

The parents all acknowledged that children need to learn how to use technologies although not necessarily at their current young age. They hope for and expect them to become skilled users while they also have concerns for their future use, especially when children start to use social media.

Some parents think that children should be exposed to and acquire different skills at this young age. Lily's parents emphasised the importance of technology in educating their child – they were aware of the level of knowledge of her peers and wanted her to be able to 'keep up':

> *I use my phone to educate her. Hmm, the first time I used to restrict her usage of the phone because I did not want her to use her to be so into, you know, like technology, but then when she's mixed with other kids her age, she seems to be like a little bit left behind like she could not do some moves like from the videos the other kids are doing like you know from the song "Stomp your feet, Clap your hands" like she was a bit slow in that sense so I thought I wanted to expose her to some of it and to educate her through these videos. That is my purpose actually...* (Lily's mother).

Although Lily's parents were concerned that she should have a balance between digital and other activities, Dana's mother was highly positive about the role technology can play in her daughter's learning English. The parents' key objective was to expose Dana to screen content for this purpose. Her father stated, "*Our aspiration is that Dana will take the good and evaluative things from it because there is both good and bad in it. It amazes me that her brothers, who were not exposed, do not know English as well as she. She's like a sponge, if she persists, she'll succeed*."

On the other hand, some parents felt strongly that children's use of technology at a young age should be very limited – they preferred them to learn through the use of traditional toys and games, and to interact with people. Matias's mother stated that she feels technology "alienates" children and can be damaging due to its addictive nature. She considered she would benefit from guidance on the 'right' age to allow access to technology – her aim is

to keep their access to technology limited until they are ten years old, but she was unsure how realistic this is due to external pressures and activities at school.

Charlie's mother displayed concerns that he watches too much TV, and that they need to maintain a balance between technological and other activities. She worried that 'never being bored' may limit the development of his imagination, and is concerned that there is a lack of guidance on how much engagement with technology is 'right'. She mentioned societal pressure and parental guilt – that technology can be seen as taboo, particularly ,"…*having the television being the babysitter*".

Many parents felt that their teaching of digital skills would help to limit any potential 'damage' caused by children accessing technology in an uncontrolled way outside the home. Where they expressed concerns, these were mainly around the internet – access to unsuitable material – and social media, especially the potential for contact with undesirable people and issues such as online bullying. Roser's parents expressed concerns about their children's future usage of the internet and social media, agreeing that they will have to look at the security and privacy of these in order to educate their children.

There were also some concerns around excessive technology use interfering with the child's development, with too much screen time affecting concentration levels and keeping them away from traditional, 'creative' play and education. Vicente's mother expressed concerns about the prevalence of technology, e.g. over traditional games, and the fact that children are influenced by peer pressure to want to own and use more devices.

There is also a sense of social 'embarrassment' for some parents in admitting technology usage. Charlie's mother commented:

> *There is a real neurosis... one of the things that everyone I know with toddlers talks about is really apologetically 'yesterday we just had to put a film on'... we all feel a certain amount of anxiety when we are not actually doing stuff with them when they are watching the television.*

She felt there is a social pressure that technology is a taboo to be used with young children, while believing that there are "*really brilliant things*" that can be done with

technology. As Charlie's mother, at the same time, most parents seemed aware of the potential benefits of technology, and were keen to identify those aspects of it which will be 'good for' the children, such as educational videos or apps that develop motor skills.

Some parents thought that children will be able to pick up these skills easily, feeling that devices are "*designed for dummies*" (Gloria's mother) – whilst others said that they need to show/ teach the children these digital skills. However, they have all had to make decisions around when they introduce or allow different types of technology. The main concern usually expressed was a desire for balance. Oscar's mother was happy with his level of technology use – "*as long as they have other things as well and can play in other ways*". Anna's parents appeared in our data quite relaxed about achieving a balance although their attitudes differed somewhat. For example, the father had some concerns about advertising content which her mother was less concerned with. We did not witness contradictions between parents in discussion about the use of technology for learning, or the development of digital skills.

For many parents, achieving a desirable balance in what they consider to be an appropriate use of digital technologies by their children was not a simple matter. Petra's parents opined that technology is important and think she will need advanced skills in it for her future life and work. They did, however, feel the need to be 'selective' in what she watches and does with it, and expressed anxieties about future use, particularly with social media which they describe as "quite terrifying". Wanda's mother also expressed concerns, particularly around her children's future use of the internet; it is "brilliant" for learning but she worried too about the "darker side". She felt that she needed to monitor a child's usage and also make them aware of how to stay safe online: "*it's not safe to tell someone where you live*". She would like more advice on internet safety – she noted that they use tablet computers at school but claimed that the school didn't offer any advice on safety relating to technology. Some parents described themselves as 'skilled users' but others expressed worries about their abilities to teach technological skills and appropriate mediation in technology use, as they did not grow up with this technology themselves, and perceived a lack of or conflicting information on the right ways to introduce their children to it.

Many parents, such as Gloria's, expected that their children will use more technology once they go to school, and valued the place of technology in their future education. At the same time, many parents expressed about their children's future internet usage: access to unsuitable material and social media, especially the potential for contact with undesirable people and issues such as online bullying. Many parents felt that their teaching of digital skills would help to limit the potential 'damage' caused by children accessing technology in an uncontrolled way outside the home: the children need to be taught 'what is wrong and what is not' (Lily's parents), or the children or how to become 'critical users' of technology and information available (Gloria's mother). On the other hand, Vicente's mother expressed the concern that children are influenced by peer pressure to want to own and use more devices, as their friends have it.

Parents sometimes worried about how children will be affected – especially potential health concerns and not having "*the chance to be bored sometimes*" – but are not greatly concerned as long as there is 'balance'. This can be seen as a challenge projecting into the future, for example Lily's parents emphasised the importance of technology in educating their child – they were aware of the level of knowledge of her peers and want her to be able to 'keep up'. They felt that apps and the internet are beneficial in helping children to learn quickly. However, they were very keen that she has a balance between interaction with technology and other types of activity. They did not at the time of the study have any concerns about her usage, as they supervise her closely and limit her time using devices, but were aware that she is likely to need further guidance as she gets older and starts to use the internet and social media. They believed that control and monitoring will become increasingly difficult and therefore their focus is on teaching her, "*what is wrong and what is not*".

Some parents had distinct attitudes depending on the devices that children engage with. Matias' mother shared that she has less concern with TV because her children can focus on other things while watching it. Similarly, Emma's mother too she feels that watching TV encourages a longer attention span, as she would generally watch a full programme. However, they were both concerned about children's engagement with other devices, such as tablet, phone and computer. Anna's family expressed concerns that too much TV watching could be detrimental; this applied to the whole family including the parents. Matias' mother is concerned that her children get 'completely fixated' with technologies. Emma's mother is concerned with Emma's use of phone because she loses concentration and frequently changes what she's watching or doing although Emma prefers to watch programmes on the phone, however, perhaps – as her mother suggests – because she finds it easier to control than the television.

Similarly, Gloria's parents were not against the use of technology but feel that it should be used for "something useful". They expect to gradually introduce more technology, and for her to have access to it, once she goes to school, in particular if they feel that a particular technology has educational value. They discussed the importance of encouraging her to be a "critical user" both in terms of online safety and in critically evaluating the information she will find online in future.

Policy implications

These are the policy implications of this work:

- This study indicates the extent to which technology is now embedded in the daily lives of many young children aged under three, but there is little research in this area. Research councils and research organisations need to ensure that sufficient attention is paid to this area in the development of new funding programmes and to ensure there are methodological developments to strengthen the inclusion of children's perspectives.
- There are differing levels of parental support/ mediation in relation to young children's uses of technology, which reflects their confidence and expertise in using technology. Creating guidelines for parents and offering family digital literacy sessions would be helpful in developing parents' skills and confidence, enabling them to reflect on their own media use. This may then impact positively on their support for their children's development
- There is a need to offer professional development in this area for health professionals who visit families in the first weeks and months after children are born. These professionals could offer helpful guidance for parents on how to manage their children's entry into the digital world. Indeed, it would be helpful for parents-to-be to have this advice in the prenatal stage.
- Some children aged 0-3 attend early years settings (e.g. childminders, kindergartens, nurseries).Practitioners working in these settings should be offered continuing professional development on young children's digital literacy development, in order that they can develop appropriate practice.

