Finding common ground: comparing children's and parents' views on children's online safety

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This study examines children's online safety with a particular interest in children's online safety skills and conduct as well as parents' mediation strategies. A survey of 141 children and 163 parents was conducted. Children have encountered a variety of different online threats, but not many children have been scared or disturbed by what they have seen or experienced. Our study revealed that children have a significantly more positive opinion about their own safety skills than their parents have, and that parents have a significantly more positive view on the amount of online safety mediation they engage in compared to children's view. Implications of these results for research and for designing tools for children's online safety mediation are discussed, suggesting the approach of 'family-negotiated online safety of children'.

Online safety. Safety mediation. Internet. Web 2.0. Social media. Children. Parents. Family.

1. INTRODUCTION

Children today are growing up in an increasingly digital world (Prensky 2001), and while immersion in online communication, use of smart phones, and social networking are usually seen as typical for teenagers, they are becoming habits of even younger children as well (Livingstone, Smith 2014). Research shows that there has been a considerable increase in Internet usage by children under nine years old (Holloway, Green et al. 2013, Kotilainen 2011). Use also varies according to socioeconomic status and there are gender differences. Boys undertake a larger variety of activities than girls (Livingstone, Smith 2014). They are more interested in games and competitions, and they share their photos and videos both with their friend network and to a wider audience, whereas girls concentrate on personal communication and sharing photos and drawings within their own friend networks (Kotilainen, Suoninen 2013).

Increase in the Internet usage of children has not yet been matched by research exploring the benefits and risks of children's online engagement, so there are many gaps in the current knowledge (Ólafsson, Livingstone et al. 2013, Hartikainen, Iivari et al. 2015). There has been an increasing interest in children's online safety in Human Computer Interaction (HCI) research, among other disciplines, with studies reporting on children's risky actions (Pater, Miller et al. 2015), parental concerns (Ammari, Kumar et al. 2015, Ammari, Schoenebeck 2015), and mitigation of children's online activities (Renaud, Maguire 2015, Wisniewski, Jia et al. 2015, Nouwen, Van Mechelen et al. 2015, Hiniker, Suh et al. 2016). HCI researchers have argued, for example, for children's resilience (Wisniewski, Jia et al. 2015), translucence in online safety solutions (Yardi, Bruckman 2011), and parental involvement (Nouwen, Van Mechelen et al. 2015) and discussed 'child-centered security' as a research discipline (Dempsey, Cassidy et al. 2016).

Further research is needed, however, for capturing the interplay between different actors involved in mediating children's online safety. Those include industry as well as different organizations and policy makers involved in developing and spreading information about technological and educational solutions for the purpose (Hartikainen, Iivari et al. 2015), such as The Safer Internet Centres all around Europe (see www.betterinternetforkids.eu) and many local actors like the communications regulatory authorities in different countries (e.g. Ofcom in UK or Viestintävirasto in Finland). Children themselves, their friends, parents, extended families, teachers and so on are in the focus of their activities (Hartikainen, Iivari et al. 2016). The role of parents in ensuring children's online safety is a particularly interesting topic to study further (Ólafsson, Livingstone et al. 2013. pp 5, Wright 2015) as parents are the main agents in mediating children's online safety (Hasebrink, Görzig et al. 2011). The term "mediation" can be seen to capture

the management of the relation between children and media (Livingstone, Helsper 2008). In line with this, we use that term to describe the strategies parents use to manage their children's Internet use, hoping to maximize the advantages and to minimize the possibility of harm.

This study aims to contribute to HCI research by studying parents' and children's views on children's online safety; in particular, on children's online safety skills and conduct, and parents' online safety mediation strategies. Therefore, we ask as our research questions 1) what kind of threats to online safety have the children encountered, 2) what kind of online safety skills do the children possess, 3) what kind of help and safety mediation do the children receive from their parents, and 4) how children's and their parents' views on children's online skills and safety differ. This is done through a survey study with Finnish primary school children and their parents. Our aim is to help HCI research to develop better and more child-centered means and tools for ensuring children's online safety.

