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Zero to eight: young children and their internet use

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The EU Kids Online network has been funded by the EC Safer Internet Programme in three successive phases of work from 2006-14 to enhance knowledge of children's and parents' experiences and practices regarding risky and safer use of the internet and new online technologies.

As a major part of its activities, EU Kids Online conducted a face-to-face, in home survey during 2010 of 25,000 9-16 year old internet users and their parents in 25 countries, using a stratified random sample and self-completion methods for sensitive questions. Now including researchers and stakeholders from 33 countries in Europe and beyond, the network continues to analyse and update the evidence base to inform policy.

For all reports, findings and technical survey information, as well as full details of national partners, please visit www.eukidsonline.net

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EXECUTIVE SUMMARY

EU Kids Online has spent seven years investigating 9-16 year olds' engagement with the internet, focusing on the benefits and risks of children's internet use. While this meant examining the experiences of much younger children than had been researched before EU Kids Online began its work in 2006, there is now a critical need for information about the internet-related behaviours of 0-8 year olds. EU Kids Online's research shows that children are now going online at a younger and younger age, and that young children's "lack of technical, critical and social skills may pose [a greater] risk" (Livingstone et al, 2011, p. 3).

Key findings

This report critically reviews recent research to understand the internet use, and emerging policy priorities, regarding children from birth to eight years old. Key findings are as follows:

- Over the last five to six years there has been a substantial increase in internet usage by children under nine years old. This increase is not uniform across countries but seems to follow usage patterns among older age cohorts – in countries where more children overall use the internet, they also go online younger.
- The substantial increase in usage by very young children has not yet been matched by research exploring the benefits and risks of their online engagement, so there are many gaps in our knowledge.
- Children under nine years old enjoy a variety of online activities, including watching videos, playing games, searching for information, doing their homework and socialising within children's virtual worlds. The range of activities increases with age.
- It has not been established that children under nine years old have the capacity to engage with the internet in a safe and beneficial manner in all circumstances, especially when it comes to this age group socialising online, either within age-appropriate virtual worlds or as under-aged participants in sites intended for teenagers and adults (Facebook, You Tube etc.).
- Video sharing sites are popular with children in this age group and are one of the first sites very young children visit. As such, the ease with which children can access inappropriate video content is of concern.
- There is an emerging trend for very young children (toddlers and pre-schoolers) to use internet connected devices, especially touchscreen tablets and smartphones. This is likely to result in an increasing number of very young children having access to the internet, along with a probable increase in exposure to risks associated with such internet use.
- The variety of internet connected devices and apps available today risks compromising the privacy and safety of young children. Different operating environments complicate the use of security and safety settings on individual devices, and the numerous applications (apps) available for children tend not to disclose the company's data collection

and sharing practices. Nor do they usually provide easy-to-use opt-out options for parents or children.

- Children's digital footprints are now taking shape from very young ages. Some parents are writing blogs, and parents and grandparents regularly post photographs and videos of babies and children. These digital footprints are created for children who are too young to understand or consent (or who may not even be born, if their parents post ultrasound scans). Children's future ability to find, reclaim or delete material posted by others is uncertain.

Recommendations

In addressing the risks that children aged between 0-8 years old are known to encounter when using the internet, EU Kids Online recommends:

1. The development and promotion of realistic, evidence-based guidelines for parents/carers regarding very young children's engagement with digital technologies and the internet. Parent education packages should be aimed at specific age groups (0-2, 3-4, 5-8) and outline ways in which parents can maximise the benefits and minimise the risks of their children going online. This should include co-use activities such as reading e-books and video conferencing with relatives, as well as engaging, interactive and safe activities that offer fun, learning moments for young children.
2. The development and promotion of age-appropriate internet safety education for all age groups — including pre-primary school or nursery/kindergarten settings. This could also acknowledge the benefits for young children of using internet-enabled devices and include digital literacy support and the identification of age-appropriate positive contents and services to enhance online activities.
3. Engagement with device manufacturers, internet service providers and content providers — especially games and video-sharing site developers — to encourage the further development of safety features appropriate to very young users. This may include the classification of content before upload (by content providers or other parties) and the provision of easy-to-use safety functions, alert and blocking functions.

In addressing the lack of information regarding children under nine and their internet use, EU Kids Online recommends:

4. Cross-national research within the EU to establish the rate of internet uptake with children under nine years old and the associated benefits, risks and harm.
5. The development of appropriate investigative methods so as to include very young children's own experiences and opinions.
6. Further updating of the European Evidence Database in order to map all research outcomes regarding very young children's internet use and to ensure that the available evidence reaches the users of research and those who make recommendations for children's safe internet activity.

Concerning issues related to children's privacy in both the short term and long term, EU Kids Online also recommends:

7. Continued engagement with device designers to encourage the integration of

default privacy protections within the design of smart phones, tablets and other mobile devices.

8. Continued engagement with software designers to ensure the provision of greater transparency regarding how data are collected, collated, used and shared via children's apps, and the provision of straightforward opt-out choices for parents and children within these apps.
9. Engagement with online service providers to review their user consent policies and responsibilities to 'take-down' information in a wide range of circumstances. This includes confidential, risky and erroneous information inadvertently posted by children — as well as parental postings.
10. Parental education regarding posts, pictures and videos of their children, and the potential effect these postings may have on their children's digital footprint.

INTRODUCTION

There have been noticeable increases in the internet participation rate of children and young people in all EU countries. However, very young children (0-8) are showing particularly increased patterns of internet use. Tweens' (9-12 year olds) usage patterns now resemble those of teenagers five to six years ago, and younger school-aged children's usage is increasing to the equivalent of tweens' previous use. Pre-schoolers are going online too, and most babies under the age of two in developed countries have an online presence (or digital footprint). This report aims to identify recent relevant evidence regarding young children of eight years and under and their increasing engagement with the internet. It evaluates the quality of this evidence, the research gaps and the implications for policy.