Participants and device use summaries

Table 1: Summary of case studies and types of technological devices

Case	Country	Name of child (pseudonym)	Age of child on day of filming	Number of types of technological devices possessed in the household	Number of technological devices which child has access to
1	Finland	Emma	34 months	6	6
2	Israel	Dana	30 months	13	7
3	Portugal	Vicente	33 months	8	5
4	Portugal	Matias	27 months	10	4
5	Portugal	Tomás	21 months	8	5
6	Spain	Gloria	21 months	7	4
7	Spain	Roser	19 months	6	5
8	Sweden	Anna	30 months	6	5
9	Sweden	Oscar	30 months	5	2
10	UK	Lily	14 months	9	9
11	UK	Petra	14 months	7	7
12	UK	Charlie	32 months	7	5
13	UK	Wanda	9 months	16	6

Table 2: Devices across the case studies

	1	Standard TV Set	7
	2	A television set connected to the internet (Sometimes known as Smart TV or connected TV)	10
Tablet Computer	3	iPad tablet computer	6
	4	Samsung Galaxy Tab	1
	5	Microsoft Surface	
	6	Amazon Fire	1
	7	Kindle Fire	
	8	Tesco Hudl	
	9	Other tablet computer	4
Smartphone	10	iPhone	9
	11	Samsung Galaxy	3
	12	HTC	1
	13	Nokia	
	14	Sony	
	15	Other Smartphone	
Console	16	Xbox (including Kinnect)	1
	17	Playstation	2
	18	Ninendo Wii (including WiiU)	
Handheld	19	PSP	
	20	Nintendo DS	
	21	PC or Laptop	7
	22	E-Reader (e.g. Kindle, Sony reader or Kobo)	
	23	PVR or Digital Video Recorder (one that allows you to record and store TV programmes or pause 'live' TV. (e.g. TiVo or Sky+)	2
	24	DVD Recorder	3
	25	BluRay	
	26	Digital Radio or DAB Radio	4

	27	Portable Media Player like an iPod Touch or Archos – that can be used to access the internet	1
	28	Tablet computer specifically for children e.g. LeapPad 2, VTech Innotab or Kurio 7	
	29	MP3 player / iPod used to play music	1
	30	Electronic toy, such as a battery-operated car or doll	10
	31	A toy which is connected to the internet, such as a robot or Furby Boom	
	32	Any other: specify	2

Notes:

Does not include entries which were marked 'yes' but where it is noted the child had no access or the item is broken.

Where families were recorded as having more than one PC/ laptop or more than one of the same smartphone, these are only counted as one entry here (as one 'type' of device).

Table 3 Apps which the children used during the visit

Type of app	On a smartphone	On a tablet computer
Learning (e.g. matching shapes, learning numbers/ letters/ words / animal names etc)	5	4
Social Networking (e.g. WhatsApp)	3	1
Instant messaging	1	
Style Creation e.g. Stardoll, Fashion Icon)		
Escape and Obstacles (e.g. temple run)		
Sports (e.g. FIFA, Flick Kick Rugby, Tiger Woods)		
Basic Strategy (e.g. angry birds)	1	
Creating virtual worlds (e.g. minecraft)		
Nurture and mimics (e.g. My Horse, Talking Tom, Pou, Toca Pet Doctor)	1	1
Audio play/ musical play/ (e.g. nursery rhymes, keyboards)	4	5
Visual play/ drawing/ colouring in (e.g. Draw; Faces iMake HD)	1	1
Video apps (e.g. YouTube)	4	6
Story apps/ interactive books (e.g. Nighty Night, Cinderella)		1
Role play (e.g. Princess Dress-Up; Pet Shop)		
Creative production (e.g. First Camera, Video Star)	1	
Augmented reality (e.g. Mattel Apptivity apps; ColAR XMix; AR Flashcards)	1	

Notes:

Three children (cases 4, 9 & 13) did not demonstrate any app usage. In case 9, the family did own a tablet computer but this was broken at the time of the visit.

Predominance of video (10), audio/ musical (9) and educational (9) apps

Table 4 skills and capabilities with apps

Skills/ capabilities	Is able to do unassisted	Needs some assistance
Turn the device off and on	2	2
Unlock the device		5
Open their apps	4	2
Use gaming apps	1	
Use reading apps		
Use video apps	3	2
Use learning apps	2	2
Use creativity apps	1	2
Find new apps in the app-store / market place		
Purchase new apps in the app-store / market place		
Click on a cross in a box to get rid of a pop-up	1	2
Take photos	1	2
Make videos		1
Draw things		
Drag items across the screen	3	1
Trace shapes with their fingers		
Exit apps and enter other apps	4	2
Increase or decrease the volume	3	2
Tap the screen to operate commands	3	
Swipe the screen (e.g. to change photos, turn the 'page' of an e-book)	4	1
Enlarge or decrease the size of objects by pinching and dragging	1	
Drag items and trace shapes	1	
Show others e.g. siblings how to use the device	1	

Notes:
Cases 4 & 5 & 7 & 12 have no tablet skills listed.
In case 7, the child can only take photos with assistance - no other tablet skills (others using tablets show a few different interactions/ capabilities).

Case 9's family have a tablet but it was broken at the time of the visit. However, the child still points at the tablet screen, showing that they have some awareness of how it works.

Table 5 activities with tablets

Activity	Number of children using tablet for this type of activity
Drawing and painting	
Colouring in	
Making collages	
Making videos	1
Taking photographs	2
Other creative activities	1
Watching video	6
Reading stories	
Play with/use apps for gaming	1
Play with/use apps for social	1
To help learning/education	4
Listen to stories/audio books	2
Listen to music	5
Look at magazines	
Look at pictures/photos	5
Voice/video communication, e.g. FaceTime/Skype	4
Browsing the internet (looking at websites)	
Using a search engine (e.g. typing key words into Google and searching)	
Watching music videos on YouTube	6
Watching videos made by other children on YouTube (e.g. 'unboxing' videos)	2
Watching 'catch-up' TV	1
Other (please specify)	2

Notes:

'Other' includes watching children's live TV channel, internet search, choosing video clips from a list

Case 1 - Emma, Finland

Family background

Emma was aged two years and ten months on the day of filming. She lives with her parents and a younger sister. Both parents have Masters degrees – the mother is currently on maternity leave and the father works as an IT specialist. The family have always lived in Finland and speak Finnish.

The day of filming

Emma, her mother and her little sister spend the morning at a local playground and wood/ park, and the afternoon at home where the Emma spends time on one floor of the apartment and in the back and front gardens – she is allowed in all of these locations at home unsupervised.

Research questions

How does technology inform the daily lives of children aged from birth to three?

Devices the child has access to:
- Television set connected to the internet
- iPad
- iPhone
- PC/ laptop
- Digital/ DAB radio
- Electronic toy

Apps used by the child on tablet/ smartphone:
- Learning
- Instant messaging
- Basic strategy
- Audio/ musical play
- Visual play/ drawing

- Video apps
- Story apps/ interactive books

Activities carried out by child using a tablet:
- Taking photographs
- Other creative activities
- Watching video
- Learning/ education
- Listening to music
- Look at pictures/ photos
- Voice/ video communication
- Watching children's channel
- Internet search

As shown by the lists above, Emma demonstrates a range of technology usage/ skills but she is particularly interested in taking photos and asking her parents to take photos of her, which she then wants to see. This is an important part of how she interacts with the world and processes her own experiences and achievements, for example when she *"…climbs somewhere she hasn't climbed before... she may say mom come and take a photo... and she wants herself to see the photo and... wow [I did it]".*

Emma also suggests internet searches (which her parents then carry out and show her the results) based on things she sees, e.g. in nature – again technology is playing a role in how she interacts with the world and processes information about it. Her mother uses these internet searches to find related craft activities for Emma to do, so the technology usage is also informing her non-technological activities.