This paper is structured as follows: The next section contains related research on online threats and the mediation of children's online safety and parents' role in. This is followed by introducing the research design. Then our results are outlined, and finally the implications of our results are discussed together with limitations and paths for future work.

2. RELATED RESEARCH

2.1 Online threats

Fears and anxieties regarding young people are not new, but new technologies create new sites of concern. Some of these are unique to the Internet, but many are either an extension or a reformulation of offline concerns (boyd, Hargittai 2013). The rise of the Internet and social media have reinforced and magnified existing fears while also created a new target to blame: technology (Ibid).

In addition to vast opportunities for entertainment, communication, knowledge seeking and exchange (Livingstone, Smith 2014), the widespread adoption of social media and other networked technologies by children has prompted concerns about the safety threats children face when they go online (boyd, Hargittai 2013). A threat is usually defined as something that can intentionally or accidentally exploit an existing vulnerability and cause some harm. Harm is a distinct and negative outcome, whether measured objectively or, more usually, through subjective self-report. A risk is a calculation based on probability and the consequences of harm, when exposed to a threat. (Livingstone, Smith 2014). For example, there is a risk that when encountering some violent or sexual content online (Livingstone, Smith 2014), children might experience psychological harm (boyd, Hargittai 2013) or,

when a child participates in certain online interactions (Livingstone, Smith 2014) they might experience physical harm (boyd, Hargittai 2013).

Online threats can be divided into content threats and contact threats. Content threats include spam, targeted emails/ads, pornography, violent content, pro-anorexia content and drug related content, while contact threats include grooming, sexting, cyberbullying, cyber stalking and privacy loss (Magkos, Kleisiari et al. 2014). Boyd and Hargittai (2013) extend this categorization to include conduct threats which include a child being engaged in activities such as illegal file sharing or bullying others, and Magkos and colleagues (2014) include some threats related to computers and Internet use, namely information security threats such as malware, phishing, data theft/loss, password stealing/ cracking and Internet addiction.

Despite all the possible threats that children may face online, most European 9-16-year-old children report not having been upset or bothered by something they experienced on the Internet (Livingstone, Haddon et al. 2011). There are vast differences between children on how they regard their experiences. For example, seeing sexual images and receiving sexual messages online is fairly common for children, but mostly not experienced as harmful (Livingstone, Haddon et al. 2011). By contrast, being bullied online is relatively uncommon, but it is most likely to upset children (Livingstone, Haddon et al. 2011). Girls are more likely than boys to be victims of cyber bullying (38% vs. 26%) (Anderson, Ktoridou et al. 2012).

Children's skills related to online behavior develop differently (Tuominen 2013) and their developing moral judgment affects their actions (Wisniewski, Xu et al. 2014). Children mature at different rates, are exposed to vastly different experiences, and respond differently to parenting strategies (Wisniewski, Xu et al. 2014). Then again, more Internet use facilitates more digital literacy and safety skills (Livingstone, Haddon et al. 2011). Based on a survey (Livingstone, Haddon et al. 2011), European pre-teens and teens are generally not unskilled when it comes to online safety: most 11-16 year olds could block messages from people they did not want to contact, and were able to find safety advice online. Around half of them could change the privacy settings of their social media, block websites and judge the quality of a website. The younger respondents, however, tended to lack in skills and confidence (Livingstone, Haddon et al. 2011).

2.2 Parental mediation

Children's online safety is an issue that requires teamwork from many different parties, for example the industry, policy makers, schools, and different authorities (Hartikainen, Iivari et al. 2015). Friends,

teachers, and parents are involved at grass-roots level, helping in mediation of children's online safety (Hartikainen, Iivari et al. 2015). Parents are the most important mediators of children's online safety (Wright 2015, Yardi, Bruckman 2011, Hasebrink, Görzig et al. 2011), although their role decreases and the role of peer mediation becomes more important when children grow older (Shin, Lwin 2016).