Despite very young children being established as active internet users, policy resources are typically directed to older children with most concern focused on teenagers. Consequently, little thought has been given to the protection of very young children online, along with minimal attention paid to the opportunities and benefits offered to young children through their internet engagement. EU Kids Online has spent seven years considering children's engagement with the internet, within the 9-16 age range. This report, therefore, does not address findings from original research by the EU Kids Online network. However, the EU Kids Online's European Evidence Database[1], which collates other research on European children's online activities, risks and safety, indicates that there is a paucity of published research regarding children under nine years old (Ólafsson et al, 2013).

Given the dramatic increase in internet uptake by both young schoolchildren and preschool children, parents and policy-makers have been left without clear direction regarding the benefits and risks involved — and about how best to support children's engagement with the internet in safe and beneficial ways. It is to be hoped that the evidence base will grow so as to inform the development of relevant policy, support safety education, build public awareness and assist parents in the effective mediation of their young children's internet use.

[1] For the European Evidence Database, see http://www.lse.ac.uk/media@lse/research/EUKidsOnline/DB/home.aspx

HOW MANY CHILDREN AGED 0-8 ARE ONLINE?

There are a limited number of studies mapping the ongoing rise of very young children's internet use across Europe. European Commission (EC) research over the last decade indicates that children are using the internet at younger and younger ages. For example, a 2005 survey of parents in member countries indicated that 34% of 6-7 year olds used the internet while the equivalent 2008 survey found that 42% of 6 year olds and 52% of 7 year olds used the internet (European Commission, 2006, 2008). These figures show both greater take up in some national populations and greater take up in the younger age groups over all the countries included in the EC survey.

More recent surveys from individual EU countries indicate that internet take up by children under nine is continuing to rise, and that children are accessing the internet at younger and younger ages:

- UK: A third of 3 to 4 year olds go online "using a desktop PC, laptop or netbook and 6% who are going online [do so] via a tablet computer and 3% via a mobile phone" (Ofcom, 2012, p. 5). In addition to this, 87% of 5-7 year olds are known to use the internet — a rise from 68% in 2007 (Ofcom, 2012).
- Germany: 21% of the 6-7 years old and 48% of the 8-9 year old use the internet "at least rarely" (Medienpädagogischer Forschungsverbund Südwest 2012a, p. 33).
- Finland: 64% of 7 year olds use the internet (Paajarvi, 2012).
- Belgium: 70% of Flemish pre-schoolers are online, usually from the age of 3 to 4 onwards, and mostly on a regular basis of at least several times a month (Tuewen et al, 2012, p, 1).
- Sweden: 70% of 3 to 4 year olds go online at least sometimes (Findahl, 2013).
- Netherlands: 78% of Dutch toddlers and pre-schoolers are already online and 5% of babies under 1 are going online (Brouwer et al, 2011).
- Austria: Almost half of 3-6 year olds use the internet on a regular basis (Jungwirth, 2013).
- Norway: 58% of 0-6 year olds go online (Guðmundsdóttir and Hardersen, 2012).

These more recent increases in Europe reflect a worldwide trend, especially in developed countries. For example, in South Korea (the country with the world's highest high-speed internet penetration), 93% of 3-9 year olds go online for an average of 8-9 hours a week (Jie, 2012). In the US, 25% of 3 year olds go online daily, rising to about 50% by age 5 and nearly 70% by age 8 (Gutnick et al, 2011). In Australia, 79% of children aged between 5-8 years go online at home (Australian Bureau of Statistics, 2012).

How many children aged 0-8 are using touchscreens?

The introduction of iPads and other touchscreen devices is occurring at the same time as sudden increases in the rate of computer and internet use by toddlers and pre-schoolers, as well as by young school children.

There are now thousands of apps available that are aimed directly at the early childhood market. This trend is most evident in existing 'high use' countries, and seems unanticipated by researchers and policy makers. Some data gathering is now underway in Europe:

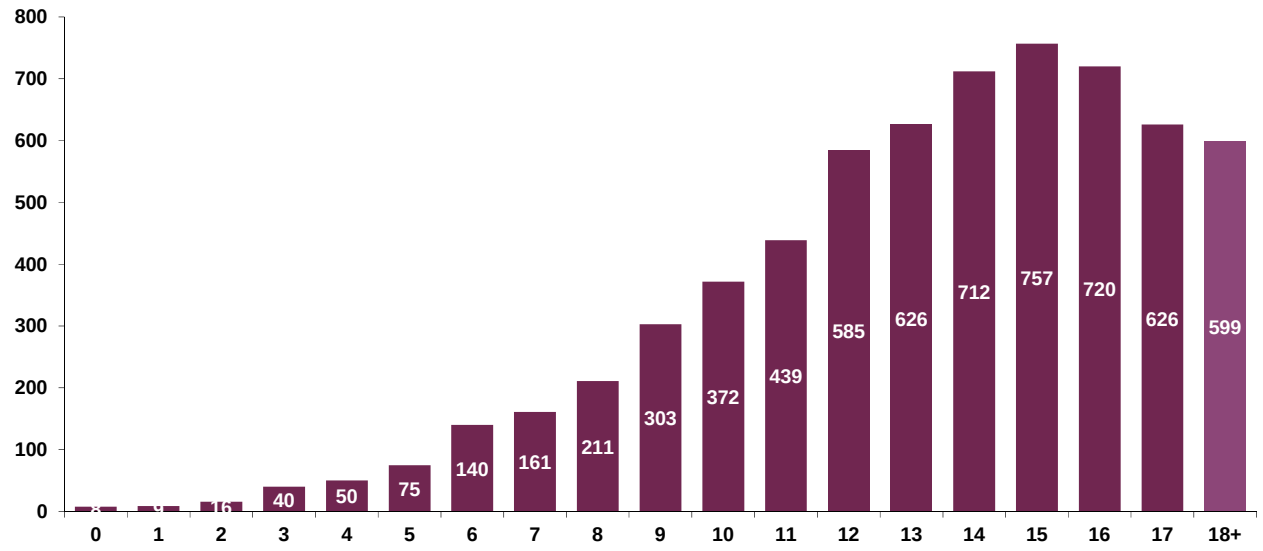
- 50% of Swedish children aged between 3 and 4 use tablet computers and 25% use smartphones (Findahl, 2013).
- In Norway, 23% of children 0 to 6 years old have access to touchscreens at home, with 32% first using touchscreens before the age of 3 (Guðmundsdóttir & Hardersen, 2102).
- In Germany, 17% of families with children aged 3-7 and 18% of families with children 6-11 have touchscreen tablets (Medienpädagogischer Forschungsverbund Südwest, 2012a).
- In the UK between 2011 and 2012, use of a "tablet computer has increased for 5-7s (11% vs. 2%), 8-11s (13% vs. 6%)" (Ofcom, 2012, p. 4).
- In the Netherlands, a survey of 575 parents found that touchscreens were very popular with children 3-6 years old and that these children seemed able to handle touchscreens more successfully than personal computers with keyboards and mouse controllers (Brouwer et al, 2011). While only 7% of families in this study owned a touchscreen tablet, 11% planned to buy a tablet in the next 12 months. The researchers expected rapid growth in the number of households with tablets, and many of these households also include young children (Brouwer et al, 2011).