What digital literacy skills and competences do children this age group develop as they engage with technologies?

Abilities demonstrated by child during tablet usage:
(*indicates tasks the child can do unassisted)
- Turn the device off and on*

- Unlock the device
- Open their apps*
- Use video apps*
- Use learning apps*
- Use creativity apps*
- Take photos*
- Drag items across the screen*
- Exit apps and enter other apps*
- Increase or decrease volume*
- Swipe the screen*
- Show others how to use the device*

How do parents or carers mediate young children's use of technologies?

Emma's parents approve of restrictions to children's technology access and make use of these, but would like more, for example a restricted version of YouTube (or similar) which only allows access to certain videos. The parents note that Emma controls her own access to some extent – she lets her mother know when she has accidentally ended up watching a different video after looking up a band she likes on YouTube, and she will independently put devices away after a certain time: *"She could just stop and do something else... it's not that the child watches five hours in front of the tv if you would just give the chance"*.

What are parents' or carers' perceptions of and attitudes towards the current and potential future use of technologies by their young children?

The parents express concern about how much Emma uses a mobile phone, but the video shows less usage than they had thought. There is some discussion around the difference between watching programmes on a television as opposed to watching on a phone or tablet – Emma's mother feels that watching on television encourages a longer attention span, as Emma will generally sit down and watch a full programme, whereas on the phone she loses concentration and frequently changes what she's watching or doing. Emma prefers to watch programmes on the phone, however, perhaps – as her mother suggests –

because she finds it easier to control than the television. There is no discussion in this case about potential future use of technologies.

Case 2 – Dana, Israel

Family background

Dana was 30 months old at the time of filming, and lives with her family (parents and two older brothers aged seven and eleven) in central Israel. The family was previously known to the researcher, who approached them knowing that technology is "*an integral part of everyday life*" for them. Both parents have BA degrees – the mother works as a personnel agency manager and the father as a cosmetics factory manager. The family speak Hebrew.

The day of filming

The researcher describes the filming day as "challenging", accompanying the family from early morning before Dana woke up until she went to sleep at night. There were also challenges in following Dana as she moved around frequently, e.g. from inside to outside. The researcher sometimes left the camera unsupervised to act as their "eyes" when Dana was alone.

Research questions

How does technology inform the daily lives of children aged from birth to three?

Devices the child has access to:
- Standard TV set
- Television set connected to the internet
- Tablet computer (other)
- iPhone

- Xbox
- PC/ laptop
- Electronic toy

Apps used by the child on tablet/ smartphone:

- Learning
- Nurture and mimics
- Video apps
- Creative production

Activities carried out by child using a tablet:

- Watching video clips
- Learning/ education
- Listening to music
- Looking at pictures/ photos
- Watching music videos on YouTube
- Watching videos made by other children on YouTube
- Other (choosing video clips from a list offered by YouTube once parent uploaded first video)

Dana quickly became accustomed to being filmed, which may suggest a familiarity with technology, and used technology throughout the day. There are many screens present in her life, including television, smartphone and tablet. Some of her actions with technology are supervised/ assisted – such as watching TV, where she is dependent on family members to find and choose content. Others are individual activities where Dana has autonomy, such as using touchscreen devices. The parents use technology to "*manage [the] children's schedules*" with routines around watching television after coming home from pre-school in the morning and watching video clips on a smartphone before going to sleep. Technology is also used as a 'distraction' to allow the mother to, for example, cook or do housework.

In this family, the young child's "viewing habits" are given priority as the parents consider the screen an educational device and in particular feel that technology will help Dana to learn English.

What digital literacy skills and competences do children this age group develop as they engage with technologies?

Abilities demonstrated by child during tablet usage:

(*indicates tasks the child can do unassisted)

- Unlock device
- Open their apps*
- Use video apps*
- Use learning apps
- Click on a cross in a box to get rid of a pop-up*
- Exit apps and enter other apps*
- Tap the screen to operate commands*
- Swipe the screen*
- Enlarge or decrease the size of objects by pinching and dragging*

Dana is observed demonstrating a number of touchscreen interface skills – she is especially familiar with her mother's smartphone and can open the YouTube app, select a clip, play it and even skip the adverts without help. However, the filming revealed that she is not familiar with the apparently 'basic' skills of changing the volume or screen rotation/ re-sizing – she "watches clips on a quarter of the smartphone screen, straining her eyes" and is seen to watch clips upside down or holding the device horizontally while the clip is in vertical mode.

How do parents or carers mediate young children's use of technologies?

The parents mediate Dana's use of the internet and television viewing – choosing the content and limiting viewing time. Her use of portable screens is less directly mediated, but is restricted by software installed by the internet service provider, to prevent access to unsuitable sites. Dana's mother does also attempt "instructive mediation" by trying to intervene during smartphone use, but the researchers note that this fails because Dana is unable to divide her attention between her mother and the device. The parents are aware that their attempts at mediation or guidance towards educational content are not always

successful, and there is some disagreement/ discussion between the parents as to what is appropriate.

What are parents' or carers' perceptions of and attitudes towards the current and potential future use of technologies by their young children?

The family do not perceive themselves as particularly technologically-minded, but the filming shows that there is a lot of technology usage, including some which the parents were unaware of or had forgotten about until they watched the video. There are some inconsistencies in the parents' attitude to technology usage. They are strongly in favour of it as an educational tool and feel that it is essential for Dana to develop digital literacy skills, but in practice this seems to translate into a large amount of usage, which is not necessarily educational. The researchers note that the parents believe that watching videos in English will help Dana to learn the language, but that in fact she appears only to repeat English phrases rather than having gained any understanding of them . The parents are broadly uncritical of Dana's level of technology usage, but do have concerns - especially after the day of filming – about the 'dangers' of excessive usage. For example, they express worries about her unsupervised smartphone usage just before sleep, and the fact that Dana's pre-school teacher has suggested she has issues with her attention span and concentration levels, which may be exacerbated by too much screen use.

Case 3 – Vicente, Portugal

Family background

The focal child, Vicente, was 33 months old at the time of filming. He lives with his mother, his older brother (aged eight) and an eighteen year-old cousin, who rents a room from the family to help with their income. His parents are separated and Vicente goes to stay with his father occasionally. The family speak Portuguese at home (the older child also speaks Spanish). Vicente's mother has a degree and works as a teacher.

The day of filming

The researchers visited on the Tuesday of the Portuguese 'Carnival break' as this was a good time to observe a typical day in the household with the two boys. The day of filming started at 9.30am, after the children were awake. The family stayed in during the morning, then the researcher left for the ok afternoon and returned around 6pm. The researcher tried to emphasise to the mother that this should be as normal a day as possible, but felt that she "took advantage" of the presence of another adult to supervise the child and may have had less interaction with him than normal.

<u>Research questions</u>

How does technology inform the daily lives of children aged from birth to three?

Devices the child has access to:
- Standard TV set
- Tablet computer (other)
- Playstation
- PVR or Digital Video Recorder
- Digital/DAB Radio
- Electronic toys
- Apps used by the child on tablet/ smartphone:
- Audio play/ musical play
- Video apps
- Activities carried out by child using a tablet:
- Watching music videos on YouTube

The family have one television set – Vicente likes to watch the same cartoons on TV repeatedly and these programmes influence his choices for toys and objects in the house, for example a Paw Patrol pillows. There is a tablet computer in the household which is used by the boys and seems to be treated as 'theirs' – Vicente has only recently started to use this. He is not allowed to use his mother's smartphone or laptop (the latter is used by her for work purposes only). He watches YouTube videos and listens to radio, and his

mother comments (during the iterative interview stage) that he is becoming increasingly interested in listening to music on radio and CD.

Technology is sometimes used to 'babysit' the children as the mother struggles with time as a single parent – she explains that she will use the tablet to occupy them while she carries out household tasks. She also has limited time to teach them how to use devices, but Vicente is taught some digital skills by his older brother. Their mother explains that he Vicente has more contact with technology when he visits his father, in particular watching more television and having access to his other half-brother's Playstation, although she states that he doesn't have a huge amount of interest in the Playstation games.