Generally speaking, parents are encouraged to take measures to protect their children from risks; proactive parents are seen as "good" parents (boyd, Hargittai 2013). Assuring that adolescents are "safe" means not only giving them tools to cope with risks that they encounter, but also teaching them not to make unethical decisions that may have severe consequences (Wisniewski, Xu et al. 2014). In this sense, online parenting is a balancing act between protecting children from excessive harm and teaching them how to cope with the sometimes ugly realities of engaging online with others (Wisniewski, Xu et al. 2014).

The different strategies used to mediate children's online safety include, for example, active mediation of children's Internet use, restricting or monitoring it, or using dedicated technical tools to control access. Active mediation includes guiding children in online safety, either by helping them when they encounter difficulties, or by telling them what to do in an upsetting or disturbing situation. Restrictive mediation involves setting up rules about what children can or cannot do. Monitoring involves checking the computer to see what children have been doing, checking children's profiles on social networking sites or messages in their email or instant messaging accounts. Technical mediation of children's Internet use can involve specific software built to filter and restrict certain types of unwanted use. (Hasebrink, Görzig et al. 2011).

Almost nine out of ten European children receive advice from their parents about Internet use and safety, and they have restrictive rules at home. Three quarters of parents use technical mediation for blocking and filtering some types of websites. Monitoring is less frequent, only experienced by half of the children. (Hasebrink, Görzig et al. 2011).

Mediating children's online safety can sometimes be difficult. Children are increasingly surfing the web with their mobile devices (Noppari 2014) and their Internet use is becoming more private and inaccessible to parental oversight (Livingstone 2009). Even if parents wanted more transparency in their children's Internet and mobile use, they might struggle with their own unfamiliarity with technology or be somewhat blind to what their children are doing with technology and therefore struggle in setting rules and boundaries regarding it (Yardi, Bruckman 2011). If a knowledge gap exists, it is however possible to close it by gaining skills and interacting with digital technologies (Helsper, Eynon 2010). It has been seen that the mediation tactic that parents choose depends largely on their own skills: reduced digital skills are linked to restrictive or indulgent approaches while parents with better digital skills more likely monitor and actively mediate children's online activities (Wisniewski, Xu et al. 2014).

Various kinds of criticism has been expressed as regards the mediation strategies. It is argued that restrictive mediation reduces online risks, but it also reduces online opportunities and skills (Dürager, Livingstone 2012, Tynes 2007). There is also controversy as regards monitoring: it is sometimes recommended, but there are considerations whether it is ethically acceptable (Magkos, Kleisiari et al. 2014) or an invasion of children's privacy (Mathiesen 2013). Criticism against tools for technical mediation include, for example, that they are not as good in blocking non-English language content, and that there is a trade-off between underblocking (permitting sites that should be blocked) and overblocking (blocking sites that should be permitted) (Magkos, Kleisiari et al. 2014).

Usually active mediation is encouraged as it is linked to lower risk and, most importantly, lower harm (Dürager, Livingstone 2012). Active mediation is also linked to children having more online activities and skills (Dürager, Livingstone 2012, Tynes 2007). By giving children skills to cope with the harmful things they might encounter it is possible to help children to make better decisions regarding their online safety (Livingstone, Smith 2014).

Overall, there are various views on how to mediate children's online safety. Control, trust, and involvement have been identified to characterize discussions on the topic (Hartikainen, Iivari et al. 2016). Control aims at predictable behavior (Kirsch 1997) by, for example, setting rules, goals, and rewards for children (Hartikainen, Iivari et al. 2016). Sometimes adults, however, have to rely on children behaving responsibly even when they do not know where children exactly are or what they do (Kerr, Stattin et al. 1999). They have to trust children, such trust being based on the knowledge of children's past and present behavior (Kerr, Stattin et al. 1999). This knowledge can be obtained by children voluntarily sharing information with adults, adults actively asking for the information from children or adults setting rules and restrictions (Stattin, Kerr 2000). Parental involvement (Fan, Chen 2001) is seen to include communication, supervision, adults' aspirations for children, and active adult participation (Fan, Chen 2001) and it can, hence, be seen as a combination of control and trust. Involvement has also been found to be an important underlying aspect in mediating children's online safety (Hartikainen, Iivari et al. 2016). It is important to notice that the concepts are not mutually exclusive but intertwined (Hartikainen, Iivari et al. 2016)

and a close and caring relationship between children and adults combined with a suitable amount of control is considered to reduce children's undesirable conduct (Fletcher, Steinberg et al. 2004).