Between 2011 and 2012, there was a tripling of UK children's at-home use of touchscreen tablets (Ofcom, 2012), so the current rate of uptake is likely to be considerably higher. In most studies, the data collected fail to capture touchscreen use by children aged two and under.

WHAT RESEARCH EVIDENCE EXISTS?

Very young children are "growing up at ease with digital devices that are rapidly becoming the tools of the culture at home, at school, at work, and in the community" (NAEYC, 2012, p. 2). Digital and media literacy has been a curriculum focus in the early childhood classroom in many European countries for at least a decade. As such, educational institutions seem better prepared to integrate new technologies within educational settings. On the other hand, the domestic consumption of the internet by very young children has had little research attention.

Figure 1: Number of studies per age in Europe. Source: Ólafsson et al, (2013). EU Kids Online's European Evidence



Note: The studies are multi coded and most studies cover more than one age group. Even though a particular age-group has been included in a study it does not necessarily mean that individuals from that group have been interviewed in person.

Over the past ten years or so there have been a growing number of research projects in Europe regarding children's online access, internet use and behaviours. EU Kids Online's European Evidence Database shows that the bulk of this research focuses on older children and teens (Figure 1). Indeed, in our review of some 1200 studies, only one in five included any children under nine years old, and only 4% included children aged birth to four years old[2]. Nonetheless, this means that over two hundred

[2] Specifically, 20% of the studies include any children at all aged below 9 years. This would be around 230 studies (bearing in mind that the definition of 'a study' can be somewhat fuzzy). Looking at 0-4 year olds only 4% of studies include any children at all in this age group (or around 50 studies). All of the studies including 0-4 year olds

studies included children aged from birth to eight, and in the present report we draw selectively upon these.

The research focus upon older children and teens reflects the fact that there is some correlation between the number of teenagers using the internet and the number of studies of their internet use. However, many younger children are now going online and there is not, at this stage, an equivalent increase in studies of children in this age group (Ólafsson et al, 2013).

The lack of studies focusing on very young children may reflect the difficulties of involving this age group in research projects. Their lack of reading and writing skills make them less able to engage in traditional survey-based data collection, either online or via pencil and paper. It is understandable, therefore, that the research that does involve pre-schoolers and other young children is mostly qualitative and explorative in nature. Although this qualitative research is more time consuming, it does enable the voices of very young children to be heard. Even so, the need for more research involving younger children raises extra challenges regarding methodology, research ethics and funding (Livingstone & Haddon, 2008).

The rise in internet uptake by children aged between 0 and 8 is not uniform. Considerable differences exist between EU countries as well as within these countries, so it is not always possible to generalise across countries. For example, in 2010 internet access for households with children in the EU ranged between 50% in Romania to 99% in the Netherlands and Finland (Eurostats, 2010). Of the 70 per cent of 7-8 year-olds who used the internet weekly in Finland in 2009, a majority preferred gaming-oriented sites. Gender differences exist, however. For instance, girls "preferred sites that fall between children- and youth-oriented social networks and gaming sites, such as panfu.fi, littlepetshop.com, and gosupermodel.com." (Suoninen, 2010 p.14). Finnish boys had different gaming preferences. Research which differentiates and explains differences between and within EU countries is needed in order to maximise support for all children to negotiate the internet in safe and beneficial ways.

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also include children from the 5-8 year old group so the very young children seem to be not studied as a separate group but rather included with older children. The same applies for the 0-8 year old group in relation to older children that studies rarely focus on this group alone. Around half (54%) of studies including children from the 0-4 year old group also include children aged 11 years or older and 82% of studies including children from the 5-8 year old group also include children aged 11 years or older

WHAT DO 0-8 YEAR-OLDS DO ON THE INTERNET?

Research regarding exactly what European children aged under nine are doing on the internet is somewhat sketchy. Some countries have begun to track what very young children do on the internet while others are yet to do so. Children in this age group treat the internet as a source of entertainment. Those under the age of 3 or 4 are more likely to spend their time watching video clips (Childwise, 2012; Findahl, 2012; Teuwen et al, 2012). For instance, YouTube is the second favourite site for children under 5 in the UK (Childwise, 2012). When they reach 3 or 4 they also become interested in playing games online (Childwise, 2012; Teuwen et al, 2012). As these young children get older they widen their internet usage to include information seeking, completing homework and socialising (Ofcom, 2012; Childwise, 2012, Guðmundsdóttir& Hardersen, 2011; Findahl, 2012).