What digital literacy skills and competences do children this age group develop as they engage with technologies?

Abilities demonstrated by child during tablet usage:
(*indicates tasks the child can do unassisted)
- Turn the device off and on
- Unlock the device
- Open their apps
- Use video apps
- Click on a cross in a box to get rid of a pop-up
- Exit apps and enter other apps
- Increase or decrease volume*
- Tap the screen to operate commands*

Although Vicente is increasingly familiar with the skills needed to operate the tablet, he cannot carry out many of these without help – this may be related to the fact, discussed above, that his mother does not have much time to show him how to use technology. He is also observed touching the TV screen once a programme has been chosen and put on (by his mother or brother) as if he is developing an understanding that changing/ selecting the channel requires some physical input.

How do parents or carers mediate young children's use of technologies?

Vicente's mother limits his usage of technology by restricting his access to certain devices – she has made a decision to only have one television set in the house, in the living room, as she feels that viewing should be limited, and they shouldn't have TVs in their bedrooms or kitchen. She does not allow him to use her smartphone, which she uses for personal use only, or her laptop, which is strictly for her work. She receives reports by email of the content the boys have watched on YouTube, but hasn't installed any parental controls on their internet access – she hasn't felt that this was needed as they didn't use the internet a lot or access social media sites, but is aware she may need to consider this in the near future.

What are parents' or carers' perceptions of and attitudes towards the current and potential future use of technologies by their young children?

Vicente's mother has some concerns that he may become 'dependent' on technology because he sometimes "sulks" when she takes the tablet away at bedtime. She notes that Vicente has had access to technology at an earlier age than his brother – partly because of having an older brother who was already watching cartoons and using a tablet. She recognises that this earlier usage will make it easier for him to learn technological skills, e.g. at school, but has some concerns about the prevalence of technology, e.g. over traditional games, and the fact that children are influenced by peer pressure to want to own and use more devices.

Case 4 – Matias, Portugal

Family background

Matias was 27 months old on the day of filming. He lives with his parents and five year-old sister in Cascais in Portugal. His mother was born in Brazil and his father in Sweden. They both have higher degrees – his mother works from home as a photographer, and his father is an economist for a Swedish company. They speak Swedish, Portuguese and English.

The day of filming

The filming took place on a Saturday, with the researcher arriving after the children had woken up and had breakfast so they had a chance to 'settle down'. The father was away on business that day. Both of the children had colds so spent the whole day in the house. The children's grandmother was visiting. Filming took place while the children were active – playing, eating lunch etc – but was paused while Matias went for a nap. The researcher felt that the presence of the camera made little difference to the children's routines.

Research questions

How does technology inform the daily lives of children aged from birth to three?

Devices the child has access to:
- Television connected to the internet
- Tablet computer (2)
- Smart phone (2)
- PC
- Digital Video Recorder
- Digital Radio
- Playstation
- Portable media player
- Tablet computer for children

- Electronic toy

Matias has access to a small range of technology, despite the fact that the household posses a wide range of digital devices.

Apps used by the child on tablet/ smartphone:
None

Activities carried out by child using a tablet:
None

Although there was technology in the household – the mother's smartphone, and her computer, which she worked on all day – the only device used by Matias and his sister during the day was the TV. They played with 'traditional' toys such as plasticine, lego and puzzles, and although they tried to get their mother's attention when she was using the computer, they did not ask to use it themselves. They asked to turn on the television, but did not spend long watching it. They watched cartoons that they liked, but the researcher observed that they were often doing another activity at the same time. Matias's attention was drawn to the television primarily when there was music or something that he found 'scary'. The family do own a tablet, which they bought when the older child was young, intending to use it to show her films whilst travelling, but they rarely use it.

What digital literacy skills and competences do children this age group develop as they engage with technologies?
Matias does not demonstrate any digital literacy skills or competencies.

How do parents or carers mediate young children's use of technologies?
Matias's parents, in particular his mother, have a radical approach to technology usage in young children, and are against them using digital technology at all. Other than watching a limited amount of TV, they allow both children very limited access to technology. The mother controls which television channels the children watch – when the older sister changes the channel, the mother challenges this as she has very strong feelings about

them only watching suitable content. The older sister is occasionally given access to a tablet computer, and to a game on her father's mobile phone (this was previously unknown to the mother until the iterative interview when the sister mentioned it), but Matias has very little access to computers or smartphones. His mother states that they only use 'distractions' such as films on a smartphone very occasionally, e.g. when they need to keep the children quiet and still at the doctors. After his pre-school showed him a film on an iPad, his mother asked if they could not do this in future, preferring him to be given a physical game or puzzle instead, but accepts that they cannot have full control over their access to technology outside the home.

What are parents' or carers' perceptions of and attitudes towards the current and potential future use of technologies by their young children?

The parents feel strongly that children's use of technology at a young age should be very limited – they prefer them to learn through traditional toys and games, and to interact with people. The mother states that she feels technology "alienates" children and can be damaging due to its addictive nature. She feels she would benefit from guidance on the 'right' age to allow access to technology – her aim is to keep their access to technology limited until they are ten years old, but she is unsure how realistic this is due to external pressures and activities at school.

Case 5 – Tomás, Portugal

Family background

Tomás was 21 months old at the time of filming, and lives with his mother, father, eight year-old brother, and fourteen year-old sister (from his mother's previous marriage) in the south-west of Portugal. His mother has a degree and works as a psychologist, and his father has a secondary diploma and works as an HR consultant. They speak Portuguese at home; the father also speaks English.

The day of filming

The filming took place on a Sunday, starting at 8am – it took place on and off throughout the day, pausing when the family went for dinner with a group of relatives and when Tomás was having a nap, and ended around 9pm. The researcher describes the day as a 'regular weekend day' and feels that the filming hardly interfered with the family's normal routine.

Research questions

How does technology inform the daily lives of children aged from birth to three?

Devices the child has access to:
- Standard TV set
- Television set connected to the internet
- IPhone and other smart phones (2)
- IPad
- PC
- Laptop
- Tablet for children
- Electronic toy

Apps used by the child on tablet/ smartphone:
- Learning
- Audio/ musical play
- Activities carried out by child using a tablet:
- Watching music videos on YouTube

Tomás started his day playing a game on his mother's mobile phone. The TV is on constantly when the family are at home – Tomás likes to watch the same cartoon film repeatedly, and there is some conflict with his brother who prefers to watch something else. Tomás is seen to interact with ("scream to") the cartoon he is watching. He also plays with a mixture of traditional and electronic toys. The family do own an iPad which Tomás watches videos on, although he did not do this during the day's recording.

What digital literacy skills and competencies do children this age group develop as they engage with technologies?

Abilities demonstrated by child during tablet usage:

None – Tomás did not use the tablet during the visit. However, the researcher notes that during the initial visit to meet the family, he was able to use YouTube on the iPad, navigating videos by suggestion.

When using his mother's smartphone, he asks for help to close adverts, as he is not able to do this – sometimes he clicks on the advert and opens a website by mistake. He prefers to play alone but asks for help from adults when he is not able to do something, such as closing the adverts or changing the TV channel.

How do parents or carers mediate young children's use of technologies?

The family allow all of the children to use technology on a daily basis but the researcher observed that they did not seem to be addicted to it. They have television in their own rooms but choose to watch it only in the living room. When Tomás accesses YouTube this is through his mother's account which has content control settings on it and is monitored by the parents (the father works for an IT company and has knowledge of how to set up controls, so he takes responsibility for this). On the day of filming the father tried to mediate between the two boys over them wanting to watch different films on TV. The mother comments that Tomás doesn't seem to tire of using the mobile phone, so she limits his time on it, often by giving it to him when the battery is already low so it will run out naturally.

What are parents' or carers' perceptions of and attitudes towards the current and potential future use of technologies by their young children?

Tomás's parents think that technology usage is a 'normal' part of life for their children, and feel that it's natural that he has started to use it. They did not set a particular age when he was allowed to start using it – he observed and joined in with activities his older siblings

were doing. They feel that technology will be "what their future is about" so are not concerned by Tomás's current usage.