3. RESEARCH DESIGN

This study belongs to a larger research effort concerning children and their online safety, carried out in three primary schools in Finland. We collect data concerning children's online safety from children and their parents and teachers.

3.1 Questionnaire

Two survey questionnaires, one for children and one for their guardians, were designed. Children's questionnaire consisted of 26 close-ended questions from existing, validated survey instruments (EU Kids Online network 2014, Suoninen 2013) concerning children's Internet usage, online threats encountered, online safety skills and conduct, and children's perceptions of online safety mediation strategies their parents use. The questionnaire was administered on paper and the answers were provided anonymously. The questionnaire for the guardians consisted of 9 close-ended questions concerning how guardians view their children's online safety skills and conduct, and what are their strategies in online safety mediation. As the purpose was to be able to compare children's and parent's answers, the questions mirrored those in the children's survey.

Prior conducting the surveys of children and guardians, the questionnaires were sent to the teachers of the participating classes for review and commenting, and they were pilot tested. The survey of the parents was tested by 4 adults, and the survey of the children was tested by 21 children. After pilot testing, also grammatical errors were corrected.

3.2 Participants

As the questionnaire for data collection required the participating children to read and to be able to analyze their own behavior at a certain level, we approached all the classes between grades 3-6 (9-12-year-olds) in the three participating schools. A total of 8 classes took part in the surveys.

Data from the children were collected at school during regular classes. 174 children got permission from their guardian to participate. At the day of the survey, 141 children were present and wanted to take part themselves. 50% of the respondents were girls, 50% respondents were boys (Table 1).

When the children filled out the questionnaire, a researcher was present and explained every question and the answer alternatives using PowerPoint slides. The questionnaire was filled in within less than 40 minutes in all the participating classes.

Table 1: *Age and gender of the participating children*

Age	Girls (N = 70)	Boys (N = 71)	Total (N = 141)
10	18	25	43
11	37	36	73
12	15	10	25

A total of 163 parents or guardians (72% female, 28% male, aged 31-56) took part in the survey. They filled in the questionnaire at home and sent it anonymously to the researcher in a sealed envelope.

3.3 Analysis

To answer our research questions, descriptive statistics were used for analyzing the online threats the children have encountered. Gender differences were also assessed by employing Mann-Whitney (M-W) test. Comparisons between the parents and the children's answers concerning children's online safety conduct and skills as well as between the perceptions of children and parents on parental mediation of online safety were tested for significant differences by using M-W test. In using the M-W test, we excluded for analysis the participants providing "Don't know" and empty answers, thus the variables used in the test were measured on either of the following scales: 1) dichotomous scale; 2) 4-point Likert scale; 3) 3-point semantic differential scale with 1 any time, 2 with permission or supervision, and 3 never, as shown in the corresponding tables in Section 4.

4. RESULTS

In this section, we present results from the children's survey relating to threats they have encountered online and some online safety related skills. We also compare the views of the children and the parents on children's online safety conduct and skills, and on parental mediation of online safety.

4.1 Online threats children had encountered

The children who answered our survey had encountered different online threats, for example viruses or malware infecting their phone or computer (22%) and someone having used their password without their knowledge (18%). Some reported adding a person they have not met to their contact list (23%), searching the Internet for new friends (10%) and pretending to be of different age online (17%). Children had also downloaded material like movies or TV series to their computer (15%). Some had sent personal information or photos to people they have not met in real life (14%). There was also some concern that they might be spending too

much time online that takes away from family, friends, or schoolwork (11%). Less reported conduct such as using someone else's content as their own, misuse of others' passwords or having embarrassed or bullied someone online.