Virtual worlds

Children's virtual worlds are simulated internet environments in which children play and interact with each other via avatars. The number of children accessing virtual worlds is on the increase with the most significant growth expected in pre-teen users aged 3-11 ("Teen, Preteen", 2009). Security software company AVG's digital diaries research project, conducted in 2011 with six to nine year olds, found that 64% of UK children, 55% of Spanish children, 46% of German children, 38% of Italian children and 37% of French children are using the social network functions on sites such as Club Penguin, Minecraft, Moshie Monsters and Webkinz ("Young Children", 2011).

Table 1. Percentage of European children aged 6-9 using SNS sites in 2010. Source: "Young children", 2011.

	Virtual worlds	Facebook
UK	23	56
Spain	37	61
Germany	5	12
Italy	0	3
France	3	14

Data collection in this area is sometimes difficult to interpret because there is no accepted definition concerning what a virtual world is — and little differentiation between 'playing games online' and visiting 'virtual worlds'. Virtual worlds merge social network functions with game playing and as such need separate research attention regarding the benefits and risks of going online to interact with others.

Underage social networkers

Research regarding under-age access to social networking sites provided for teenagers and adults (such as Facebook) can be problematic due to underreporting. However, the UK Safer Internet Centre's recent survey found that 30% of 7-11 year olds reported having their own Facebook profiles before they are 13: the minimum age specified for membership (Broadbent, Green & Gardner, 2013). In Finland also, children under 13 frequently

mention Facebook as a favourite site (Pääjärvi, 2012). In 2010 the AVG digital diaries study indicated that some children aged between six and nine have their own Facebook accounts (Table 1). They found that 10% of UK children, 11% of Spanish children, 6% of German children, 22% of Italian children and 15% of French children between the ages of six and nine use Facebook ("Young Children", 2011)[3] .

A detailed study carried out in Germany found that 44% of children under 13 use social network sites aimed at teenagers and adults. The most visited sites were Facebook (13+) and schülerVZ[4] (12+). More specifically, 5% of 6-7 year olds and 18% of 8-9 year olds used these sites in 2012. These percentages are expected to rise in the next few years (Medienpädagogischer Forschungsverbund Südwest 2012a). The expected rise in under-age usage signposts a critical need to investigate young children's ability to negotiate these sites in a safe and beneficial manner — as well as indicating the value in exploring parental attitudes to this trend.

[3] The Swedes and the Internet 2013 study indicates that combining children aged 6-9 into one group does not highlight the changes children tend to undergo at about 8 or 9 years old. For instance, in Sweden very few 6-7 year olds visit Facebook while 30% of 9 year olds do (Findahl, 2013).

[4] schülerVZ does not exist anymore as it closed at the end of April 2012.

WHAT ARE THE BENEFITS OF VERY YOUNG CHILDREN GOING ONLINE?

Apart from the obvious enjoyment many young children experience playing games, watching video clips and socialising online, their engagement with the internet helps to develop emergent digital literacies. It can also support future academic achievement, playful encounters and social interaction (Cavanaugh et al, 2004; Johnson, 2010; Marsh, 2010; Judge et al, 2006).

To a greater or lesser degree, European countries support the provision of digital technologies and the development of digital literacy skills in their early childhood classrooms, recognising that the internet provides new opportunities for learning, participation, creativity and communication with others (Plowman et al, 2011). Recent increases in internet use by children under the age of nine (see Section 3) suggests that many parents also support their young children's early exposure to the internet by providing them with opportunities to explore and play online. At this stage, however, there is little clear guidance about how these very young children can learn, explore and play online in safe and beneficial ways.

Academic achievement

Longitudinal studies show a positive correlation between internet use during early childhood and achievement at school (Cavanaugh et al, 2004). A large-scale longitudinal study with 8,283 kindergarten, first and third grade children in the US found that "frequent use of the internet and proficiency in computer use [….] correlated positively with academic achievement" (Judge et al, 2006, p. 52). This research also indicated that using a computer at home was clearly advantageous to achievement levels in reading and mathematics (p. 57).

A recent longitudinal study in Australia which investigated the vocabulary development of over 9000 children aged between four and eight years of age found that, after allowing for socio-economic background and the time the children spent reading, "having access to the internet was positively related to verbal abilities" (Bittman et al, 2011, p. 167). One exception to this positive relationship is the use of "games consoles and functional equivalents [which] is associated with lower linguistic abilities" (p. 172). Early childhood educators understand the importance of digital technologies as an integral learning tool which, when used judiciously, promotes the language, cognitive and social development of young children (Couse & Chen, 2010; Gimbert & Cristol, 2004; Information Society for Technology in Education [ISTE], 2007; NAEYC, 2012).

Digital literacy, digital social skills and digital citizenship

Many young children are entering their formal schooling years with significant experience in computer use and the internet. They show emerging skills in navigating, retrieving and creating content (Hopkins et al, 2013; Edward-Groves & Langley, 2009; Siibak & Vinter, 2010; Zevenbergen & Logan, 2008). Being literate in a digital age involves multiple literacies - skills in accessing, understanding, viewing and creating in multiple digital formats.

These emerging digital literacy skills also form the basis for responsible use of these technologies (digital citizenship). Being able to use computers and the internet effectively and responsibly supports good interpersonal relationships and promotes creativity, self-expression and individual identity-making. It also helps strengthen a sense of belonging or social connectedness and assists the development of 'digital social skills' and 'digital citizenship' (Holloway et al, 2013; Collin, Richardson & Third, 2011).

Play and social interaction

Young children use the internet in ways that reflect conventional childhood use of media and communication technologies in previous generations. They play, learn, interact and maintain relationships with other children and family members. Using emails, messaging, playing in virtual worlds, and video conferencing with friends and family are a few examples of the ways in which the internet sustains children's social interaction and play.