Case 6 – Gloria, Spain

Family background

The family were previously known to one of the researchers as they live in the same area. The focal child, Gloria, was 21 months old on the day of filming. She lives with her mother, who works full-time as an administrator, and her father who is currently unemployed and is Gloria's main carer. Both parents have Bachelor degrees in Arts. The family live in Madrid and mainly speak Spanish, but the mother is from Italy and sometimes speaks to Gloria in Italian.

The day of filming

Filming took place on a Saturday, when the whole family was at home, from around 10.30am to 7pm, with a three hour pause in the afternoon while the family had lunch and Gloria had a nap. Most of the filming time was spent in the house – in the living room and kitchen – but also followed two walks in the local area. Gloria did not seem to be disturbed by having a visitor or by the filming.

<u>**Research questions**</u>

How does technology inform the daily lives of children aged from birth to three?

Devices the child has access to:
- Standard TV set
- PC/ laptop

- DVD recorder
- Electronic toy
- There were also a smartphone and an e-reader in the house but the child did not have access to these.

- ***Apps used by the child on tablet/ smartphone:***
  None (did use YouTube on the laptop).
- Activities carried out by child using a tablet:
  None – family does not have a tablet.

Gloria's interaction with technology consists of watching cartoons and music videos on TV and on a laptop. She has a routine of having her breakfast slowly and her parents put on music videos on YouTube during this time. The parents explained that this happens every morning, including before she goes to nursery on weekdays. After this, on the day of filming, she asked to get down from her highchair and played with non-electronic toys. Digital technology was also used to 'calm her down' when she was in a bad mood after waking from her nap and being given a yogurt that she didn't like.

Her parents confirmed that she sometimes asks them to put on a DVD or TV programme (she also does this at her grandfather's house) but doesn't watch for long. Her main activities consist of interaction with her parents – going for a family walk, making pastry and meals with her mother – playing with 'traditional' toys, and being read to. Her parents engage in technology use around her, using the laptop and discussing the screen contents, and having the mother's mobile phone around.

What digital literacy skills and competencies do children this age group develop as they engage with technologies?

Abilities demonstrated by child during tablet usage:
None – family does not have a tablet.

Gloria has limited direct contact with technologies in the home – she only uses the laptop to watch videos. She understands that DVDs need to be inserted in the DVD player to play

and will indicate that she wants this to happen when she wants to watch a film. She may be learning about technology through observation as her parents use technology around her.

How do parents or carers mediate young children's use of technologies?

Gloria's parents limit the number of digital devices in the home and explicitly ask relatives not to buy technological gifts for her. They mediate in a "warm, caring style", negotiating how many episodes of a programme to watch and inviting Gloria to sit near them when she is sitting too close to the TV. Gloria also seems able to mediate her own technology use, asking to 'get down' from her highchair once she has watched around 30 minutes of videos, and looking for other things to do when she gets bored of a cartoon video.

What are parents' or carers' perceptions of and attitudes towards the current and potential future use of technologies by their young children?

The parents are not against the use of technology but feel that it should be used for "something useful". They consider themselves to be 'low-tech' and do not have much technology in the household but have an advanced level of digital knowledge themselves. They feel that technological skills are easy to learn so don't see a problem with Gloria learning them at a later age. They expect to gradually introduce more technology, and for her to have access to it, once she goes to school, in particular if they feel that a particular technology has educational value. They discuss the importance of encouraging her to be a "critical user" both in terms of online safety and in critically evaluating the information she will find online in future.

Case 7 – Roser, Spain

Family background

The family were previously known to one of the researchers and chosen because they were known to use comparably more technology than Case 6 (above) in Spain. Roser was 19 months old at the time of filming and lives with her parents and a younger brother. Both parents have degrees – the mother works as a lawyer and the father as an electrician. The father was taking paternity leave for the birth of the younger child at the time of the visit. The family speak Catalan.

The day of filming

Filming took place from 10.50am to 4.50pm, with a pause whilst Roser slept in the afternoon, resulting in around four hours of recording. Most of the day the family were in the living room, but they also took a walk to the pharmacy and their grandparents' flat.

Research questions

How does technology inform the daily lives of children aged from birth to three?

Devices the child has access to:
- Television set connected to the internet
- Tablet (other)
- iPhone
- Samsung Galaxy
- DVD recorder
- Electronic toy
- There is also a PC in the house but the child does not have access to this.
- Apps used by the child on tablet/ smartphone:
- Audio/musical play

- Video apps

Activities carried out by child using a tablet:
- Watching video
- Listening to stories/ audio books
- Listen to music
- Looking at pictures/ photos
- Voice/ video communication

Roser is surrounded by technology throughout the day – there is a large TV in the living room which is on almost all day. A tablet computer with keyboard is available to her at all times. Watching TV is closely linked to her daily routine – she watches the same cartoon during breakfast and lunch – and it is on in the background when she plays in the afternoon. She is observed to watch the TV adverts with interest. She also asks her father to take a photo of the family when they are playing. She plays with other toys, both electronic and traditional.

What digital literacy skills and competencies do children this age group develop as they engage with technologies?

Abilities demonstrated by child during tablet usage:
(*indicates tasks the child can do unassisted)
- Take photos

Roser knows where the tablet is kept and takes it out when she wants to watch a cartoon but she cannot open or operate it. However, she is starting to show awareness of how it operates – she '*turns it off*' by closing it and has tried to press the screen as she has noticed that it is interactive, although her parents believe, "*she does not know why she does it*". She tries to touch the keyboard but the parents do not allow her to do this. She recognises the difference between the cartoon and advertisements, and has become frustrated and tried to 'skip' these by pressing the screen, but her parents have noticed that she has now "l*earned to wait*" for the advert to play or for her parents to skip it for her.

She seems to be aware that a mobile phone vibrating "*requires an action by the mobile owner*" as she brings her father's phone to him when it vibrates.

How do parents or carers mediate young children's use of technologies?

Roser's parents consider her "too small" to interact with technology and only use it in certain situations, in particular to help her stay still during meals at home or at restaurants by playing cartoons. They have not downloaded any apps for her to play with. They allow her to play with electronic toys but encourage traditional "*on the carpet*" play. They actively encourage her to interact with family members by phone. They also mediate in the younger sibling's interaction with the TV, turning him away from it as they have noticed how strongly his attention is caught by it (the 'abduction effect').

What are parents' or carers' perceptions of and attitudes towards the current and potential future use of technologies by their young children?

The mother and father have differing views about the use of technology – the father thinks it can be equally good and bad, depending on how it is used: "*It is important to know how to use it and... use it in your favour so that it won't go against you*". He is in favour of technology for studying, but aware of the potential dangers. The mother thinks technology is "*horrible*" and "*dehumanizing*", and feels that children's use of it should be delayed as long as possible. These differences mean that their views on mediating their children's technology use differ – the father thinks it should be a collaborative process where the children learn how to use it safely, whereas the mother thinks they need to strictly control it. They both agree that children's learning should have a 'traditional' basis before involving technology, and express concerns about their children's future usage of the internet and social media, agreeing that they will have to look at the security and privacy of these in order to educate their children.

Case 8 – Anna, Sweden

Family background

Anna was 30 months old at the time of filming, and lives with her parents and 4 month-old brother in Sweden. Both parents are civil engineers – her father works partly from home and her mother is currently on parental leave after the birth of the younger child. They speak Swedish at home.

The day of filming

Filming took place from 7.30am to 6.30pm, with a break for the family's afternoon nap. Anna, her mother and her little brother were present for the whole day, and the father joined them from 3.30pm. The camera was placed mainly in the entrance with a view into the kitchen and living room, where Anna spent the vast majority of her time.

Research questions

How does technology inform the daily lives of children aged from birth to three?