The majority (57%) could not remember having seen or experienced anything on the Internet that scared or bothered them. 21% could remember this kind of situation, while some were unsure (16%) or did not want to disclose this (5%). Those children that recalled seeing or experiencing something that bothered or scared them were asked to elaborate what it was that they encountered (Table 2).

Table 2: *Online threats experienced by children (n = 56)*

When you experienced something that scared or bothered you on the Internet, what caused it?	%
Disturbing or scary video	32
Disturbing or scary photo	27
Contact by strange people	20
News	16
Cyberbullying	14
Sexual content	11
Disturbing or scary game	7
Something else	7
Don't remember or can't say	20

Among those children who had seen or experienced something disturbing, most reported on encountering content threats such as disturbing or scary videos or photos, news, sexual content or games. There had also been exposure to contact threats such as being contacted by strange people and cyberbullying.

No significant differences in the girls' and the boys' reports were found, except that some girls (7% in the whole sample reporting disturbing facts, i.e., 4 girls) noted that they had seen something else that was scary on the Internet, namely they found it disturbing to receive scary messages that circulate in instant messaging apps like WhatsApp.

Those children who recalled seeing or experiencing something that bothered or scared them were also asked if they had told anyone what they had encountered online. They reported having told their parents or guardians (41%), their friends (38%), some other adult (16%), a sibling or other child they are living with (7%), or their teacher (2%). No statistically significant gender differences were found.

4.2 Children's online safety skills and conduct

Table 3 presents specific online safety related skills as self-reported by the children. The majority reported being able to judge what kind of information and content they can share online and when it is

OK to share it. The majority also reported knowing how to block unwanted messages, find information about safe Internet use, and change passwords to different services. Boys had a more favorable opinion than girls about their own skills in most categories. Some gender differences were found statistically significant, such as in comparing websites (p = 0.003) and blocking ads and spam (p = 0.03). It might also come as a relief to parents that only 16% of children said they know how to modify filtering or restriction settings on a computer. The difference in these skills by boys and girls was significant ($p < 0.001$).

Table 3: *Online safety skills reported by children*

Which of the following things can you do online	% of girls	% of boys	% of all
Judge when information and content can be shared online	77	76	77
Judge what information and content can be shared online	76	72	74
Block unwanted messages	69	70	70
Find information about safe Internet use	60	75	67
Change passwords in online services	57	70	64
Clear browsing history	59	62	60
Compare websites and their information *	39	62	50
Change privacy settings in online services	49	49	49
Block pop-up windows	44	49	47
Block ads or spam *	36	49	43
Use report abuse buttons	50	34	42
Modify filtering/restriction settings on computer *	6	27	16

Note: * significant difference between girls and boys at p < 0.05 based on M-W test where each statement was rated on a dichotomous scale with *0 No*, *1 Yes*.

Regarding the perception of children's general online safety skills and conduct, the children seemed quite confident (Table 4). The majority either strongly agreed or somewhat agreed that they are skillful Internet users (83%). The majority also reported that they know how to use computer safely (89%), keep their passwords private (90%), and report people who are behaving inappropriately on the Internet (79%). Children were also positive that their parents know what they are doing online (79%). Table 4 shows that children generally had not made new friends online that they had then proceeded to meet face-to-face (M = 3.30); however, 22% reported new friends made through the Internet.

Table 4 also shows parents' perceptions regarding children's online safety skills and conduct, significant differences between parents' and children's perceptions, and M-W test values. The parents perceived children's online safety conduct generally with slightly less confidence than the children, and some of the differences in perception are statistical-

ly significant. However, generally parents agreed on the skills and conduct of children to take online safety measures. Parents were slightly, but significantly less confident than children that children know how to use the computer safely (*p* < 0.001), that they keep their passwords safe (*p* = 0.001), and that they know where they can report people who are behaving inappropriately online (*p* = 0.004). Parents were also significantly less confident about whether they know what children are doing online (*p* = 0.022).