Online play is, to some extent, comparable to offline play. Marsh (2010) found that children's virtual worlds, in particular, offer online interactions that are often "playful in nature" and "closely related to offline play" (p. 23). She noted that this virtual play included "fantasy play, socio-dramatic play, ritualized play, games with rules, and what might be called 'rough and tumble' play, albeit […] a virtual version of offline physical play" (p. 30). Although children's interactions within some virtual worlds may be risky and worthy of further research, Marsh suggests that further research is also warranted so as to "examine their affordances more closely in order to identify what children gain from their playful engagement in these worlds" (p. 36).

WHAT ARE THE POSSIBLE RISKS FOR CHILDREN AGED BETWEEN 0-8?

EU Kids Online research suggests that "lower levels of skills and confidence claimed by younger children are especially of concern" (O'Neill et al, 2011b, p. 19). Although EU Kids Online research has dealt with children aged nine years and older, it is prudent to assume that children younger than nine will have even fewer skills in negotiating the risks involved in going online than do 9-10 year olds. In addition to this, EU Kids Online's European Evidence Database indicates that there is little in-depth European research regarding the benefits and risks of internet engagement for children aged between birth and eight. This is especially true of research which includes children's own experiences and opinions. Even so, 2013 survey data from Sweden indicates that 13% of the parents of 3-7 year olds report that their child has had negative internet experiences. This is also the case with 20% of parents of 8-11 year olds (Findahl, 2013).

A study of internet-readiness carried out in Australia with 57 children aged between 5 and 8 found that children this age were more vulnerable to internet harm than older children, despite having an overall understanding of the risks encountered while online. Most of the 57 children learned about internet risks from their parents or other family members (Ey & Cupit, 2011). The 5 to 8 year-olds were able to identify content risks (sexual content, violence, inappropriate language) or contact risks (meeting people they only know online). Nonetheless, they displayed a degree of naivety when they were presented with 'real life' internet scenarios. They failed to identify inappropriate communication, commercialism, unreliable information and revealing personal information as internet risks (Ey & Cupit, 2011). For example, when asked if they would go to a birthday party or go to the park for a game after being invited by someone they only knew on the internet, some said 'yes' (p. 62). In this sense, young children's knowledge about internet risks may not always result in safe behaviours in real life internet encounters.

Social network sites

Social networking sites (SNS) aimed at teenagers have been criticised for their inadequate default privacy settings, and for paying less attention to monitoring respectful conduct than the virtual worlds aimed at primary school aged children (O'Neill, 2010). Social network sites aimed at teenagers and adults are being visited by children under the minimum joining age, however, and concerns have been voiced about whether primary school children are developmentally ready for online chat or networking (Bauman & Tantum, 2009). This is especially the case with the rise in under-age access to sites such as Facebook, which stipulates that members should be 13 or older.

Although there is very little research outlining children's own experiences when visiting SNS sites as under-aged participants, German research indicates that 80% of the children under 13 years of age who have an account on a social network site, got support in setting up

their user accounts: 35% from a father, 33% from a mother, 30% from friends and 17% from siblings (Medienpädagogischer Forschungs-verbund Südwest 2012a, pp. 40). Moreover, while conducted with 9-16 year olds only, analysis of the EU Kids Online survey revealed that where parents ban the use of social networking sites, relatively younger users (9-12) are likely to obey. It is mainly teenagers who get a profile even if their parents have said they should not (Livingstone, Ólafsson, & Staksrud, 2013). Hence we might assume that even younger children will be willing to follow such parental advice.

Israeli researchers investigated the parental supervision practices of 195 Facebook users aged between 8 and 17. They found that 82% of children under 13 had Facebook accounts (Dor & Weinmann-Saks, 2012, p. 10). Parents reported similar levels of at-home monitoring for all children despite their age. However, the parents of under-aged users were less likely to co-use Facebook with their children. The researchers suggested that this lack of online monitoring is because parents perceive younger children's online activities, such as playing games and chatting to friends, as relatively innocuous compared to older children's (13+) online activities. It may also be because "parents are not comfortable with the situation in which they actually let their children register this way [as under-agers falsifying their birth date]" (p.11).

If such concerns hold true for parents of most under-aged Facebook users, this might mean that these children are at greater risk than older children who have the benefit of active parental monitoring. Such concerns also illustrate issues caused by assuming that children's online activities are driven by age rather than desire, and these findings underline the need to research internet use across children's age-ranges from babyhood through to late adolescence.

Children's virtual worlds

Researchers, educators and parents are all aware of the potential risks posed by social network sites in terms of children experiencing bullying and exposure to inappropriate content. What is missing from the research agenda is investigation into the increasing use of "Websites designed for younger children that have components of social networking" (Graber, 2012, p. 85). Children as young as five are joining virtual worlds such as Minecraft, Moshi Monsters and Club Penguin.

These virtual worlds typically have filters, which make it difficult for children to exchange personal information. In addition to this, real-time moderation usually takes place within children's virtual worlds (peer, in-game, silent and/or automated) in order to deter instances of bullying or abusive behaviour. Notwithstanding these safety features, younger children can still be troubled by behaviours they encounter while playing in virtual worlds.

Younger children seem less resilient (due to their age) and can become distressed when things go wrong: when they are socially excluded from games by known friends; when friends and siblings misuse their online profiles; and when they encounter virtual losses (games being hijacked or ruined, or losing virtual currency) (Holloway et al, 2013). There are also concerns about young children's "competence

to negotiate online commercial content" (Nansen et al. 2012, p. 204).

Researchers also question whether children this age are developmentally ready or have the critical skills needed to keep them safe when they play and interact within virtual worlds (Bauman & Tantum 2009; Ey & Cupit, 2011). The rise in the number of children inhabiting virtual worlds requires "a better understanding of the ways that social networking sites mediate kids' socializing" (Grimes & Fields, 2012) as well as the skills and abilities children under nine need to handle risk in virtual worlds.