Devices the child has access to:
- Standard television set
- Television set connected to the internet
- iPad
- iPhone
- Other – CD-player in car
- Apps used by the child on tablet/ smartphone:
- Learning
- Social networking (Facetime)
- Audio/ musical play
- Video apps
- Augmented reality (QR codes)

Activities carried out by child using a tablet:

- Watching video
- Playing with/ using apps for gaming
- Learning/ education
- Watching videos on YouTube

Anna's use of technology is described by the researchers as 'limited' but connected to a daily routine – watching YouTube videos when she first wakes up, watching the same children's TV programme every evening. Anna has a 'ritual' of wearing a particular skirt and dancing to the TV programme every day. She speaks to her grandparents via Facetime as they live some distance away. Some of her technology usage on the day of filming seems to be prompted by questions from the researchers, for example when they ask about her iPad usage, the father fetches the iPad and shows some of the apps that Anna plays with. Similarly, when they ask about music, this prompts Anna to ask to listen to a particular song, which her mother puts on for her (they have set up a Spotify playlist of children's songs). Anna has clear opinions about which songs she likes and dislikes. She sings along and prompts her mother to do the same. Most of Anna's time is, however, spent playing with traditional toys, such as wooden trains, puzzles and soft toys.

What digital literacy skills and competences do children this age group develop as they engage with technologies?

Abilities demonstrated by child during tablet usage:
(*indicates tasks the child can do unassisted)

- Turn device off and on
- Open their apps*
- Use gaming apps*
- Use video apps*
- Drag items across the screen*
- Trace shapes with their fingers
- Exit apps and enter other apps*
- Increase of decrease the volume
- Tap the screen to operate commands*

- Swipe the screen*
- Drag items and trace shapes*

Anna is unable to operate the TV or music system by herself, but has a fairly large range of independent skills while using the iPad, as shown above.

How do parents or carers mediate young children's use of technologies?

Anna's parents use technology as part of the daily routine – Anna never asks them to turn on the TV, but they put it on at a particular time in the evening to watch a specific programme with her. Likewise, she doesn't ask for the iPad but they give it to her when she wakes up or when she is in her father's work room with him before the rest of the family wake up. On the day of filming, there is a small conflict when the father would like Anna to stop using the iPad – she negotiates that she would like to 'pause' rather than stop. Her father mentions that he would like to create a list of recommended YouTube videos for Anna, to have more control over what she is watching.

What are parents' or carers' perceptions of and attitudes towards the current and potential future use of technologies by their young children?

There is little discussion in the family about the media, technology or about what Anna watches/ does. The parents' attitudes to technology seem to differ – the father has some concerns about content in adverts etc, but the mother does not appear to worry about this. There is no discussion about the use of technology for learning, or the development of digital skills.

Case 9 – Oscar, Sweden

Family background

Oscar, 30 months old at the time of filming, is the youngest child of three, and lives with his parents and his two brothers, aged nine and seven. Both parents are medical professionals and work at the local hospital, with the father working irregular hours, sometimes nights. Oscar's mother works part-time (85%), also with irregular hours. Oscar attends kindergarten five days a week, unless his mother has a day off, then he stays at home with her.

The day of filming

Filming took place from 7.30am to 4.15pm, with a break for Oscar's nap in the afternoon. On this day, Oscar's mother was at home, and his father returned from night shift at 8.50am. The camera was mainly placed on a tripod in the living room – the researcher's felt that neither they, nor the camera's presence, interfered with Oscar's normal routine. Oscar spends most of the day in the house, but also goes with his mother in the car to take his older siblings to school, for a walk with his mother to the town centre, and to play outside.

Research questions

How does technology inform the daily lives of children aged from birth to three?

Devices the child has access to:
- Television set connected to the internet
- Electronic toys (remote controlled car)
- Other – CD-player in the car

- The family also have an iPad which is broken, and a computer which Oscar "*sits with at times but does not lay any games*", and occasionally "*presses and pushes*" the screen on his parents' smartphone.
- Apps used by the child on tablet/ smartphone:
  None – the iPad was broken.
- Activities carried out by child using a tablet:
  None – the iPad was broken.

Oscar's main interaction with technology is watching TV – watching an Advent Calendar programme first thing in the morning and asking his mother to put on this programme again, and others, on various occasions throughout the day, including when he is doing other activities such as painting. However, most of his activities involve traditional play – playing board games, and making up games, which often involve the characters he has seen on TV. He also likes being read to. Oscar has access to the lowest number of devices in the study and this seems to be reflected in his low level of technology use.

What digital literacy skills and competences do children this age group develop as they engage with technologies?

Abilities demonstrated by child during tablet usage:
None. The tablet is broken at the time of the visit (and has been for several years).

At the follow-up visit, Oscar had started to use his mother's smartphone and "showed good skills in navigating on the screen". He is able to turn the television on, but cannot change the channel – he does, however, pretend to do so using the remote control, so is aware of how this works.

How do parents of carers mediate young children's use of technologies?

Oscar's parents note that they were very strict with his oldest brother and limited his time using technology, but they have become less strict as they have had the other children. Oscar's mother doesn't feel that it would be helpful to impose limits, and is happy with his

level of technology use – "*as long as they have other things as well and can play in other ways*". They use a blocking software to control internet access for the family. The parents generally agree on their approach to the children using technology.

What are parents' or carers' perceptions of and attitudes towards the current and potential future use of technologies by their young children?

Oscar's parents feel that technology use is vital as it is "*their future and they need the skills*". They sometimes worry about how children will be affected – especially potential health concerns and not having "*the chance to be bored sometimes*" – but are not greatly concerned as long as there is 'balance'. They discuss issues around technology with each other and with friends who have children around the same ages, and feel that most of their friends have the same values around technology.

Case 10 – Lily, UK

Family background

Lily, 14 months old at the time of filming, lives with her parents in the North West of England. Both parents are Malaysian and both are 31 years old. Her mother has a Master's degree and her father a Bachelor's degree. Her mother is studying for a PhD and also works as a part-time tutor and university lecturer. Lily's father looks after her full-time and has recently worked as a delivery man. The parents were previously known to the RA on the project, and were keen to take part due to their interest in research and in child development and technology. They speak Malay and English at home.

The day of filming

Filming took place from just after 10.10am to 5.30pm, with an hour's break in the

afternoon while Lily had a nap. The family and researchers all stayed in the flat – effectively in one small, but comfortable, room – for most of the day, with the father going out for a short time.

Research questions

How does technology inform the daily lives of children aged from birth to three?

Devices the child has access to:
- Standard TV set
- iPad
- Samsung Galaxy Tab
- iPhone
- Samsung Galaxy
- Playstation
- PC/ laptop
- MP3 player/ iPod
- Electronic toy

Apps used by the child on tablet/ smartphone:
- Learning
- Audio/ musical play
- Video apps

Activities carried out by child using a tablet:
- Watching video
- Learning/ education
- Listening to music
- Looking at pictures/ photos
- Voice/ video communication
- Watching music videos on YouTube
- Watching videos made by other children on YouTube (e.g. 'unboxing' videos)

Lily spends almost of her day in one room and is surrounded by technology throughout the day – the room is described by the researcher as a 'rich' environment for the child, with various technologies and many traditional toys. Only one other child in the study (Matias – case 4) has access to as many devices, but in Lily's case these are all at home, whereas Matias mainly had access elsewhere.

A large TV is always on, but Lily does not generally pay attention to it - she only shows interest in recognisable theme songs (of programmes watched regularly by her parents), adverts (again, because of their repetitive nature and music) and some child-directed content. She frequently plays with a tablet – which had been her mother's but has now been handed on to her, and 'adapted' for her with a pink frame and handle. She enjoys watching YouTube videos on the tablet and on her mother's smartphone, especially those directed at children, e.g. 'unboxing' videos and those that teach about colours.

Her mother uses the tablet to try to keep Lily occupied while she is working, but this is not always successful: *she'll end up climbing on top of me or my laptop anyway".*

What digital literacy skills and competences do children this age group develop as they engage with technologies?