Table 4: Children's online safety conduct. Children's perceptions vs. parental perceptions

Children's online safety conduct	Children			Parents			M-W test
	n	*M*	*SD*	*n*	*M*	*SD*	*U*
Is skillful Internet user	134	1.83	0.74	163	1.74	0.64	10373.0
*Uses computer safely **	133	1.47	0.65	163	1.82	0.65	7589.5
*Parents know what they do online **	132	1.68	0.87	161	1.79	0.65	9117.5
*Keeps passwords private**	133	1.23	0.60	163	1.47	0.76	8899.5
Social media important to keep up with friends	128	2.15	1.04	163	1.99	0.85	9752.0
*Knows where to report inappropriate behavior **	130	1.60	0.87	163	1.85	0.88	8706.5
Makes friends online and meets face-to-face	132	3.30	1.10	163	3.60	0.78	9631.0

Note: * significant difference at *p* < 0.05 between children's and parents' perceptions. Each statement was rated on a 4-point Likert scale where *1 strongly agree, 4 strongly disagree*.

Regarding gender differences between the children, the only significant difference was as regards keeping passwords to oneself: more boys (7%) than girls (1%) reported of not keeping the passwords to themselves (*p* = 0.047).

4.3 Active parental mediation

Both the children and the parents had a positive view on how parents actively mediate children's online safety and Internet use. However, parents had generally more positive perceptions of how much they engage in different activities than children (Table 5). Some of the differences were statistically significant, namely children were slightly less positive than their parents about parents suggesting them ways to use the Internet safely (*p* = 0.001), encouraging them to explore the Internet independently (*p* < 0.001), talking to them generally about what they are doing online (*p* < 0.001), explaining to them why some websites are good or bad (*p* < 0.001), suggesting them ways on how to behave toward other people online (*p* = 0.001), and talking to them generally about what to do if something on the Internet bothers them (*p* = 0.003).

The vast majority of the parents believed that they have engaged in all of the active mediation strategies they were asked to rate. The strongest confi-

dence they had was in having discussed with their children what children do online (95%), having helped their children when they had had difficulties to do something or find something on the Internet (93%), and suggesting children ways to use the Internet safely (88%).

Table 5: Active parental mediation. Children's perceptions vs. parental perceptions

Strategies of active parental mediation	Children			Parents			M-W test
	n	*M*	*SD*	*N*	*M*	*SD*	*U*
Helping to find something on the Internet	133	1.11	0.32	161	1.06	0.24	10164.0
*Suggesting ways to use the Internet safely**	117	1.21	0.41	155	1.08	0.27	7832.0
*Encourage learning things online independently **	101	1.53	0.50	150	1.23	0.42	5242.0
*Talking generally about what to do online**	110	1.26	0.44	162	1.04	0.20	6946.0
*Explaining why some websites are good or bad **	123	1.24	0.43	152	1.07	0.26	7744.5
*Suggesting ways to behave towards other people online**	111	1.27	0.45	157	1.11	0.32	7357.5
Helping when something has bothered online	112	1.35	0.48	129	1.29	0.45	6780.5
*Talking generally about what to do if something on the Internet bothers **	108	1.34	0.48	149	1.18	0.39	6747.5

Note: * significant difference between children's and parents' perceptions at *p* < 0.05. Each statement was rated on a 2-point scale where *1 Yes, 2 No*.

The children's most positive views were about their parents having helped them when something has been difficult to do or find on the Internet (84%), explaining to them about good and bad websites (66%), and suggesting them ways to use the Internet safely (65%). Children reported lower number of parents encouraging them to explore and learn using the Internet independently (33%). This was also the most significant disagreement between the children's and parents' views on active mediation strategies (*p* < 0.001).