Video sharing sites

Video viewing is now one of the earliest internet activities carried out by young children (see Section 5). Sites such as YouTube offer a range of educational and entertainment videos for the very young. For instance, YouTube's Sesame Street channel recently reached a billion views (Luckerson, 2013). Once children are set up in front of the computer/tablet/smartphone, however, the easy-to-use graphic interfaces allow children as young as two or three years old to activate other videos from the suggested playlist that appears alongside the content preferred by the adult in charge (Buzzi, 2012).

In this way, young children's safe and beneficial access to these sites can be problematic. Parents and social commentators are now raising concerns about the ease with which very young children can access age-inappropriate videos on sites such as YouTube and Tumblr (Blythe-Goodman, 2010; Agarwal, 2012; Dewey, 2013). A content study of popular children's videos on YouTube found that young users "are just three clicks away from content better suited to a more mature audience" (Dewey, 2013 Feb 6). By clicking or touching the playlist choices on the sidebar, children can inadvertently access adult-orientated footage.

A survey of 100 Italian parents with children aged between two and thirteen found that a number of their children had watched inappropriate content on YouTube (Buzzi, 2012). EU Kids Online research also reports that European children (9-16) are sometimes bothered by clips they view on video sharing sites such as YouTube and Redtube. When they are exposed to videos of explicit pornography, violence, schoolyard bullying, cruelty to animals and real life car accidents children often find this content upsetting (Livingstone et al, 2013 p. 6). While the EU Kids Online findings related to children aged 9-16, many quotations indicating distress came from the youngest children in that survey, aged 9-10, and thus it is unfortunate that there seems to be minimal research investigating very young children's (0-8) responses to what they encounter on video sharing sites.

In order to minimise these risks there are calls to "evaluate the usability of [current] YouTube user interfaces for signalling or blocking inappropriate content" (Buzzi, 2012). It has also been recommended that YouTube and other video sharing sites ensure all videos are classified before they are uploaded to their sites (Buzzi 2012; Agarwal, 2012); and that reliable, easy-to-use safety functions and other alert and blocking functions should be put in place (Buzzi, 2012 p. 250).

Mobile technologies and apps

Young children constitute a large user group for mobile technologies, accessing the internet through a variety of devices (Ofcom, 2012). Preferred digital access points include iPods, touchscreen computer tablets, e-readers, laptops and smart toys. Tablet devices are also being integrated into a variety of children's toys and other products. These mobile technologies enhance access to and enjoyment of the internet for all children. At the same time, the privacy and safety of children using these multiple devices may be compromised. Security and safety settings can be complicated for both parents and children and often involve different operating environments even in apparently similar technologies. In the case of smartphones and touchscreen tablets, many children's apps draw upon specific user information without the child's or their parents' knowledge. This information may include the child's identity details, geo-location or phone number. In addition to this, some operating environments also provide links to social network sites within the apps without divulging this before the user downloads the app[5].

A recent analysis regarding privacy disclosure and information collection and sharing practices within children's apps, carried out by the Federal Trade Commission in the US, found that of the 400 children's apps they surveyed:

- "nearly 60% (235) of the apps reviewed transmitted device ID to the developer or, more commonly, an advertising network, analytics company, or other third party [… while] only 20% (81) of the apps reviewed disclosed any information about the app's privacy practices" (Mohapatra & Hasty 2012, p. 6).
- "22% (88) of the apps reviewed contained links to social networking services, while only 9% (36) disclosed such linkage prior to download" (Mohapatra & Hasty 2012, p. 20).

Little else is known about the relationships between specific internet-enabled devices and the benefits or risk srelated to their use by very young children, especially in terms of mobile devices and internet safety. Identifying and contextualising children's and their parents' practices around different devices will help pinpoint the age, circumstances and devices more likely to be associated with safe and beneficial internet use for young children.

Tablets and early childhood development

Touchscreen technologies lend themselves to the sensorimotor stage of very young children who readily pick them up and press the buttons and icons with little direction or modelling from adults (Valkenburg, 2004). This ease of use allows a greater of degree of independence for young children who can explore and play with touchscreens relatively unaided, especially in contrast to laptops or PCs, which usually require the assistance of older users to work the keyboard or mouse.

Babies, toddlers and pre-schoolers are at crucial developmental stages where the foundations are set for many physical, social and intellectual capacities. It is therefore not surprising that the recent uptake of touchscreen technologies by very young children has intensified debate and discussion regarding the

[5] See http://www.siliconrepublic.com/digital-life/item/31005-the-week-in-gadgets-ces-20

place of screen technologies in early childhood development. However, there is a range of differing opinions regarding the role of screen technologies in the early years of life.

Educators are increasingly acknowledging the importance of technology in the early childhood classroom. For instance, long standing curriculum guidelines in the UK tends to focus on emergent technological literacy, as well as the practical use of ICT tools for the early years:

> Children need the opportunity to explore and play with computers just as they do with other forms of ICT, such as cassette recorders. This kind of play acts as the foundation for more structured use of applications later on. It means that ICT must be integrated across the curriculum (Siraj-Blatchford & Siraj-Blatchford, 2000, p.1).

On the other hand, advice given by the American Academy of Pediatrics regarding screen time in early childhood is often quite restrictive — with no screen time advised for children under two, including the avoidance of all background television (Brown, 2011). This advice was developed for older screen technologies, and provided before the adoption of smartphones and tablets by very young children. Much of the research literature advising strict limits on screen time is "discursive rather than evidence based" (McPake et al, 2013, p. 423). The body of research supporting this stance also tends to connect ownership or usage of screen technologies too readily with (insufficiently supported) "hypotheses about their effects" (McPake et al, 2013, p. 423).

There are also concerns regarding very young children's screen activities and their attention span or general brain function (Miller, 2005; Zimmerman et al, 2007; Christakas, 2009). However, there has been no published research to date regarding touchscreen technologies. Dr Jordy Kaufman (2013), who is currently researching the cognitive effects of iPads on children aged between 4 and 6, suggests that it is more likely that 'what' young children do on their touchscreen is of greater significance than general screen usage:

> Children can read literature, watch educational television, create fantastic works of art, learn maths and science, and have video chat conversations with their grandparents on screens. But they can also play age-inappropriate games, and spend countless hours passively watching non-educational videos (Kaufman, 2013).