Abilities demonstrated by child during tablet usage:
(*indicates tasks the child can do unassisted)
- Unlock the device
- Open their apps*
- Use video apps*
- Use learning apps
- Click on a cross in a box to get rid of a pop-up
- Drag items across the screen*
- Exit apps and enter other apps*
- Swipe the screen*

Lily demonstrates a range of mostly independent skills in using touchscreens on the tablet and smartphones. She shows awareness of how phones are normally unlocked – *"whenever she has a phone in her hand, she will... push the home button first to see... to unlock it".* Due to her interest in YouTube she can identify this app quickly and is able to open it and navigate around it. As described above, she shows clear preferences in content and knows how to swipe the screen to change the videos, to find her preferred types of video to watch.

How do parents or carers mediate young children's use of technologies?

Lily's parents are concerned that she has a balance between digital and other activities, and will sometimes hide devices so that she will also explore different types of activity such as physical play, traditional toys and being read to, all of which she enjoys. They are aware of the educational possibilities of technology, for example drawing her attention to some things on TV if they think these are useful, e.g. "*pointing out a connection between a bear on a wildlife programme and her toy bear*". They restrict the amount of time she can play with smartphones during the day – *"we let her use it for an hour"* – but note that she will often "*get bored of it herself*" and therefore mediate her own use. The parents encourage Lily to take breaks from technology by gently engaging with her through physical interaction, e.g. cuddling when she has spent 'too long' watching videos on the tablet. They have had discussion with friends and read advice about children's access to technology, but adapt these to fit their own lifestyle.

What are parents' or carers' perceptions of and attitudes towards the current and potential future use of technologies by their young children?

Lily's parents emphasise the importance of technology in educating their child – they are aware of the level of knowledge of her peers and want her to be able to 'keep up'. They feel that apps and the internet are beneficial in helping children to learn quickly. However, they are very keen that she has a balance between interaction with technology and other types of activity. They do not currently have any concerns about her usage, as they supervise her closely and limit her time using devices, but are aware that she is likely to

need further guidance as she gets older and starts to use the internet and social media – they believe that control and monitoring will become increasingly difficult and therefore their focus is on teaching her, "*what is wrong and what is not*".

Case 11 – Petra, UK

Family background

Petra was 14 months old at the time of filming, and lives with her parents in a suburb of London. Her mother has a BA in Fine Art and a post-graduate teaching qualification, and works as a Special Needs Teacher. Her father has A levels, he is a professional musician and has recently trained as an electrician. He works as a self-employed drummer, and also as a carpenter, electrician and landscaper. They live in a two-bedroom flat with a small garden, and speak English at home. Petra attends a childminder two days per week.

The day of filming

The filming took place over approximately six hours, entirely in the family home. Petra's mother was present for the whole time, and her father for most of it. The researchers took a break from filming and left the home during Petra's afternoon nap.

Research questions

How does technology inform the daily lives of children aged from birth to three?

Devices the child has access to:
- Television set connected to the internet
- iPad
- iPhone

- HTC
- PC/laptop
- Portable media player
- Electronic toy

Apps used by the child on tablet/ smartphone:
- Social networking
- Audio/ musical play

Activities carried out by child using a tablet:
- Making videos
- Taking photographs
- Watching video
- Playing with/ using apps for social
- Listening to stories/ audio books
- Listening to music
- Looking at pictures/ photos
- Voice/ video communication
- Watching music videos
- Watching catch-up TV

Although the family have not bought any digital devices specifically for Petra, they have a range of technology as a family, and these are always present in the living room where they spend most of their time. A major focus of Petra's technology use seems to be interaction with family who live elsewhere – being involved with WhatsApp calls to her grandmother and her auntie (including interaction with her cousins), browsing family photos on the iPad – this family interaction is an enjoyable activity for her. She shows much interest in taking and looking at photos. TV viewing is 'sparing' and used as shared relaxation by the family. Petra engages in a range of musical activities, some of which use technology such as apps and websites. She also engages in a wide variety of non-digital activities – craft, playing with toys, being read to, making up games.

What digital literacy skills and competences do children this age group develop as they engage with technologies?

Abilities demonstrated by child during tablet usage:

(*indicates tasks the child can do unassisted)

- Turn device off and on*
- Unlock the device
- Open their apps
- Use video apps
- Use creativity apps
- Take photos
- Make videos
- Drag items across the screen
- Exit apps and enter other apps
- Swipe the screen

Petra demonstrates a fairly wide range of skills using a tablet, but needs assistance with most of these. She shows awareness of how the TV works – 'fiddling' with the remote and pointing at the TV. She is very familiar with interacting with family via WhatsApp video calls – her mother observes that she was initially "*very, very confused*" by this, but has got used to it. She now "*chats away*" and interacts with family members in other ways such as showing them toys.

How do parents or carers mediate young children's use of technologies?

The parents limit the amount of time that Petra is allowed to watch TV, and tend to use it as a distraction – "*when I'm preparing tea*" or when Petra wakes very early. They are aware that their own technology use influences Petra, and try to model behaviour which limits its usage: "*I definitely need to... be more mindful that I'm on my phone and... leave it in another room*".

What are parents' or carer's perceptions of and attitudes towards the current and potential future use of technologies by their young children?

Petra's parents feel that technology is important and think she will need advanced skills in it for her future life and work. They do however feel the need to be 'selective' in what she watches and does with it, and they express worries about future use, particularly with social media which they describe as "quite terrifying".

Case 12 – Charlie, UK

Family background

Charlie was 32 months old at the time of filming, and lives in a rural village in Southern England with his parents and 7-month-old brother. His mother is 35 and has a postgraduate qualification in journalism. She works as a copywriter, but is currently on maternity leave with the younger child. Charlie's father is 38, has an MBA and works in computer programming and strategy. Charlie attends a private nursery two days per week. The family speak English at home.

The day of filming

The researchers visited the family for approximately six hours. The mother was present throughout the filming, while the father came and went but did not participate in the filming. The morning was spent in the family home, then in the afternoon the researchers followed the mother and children on a walk to the village shop and then to the maternal grandparents' house. There was a break in filming while the children were napping in the afternoon.

Research questions

How does technology inform the daily lives of children aged from birth to three?

Devices the child has access to:

- Television set connected to the internet
- iPhone
- PC/laptop
- Digital/ DAB radio
- Electronic toy

Apps used by the child on tablet/ smartphone:

- Learning
- Social networking
- Audio/ musical play

The family do not own a tablet – although they intend to buy an iPad in future – so these apps were used on a smartphone.

Activities carried out by child using a tablet:

None – family do not own a tablet.

The family do not own any technology bought specifically for Charlie or his brother, but the parents each have a computer and smartphones, and there is internet catch-up TV, and all of these play a role in his life. Charlie is particularly interested in videos – making videos of himself and sending them to his friends, and sometimes watching YouTube. He communicates with his grandparents via Skype with his mother's supervision on her laptop. His parents sometimes use TV or videos as a 'distraction' to keep Charlie busy while his mother is in the kitchen or feeding his younger brother. Charlie also demonstrates a range of non-digital activities – in particular making up physical games, playing with toys, painting, and being involved with his mother in helping to cook supper. Whilst at his grandparents' house, his interaction with his grandfather revolves around three types of 'technology' – a calculator, a hole punch and his grandfather's blood pressure monitor.

What digital literacy skills and competences do children this age group develop as they engage with technologies?

Abilities demonstrated by child during tablet usage: None demonstrated on the day although parents mention that Charlie sometimes uses his grandparents' iPad when they visit. Charlie demonstrates skills in role playing a game with his grandparents over Skype and his ability to end the conversation by closing the laptop. He can start and stop programmes on the TV and iPlayer, but cannot yet find programmes for himself.   As mentioned above, he is able to make videos of himself using his parent's smartphones and uses WhatsApp to send them to friends' parents to share with one particular friend who has moved away.

How do parents or carers mediate young children's use of technologies?

Charlie's parents closely supervise his use of computers as, *"he would probably break my work computer".* Aside from this, they do not have any particular rules or restrictions. Charlie is allowed to watch their technology use and, *"we don't have a half an hour of screen time a day rule or anything like that"*. They broadly agree about strategies around technology, although the mother is '*more old-fashioned*'. She has concerns about mediating content, and tends not to use social media around the children to avoid them becoming interested in it, but did support Charlie when he wanted to send a video message to a friend he was missing because she had moved away.