It may be more important, therefore, for future research to differentiate between the variety of screen activities available to young children rather than referring to overall usage rates or promoting blanket condemnation of screen use by young children.

Some of the concerns regarding young children's screen time focuses on the displacement of time spent on other activities such as play and social interaction — both important to children's cognitive, social and physical development (Linn, 2010). Children's advocates and media commentators tend to blame each new ICT technology (television, computers, gaming platforms, touchscreens) for the erosion of children's playtime — often without reference to other social and economic changes that have progressively eroded

children's play time over the last few generations (Ginsburg, 2007). For instance, working parents tend to have less time to supervise outdoor play (McBride, 2012); generations of parents have progressively restricted the places or boundaries where children can play unsupervised (Louv, 2005; Tandy, 1999); and spontaneous play has progressively been replaced by adult organised activities (Skår & Krogh, 2009). This gradual reduction in children's play opportunities brings into question whether or not home-based entertainment technologies are the single, or even the major, reason for the decline in spontaneous play.

Other qualitative research regarding tabloid technologies and the pre-school child examines whether 'digital play' promotes the child's development, as real world play does (Verenikina & Kervin, 2011). Verenikina and Kervin's case study indicates that children aged between 3 to 5 have "positive experiences with digitally mediated imaginative play" and that children's use of iPads in the home often involves face-to-face social interaction with other family members (2011). As digital natives, young children incorporate digital technologies into their play without differentiation. Adults, on the other hand, tend to revisit their own childhood when constructing idealised notions of children's play — as unspoiled and free from digital technologies (Zevenbergen, 2005).

Timely research which engages with young children's everyday lives and looks beyond general 'screen-time' will go some way towards building a more applied evidence base from which policy and recommendations to parents can be developed. In particular, a more nuanced understanding of 'screen time' (what activity, how often, with whom and for how long) is needed in order to understand fully the impact of touchscreen technologies upon early childhood development (Kaufman, 2013).

WHAT ARE THE FAMILIES OF VERY YOUNG CHILDREN DOING?

The rise in young children's (0-8) internet use has not yet been matched by evidence-based research investigating the role that families have in mediating young children's internet use. In Sweden (and most likely other EU countries), it is young parents aged between 25 and 45, who are themselves experienced internet users, who are providing their children with access to a greater variety of internet-enabled devices. Parents who are more affluent are more likely to provide access to the newest technologies such as touchscreen tablets (Findahl, 2013). Given that other research also shows that parents tend to feel less troubled about their younger children's internet use than their older children's use (Brouwer et al, 2011; Plowman et al, 2010, Wagner et al, 2013), further consideration of the role of families in effectively mediating the digital life of very young children is warranted.

Parental mediation

There is some available evidence indicating differences in family mediation practices between and within EU countries. Nikken and Janz (2011) found that parents of 792 Dutch children aged between 2 and 12 reported being actively involved in guiding their young children's internet use and paying more attention to younger children in this age group. Socioeconomic differences were also noted, with children from more privileged families receiving slightly more active mediation than those from poorer families (2011).

In Estonia, on the other hand, Vinter and Siibak found that "parents either delegate their role as mediators to older siblings or enforce restrictions" (2012 p. 78). Focus group interviews with children (aged 5-7 years old) and their parents revealed that parents were less likely than with older children to engage in active mediation, relying instead on older siblings to mediate in their place. This 2012 study highlights the role some older siblings have in guiding, supervising and influencing very young children's choices on the internet. It also underlines the importance of interviewing children themselves (as well as their parents) when researching family mediation practices, and the risks and benefits of the internet use for very young children.

The role of siblings

The Estonian study above highlights the potential influence that older siblings have on young children's internet use. Having an older sibling makes it more likely for very young children to start using the internet at an even younger age (Teuwen et al 2012; Brouwer et al 2011; Stevens et al, 2008). Stevens, Satwicz and McCarthy (2008) carried out an observational study within family contexts and noted that older siblings tended to encourage and mediate younger siblings' use of digital media in the home. Older siblings demonstrated to their younger brothers and sisters how to use the internet, access virtual worlds and use social network sites such as

Facebook — thereby encouraging early exploration of these sites (Barone, 2012).

These findings suggest that the role of siblings in guiding, supervising and influencing young children's internet choices may be of particular importance to investigators researching the risks and benefits of the internet for young children below nine years of age. The findings also highlight the importance of incorporating detailed investigation of family members' sociocultural practices around internet use in the home, requiring researchers to be responsive to issues and themes coming out of children's and parents' own reflections about the family context of media internet use (Holloway & Green, 2008, 2013).

Parents and their children's digital footprint

Many children below the age of nine were born with the first fragment of their 'digital footprint' already available online. These youngsters will be the first generation to experience the aggregated effect of living in a digital world over their whole lifetime. They will inherit their digital profiles as a work in progress from parents who often assume that the information they post carries the privacy and security levels available to them at the time of posting, or who did not consider such issues when they posted their child's ultrasound photos or doctors' reports.

Parents create these digital profiles when they upload sonogram pictures, post about their experiences in pregnancy, upload photos of their newborns and add further commentary as their children grow. A 2010 survey carried out for AVG noted that 73% of babies whose mothers had an SNS profile in the UK, France, Italy, Germany and Spain already had an online digital profile before they reached two years of age (Williams, 2013). A more recent survey of 632 parents of 2-5 year olds in Germany found that 53% of parents were members of a social network and 33% published information about their child. Of these parents, 88% posted pictures of their child, 42% posted information about child's experiences/activities and 14% posted videos of the child (Medienpädagogischer Forschungsverbund Südwest , 2012b, p. 72).