What are parents' or carers' perceptions of and attitudes towards the current and potential future use of technologies by their young children?

They think technology and understanding how to use it confidently is important – *"the more Charlie can understand about it the better"* – and can stimulate learning and imaginative play. However, his mother in particular has concerns that he watches too much TV, and that they need to maintain a balance between technological and other activities. She worries that '*never being bored*' may limit the development of his imagination, and is concerned that there is a lack of guidance on how much engagement with technology is

'right'. She mentions societal pressure and parental guilt – that technology can be seen as taboo, particularly *"having the television being the babysitter"*.

Case 13 – Wanda, UK

Family background

Wanda was nine months old at the time of filming. Her family were already known to the researchers, having taken part in previous research with Wanda's six year-old sister, Emma. The girls live with their mother, aged 28, and her father, aged 43, in an area of Sheffield classed as 'deprived'. Both parents are qualified to GCSE level – her mother works as a nail technician and her father is a machine setter. The family are White, and speak English. They have extended family in the local area.

The day of filming

The researchers recorded what appears to be a typical day in the family home, filming from breakfast to the end of the school day (8.30am - 4pm).

Research questions

How does technology inform the daily lives of children aged from birth to three?

Devices the child has access to:
- Television set connected to the internet
- Samsung Galaxy (2)
- iPad
- Kindle
- Digital baby camera
- Electronic toys

Apps used by the child on tablet/ smartphone/ Activities carried out by child using a tablet:

Wanda's older sister and mother have tablet computers - she shows interest in these and has tried to grab and touch them, but does not use them herself.

The only technology that belongs to Wanda consists of some electronic toys (she also has non-digital toys, both of her own and inherited from her sister). However, the TV and her mother's smartphone play significant roles in her everyday life. Her father also has an X Box, but he plays this in another room and she doesn't seem to be interested in this. Wanda's older sister introduced her to 'Chuchu TV' videos on YouTube as she was very keen on these when she was younger. Wanda's mother plays these to her on the Smart TV, and Wanda responds physically, including dancing and singing along.

Wanda interacts with her grandmother via Skype. This includes her grandmother singing one of the songs from *'Chuchu TV'* which has already been played repeatedly at home – showing that the programmes are part of the 'whole family media habitus'.

What digital literacy skills and competences do children this age group develop as they engage with technologies?

Wanda shows awareness that her mother can control the TV with her phone – when she accidentally turns it off, she looks at her mother to switch it back on for her. She also understands that the phone can be used to communicate with other people – she recognises her mother's interactions with the phone that mean that she is going to be talking by Skype to her grandmother.

Wanda understands how to interact with her grandmother via the smartphone, and is later seen trying to navigate the phone – alternating between holding it to her head and trying to tap and swipe the screen, and playing with it as if it were a non-digital toy.

How do parents or carers mediate young children's use of technologies?

Wanda's mother has not bought any technology specifically for Wanda, and says that she won't do this until she's older. She believes in having a balance between use of technology and traditional play. She has controls on the family's YouTube access, and has previously stopped Wanda playing with her phone, *"because she throws it"*. She uses the Smart TV to show YouTube videos to avoid this: "We*'ve just started putting it on the telly so she can't mess about with the phone"*. Both parents generally agree on their approach to technology but the father is *"a bit more relaxed"* and less likely to impose limits. Wanda's mother doesn't allow the father to play X Box games in front of the children so that they are not exposed to inappropriate content: "He *plays all the shoot them up games, I won't let him down here with it"*.

What are parents' or carers' perceptions of and attitudes towards the current and potential future use of technologies by their young children?

Wanda's mother expresses concerns particularly around her children's future use of the internet – she thinks that it is "brilliant" for learning but worries about the "darker side". She feels that she needs to monitor their usage and also make them aware of how to stay safe online: *"…it's not safe to tell someone where you live".* She feels that she would like more advice on internet safety – she notes that they use tablet computers at school but the school don't offer any advice on safety relating to technology.

References

Byrne, J., Kardefelt-Wither, D., Livingstone, S., & Stoilova, M. (2016). *Global Kids Online research synthesis,* 2015–2016.

Chaudron, S. (2015). *Young children (0-8) and digital technology: a qualitative exploratory study across seven countries.* Luxembourg. Retrieved from https://ec.europa.eu/jrc

Chaudron, S., Di Gioia, R., & Gemo, M. (2018). *Young children (0-8) and digital technology - A qualitative study across Europe.* Retrieved from https://ec.europa.eu/jrc/en/publication/eur-scientific-and-technical-research-reports/young-children-0-8-and-digital-technology-qualitative-study-across-europe

Gillen, J., Arnott, L., Marsh, J., Bus, A., Castro, T., Dardanou, M., … Tafa, E. (2018). *Digital Literacy and young children: towards better understandings of the benefits and challenges of digital technologies in homes and early years settings. A Policy Brief.* Retrieved from http://digilitey.eu/wp-content/uploads/2018/08/DigiLitEY-and-EECERA-Digital-Childhoods-Policy-Brief.pdf

Gillen, J., & Cameron, C. A. (2010). International perspectives on early childhood research: A day in the Life. *International Perspectives on Early Childhood Research: A Day in the Life.* Basingstoke, UK: Palgrave Macmillan. http://doi.org/10.1057/9780230251373

Gillen, J., Cameron, C. A., Tapanya, S., Pinto, G., Hancock, R., Young, S., & Gamannossi, B. A. (2007). 'A day in the life': advancing a methodology for the cultural study of development and learning in early childhood. *Early Child Development and Care,* 177(2), 207–218. http://doi.org/10.1080/03004430500393763

Kumpulainen, K., & Gillen, J. (n.d.). Young children's digital literacy practices in homes: past, present and future research directions. In R. Flewitt, O. Erstad, Kuemmerling-Meibauer.Bettina, & I. Pereira (Eds.), *The Routledge handbook of digital literacies in early childhood.* Abingdon, UK: Routledge.

Kumpulainen, K., & Gillen, J. (2017). *A review of literature on young children's digital literacy practices in the home.* Retrieved from www.digilitey.eu

Livingstone, S., Haddon, L., Görzig, A., & Ólafsson, K. (2011). *EU kids online: final report.* London. Retrieved from http://eprints.lse.ac.uk/39351/1/ EU_kids_online_final_report_%5BLSERO%5D.pdf

Marsh, J., Plowman, L., Yamada-Rice, D., Bishop, J., Lahmar, J., Scott, F., … Winter, P. (2015). *Exploring Play and Creativity in Pre-Schoolers' Use of Apps: Final Project Report.* Retrieved from www.techandplay.org

Mascheroni, G., & Cuman, A. (2014). *Net children go mobile.* Milano. Retrieved from http:// netchildrengomobile.eu/reports/

Ólafsson, K., Livingstone, S., & Haddon, L. (2013). *Children's use of online technologies in Europe. A review of the European evidence base.* London.

Sandberg, H., & Jorge, A. (2018). *Growing up with portable digital media: A comparative European study of 0-3 years old.* Panel E in Children and adolescents in a mobile media world: ECREA pre-conference, Lugano, Italy.

Sefton-Green, J., Marsh, J., Erstad, O., & Flewitt, R. (2016). *Establishing a Research Agenda for the Digital Literacy Practices of Young Children A White Paper for COST Action IS1410*. Retrieved from http://digilitey.eu/

List of researchers and how to cite this document

Researchers

Julia Gillen, UK (lead)

Mitsuko Matsumoto, Spain

Cristina Aliagas, Spain

Yehuda Bar-lev, Israel

Alison Clark, UK

Rosie Flewitt, UK

Ana Jorge, Portugal

Kristiina Kumpulainen, Finland

Jackie Marsh, UK

Marta Morgade, Spain

Raquel Pacheco, Portugal

David Poveda, Spain

Heidi Sairanen, Finland

Helena Sandberg, Sweden

Fiona Scott, UK

Ulrika Sjöberg, Sweden

Ebba Sundin, Sweden

 Ilham Tigane, UK

Vitor Tomé, Portugal

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Note on images

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