Table 2: Digital footprint survey data from mothers who are on SNS and have children under 2 years. Source (Digital Birth, 2010)

	Mothers who have uploaded images of child under 2	Mothers who uploaded images of their new-born	Mothers who have uploaded antenatal scans online
UK	81%	37%	23%
France	74%	26%	13%
Italy	68%	26%	14%
Germany	71%	30%	15%
Spain	71%	24%	24%
USA	92%	33%	34%
Canada	84%	37%	37%
Australia	84%	41%	26%
New Zealand	91%	41%	30%
Japan	43%	19%	14%
EU5 average	73%	29%	20%
Overall average	81%	33%	23%

These parents are establishing their children's digital footprints in social networking sites that can alter privacy policies without clearance from individual users. In addition to this, friends, relatives or other contacts can effectively bypass individual privacy settings when they repost or retweet information. Facebook, in

particular, has a history of steadily decreasing "the default settings of users' profiles" (O'Neill, 2010). In this sense, "many of the digital traces persist and can often be easily (re-) attached to the children in question later in life" (Leaver, 2011).

Parents are also writing blogs describing the lives of their children (McCarthy, 2010, Apr 14), and posting videos on YouTube such as the 2007 viral sensation *Charlie bit my finger* (Shifman 2012). Although these postings are not intentionally malicious, parents need to be aware that their children's online dossiers are likely to be with them for the rest of their lives.

Children may not be happy with their inherited profile. For example, parents who advocate "for causes such as autism or diabetes after their children are diagnosed have essentially 'outed' their kids without the children's permission" (Bonnie Harris interviewed in Tillotson-McClatch, 2010). These children have not chosen to have a digital profile, they have not chosen what they want to make public or with whom they want to share this information (Bakardjieva, 2010 interviewed in Kadane 2010).

Concerns about risks and harm for very young children consequently also involve strategies for parental education regarding protection of their children's privacy "going forward in a world of technology" (McCarthy, 2010), as well as engagement with online service providers who should include such considerations in their user consent policies and should accept the responsibility to 'take-down' information in a wide range of circumstances.

CONCLUSION

The one thing we know for sure about 0-8 year olds' internet use is that children in this age group are increasingly going online. New products and apps aimed at this demographic are released every week. Further, new-release technologies, such as smartphones and tablets, are especially baby and toddler-friendly since they do not require complex motor skills or difficult protocols around keyboard use and mouse-clicks. Many such technologies turn on with a single button. Toddlers and other preschool children seem to enjoy playing with digital material and often do so as part of their interactions with adults.

What we also know is that children are likely to run some risks if they access the internet unsupervised, or for long periods of unbroken time. Even so, we are unclear about possible benefits and opportunities. Given this lack of knowledge, some paediatricians, psychiatrists and psychologies argue that parents should limit pre-schoolers' use of, and exposure to, digital technologies. It may be, however, that in a digital world it is appropriate that children grow up with digital resources as part of their everyday experience, guided in their use through the active engagement of parents and older siblings, thus making digital technology a normal part of a child's social development.

Contemporary parents seem to see value in allowing younger children to use digital technologies, which is why internet use in the 0-8 age group is growing so rapidly. Nonetheless, as this report indicates, there are early indications of a range of risks that we should not be blind to or complacent about. Further investigation is required to identify the range of benefits and risks of internet use before simply letting small children use internet-enabled devices by themselves.

The uptake of internet use by young school-aged children is also on the rise, and their internet repertoire is widening. While children this age (up to 8) are known to play games online, they are also completing their homework, watching video clips, chatting with friends and using social network sites. This report consequently calls for cross-national research within the EU to understand better the internet activities of children below nine years of age, along with the benefits, risks and harm associate with their online practices.

The aim of future research should be both protective and empowering. Protective, because we know that the younger a child is, the less likely he/she is able to negotiate the internet in safe and beneficial ways. Thus a better understanding of the dimensions of risk, harm and safety will help ensure the socio-emotional well-being of all children in this age group. The proposed research would also be empowering insofar as safe access to the internet for young children supports the development of digital literacy skills, strengthens interpersonal relationships, promotes creativity and individual identity-making, creates a sense of belonging or social connectedness, and benefits the development of 'digital social skills' and 'digital citizens'.

If very young children are able to engage with the internet in safe and beneficial ways, they

will also be able to learn and consolidate a variety of internet-related skills at younger ages. This can only be advantageous for the creation of an environment in which children and young people are empowered actors and contributors in the digital age.

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ANNEX 1: EU KIDS ONLINE

Overview

In its first phase (2006-9), as a thematic network of 21 countries, EU Kids Online identified and critically evaluated the findings of nearly 400 research studies, drawing substantive, methodological and policy-relevant conclusions. In its second phase (2009-11), as a knowledge enhancement project across 25 countries, the network surveyed children and parents to produce original, rigorous data on their internet use, risk experiences and safety mediation. In its third phase (2011-14), the EU Kids Online network is examining findings and critical analyses of internet and mobile technology uses and associated risks among children across Europe, drawing on these to sustain an active dialogue with stakeholders about priority areas of concern for child online safety.

Thus, the network has widened its work by including all member states and extending its engagement – both proactively and responsively - with policy stakeholders and internet safety initiatives. It has also deepened its work through targeted hypothesis testing of the pan-European dataset, focused on strengthening insights into the risk environment and strategies of safety mediation, by pilot testing innovative research methodologies for the nature, meaning and consequences of children's online risk experiences, and conducting longitudinal comparisons of findings where available over time.

Last, it is updating its work on the online database of available findings, and by producing timely updates on the latest knowledge about new and emerging issues (for example, social networking, mobile platforms, privacy, personal data protection, safety and awareness-raising practices in schools, digital literacy and citizenship, geo-location services, and so forth).

Work Packages

- WP1: Project management and evaluation.
- WP2: European evidence base
- WP3: Hypotheses and comparisons
- WP4: Exploring children's understanding of risk
- WP5: Dissemination of project results

  WP6: Policy implications

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