4.4 Technical mediation

When it comes to using technology to mediate children's online safety, the parents seemed to be mostly active in using information security software like antivirus (98%). Then again, a large percentage of the children were unsure about the use of these technologies on their home computers. Comparatively, across all categories, parents were more frequently reporting use of technical mediation than children.

Table 6 shows the general trends based on parents' and children's self-reports. Even though apparently both the children and the parents agreed on the presence of antivirus and spam blocking

programs, there were significantly less children that knew about the presence of these programs on their computer (90% in the total of 91 children who answered yes or no; *p* = 0.01). A large proportion of children (34% out of 139 who answered this question) were not aware if such antivirus or spam blocking programs were installed on their home computers.

Table 6: Technical mediation. Children's perceptions vs. parental self-reports

Strategies of technical mediation	Children			Parents			M-W test
	N	M	SD	n	M	SD	U
Programs that prevent spam or viruses *	91	1.10	0.30	162	1.02	0.16	6824.0
Programs or settings that keep track of the visited websites	64	1.39	0.49	155	1.34	0.48	5578.5
Programs or settings that block certain websites	81	1.72	0.45	147	1.65	0.48	4718.5

Note: * significant difference between children's and parents' perceptions at *p*<0.05. Each statement was rated on a 2-point scale where *1 Yes, 2 No*.

The next most common type of technical mediation strategy was the use of programs or settings that keep track of the websites children visit (63% of parents reporting use). However, only 29% of children that answered the question were aware that these programs were installed, 18% had the opinion these programs were not installed, while 53% did not know. Programs that prevent children from surfing certain websites were not that popular; however, 31% of parents reported using these programs.

4.5 Monitoring

The majority of the parents that took part in the study explained that they engaged in some form of monitoring of their children's Internet use and online safety (Table 7). On the other hand, the most frequent reports from the children were that parents do not monitor any of their online activities listed in Table 7; while the second most frequent reports were that they do not know whether they were monitored or not.

Table 7: Monitoring. Children's perceptions vs. parental self-reports

Monitoring strategies	Children			Parents			M-W test
	n	M	SD	n	M	SD	U
Websites visited *	81	1.53	0.50	163	1.17	0.37	4190.5
Profile on SNSs or online community *	93	1.57	0.50	151	1.34	0.48	5438.0
Friends added in SNSs or IM services *	100	1.69	0.46	153	1.45	0.50	5821.5
Messages on IM or email	112	1.63	0.48	158	1.52	0.50	7831.0

Note: * significant difference between children's and parents' perceptions at *p*<0.05. Each statement was rated on a 2-point scale where *1 Yes, 2 No*.

According to parents' self-reports, monitoring children's online activities was most often done by checking which websites children had visited (83%). Over half of the parents also reported on checking their children's profiles on a social networking site or similar (61%), and whom they add as friends in online services (52%). It was less common that parents checked the messages in their children's email or instant messaging service (47%).

On the other hand, children seemed not to be aware of their parents monitoring strategies. About a quarter believed that their parents check the websites they visit (27%), their profile in SNSs or online community (28%), or who they add as friends on social media or instant messaging service (22%). Very few children reported that their parents check messages on their email or instant messaging service (11%).

Comparing the parents' self-reports and children's perceptions of parental monitoring, significant differences yielded by M-W test showed that children were particularly not aware that parents are monitoring the pages they visit (*p* < 0.001), their profile on social media sites (*p* = 0.001), and their friends (*p* < 0.001).

4.6 Restrictions

Most of the parents employed some restriction strategies to limit the use of Internet by their children (Table 8).

Table 8: Restriction strategies. Children's perceptions vs. parental self-reports

Restriction strategies	Children			Parents			M-W test
	N	M	SD	n	M	SD	U
Give personal info	116	2.67	0.59	158	2.78	0.45	8544.5
Download paid apps *	120	2.47	0.58	162	2.73	0.46	7443.0
Register location to be visible to others	82	2.66	0.61	139	2.68	0.62	5583.0
Profile on SNS *	99	1.79	0.82	157	2.47	0.75	4414.0
Download music/movies	80	1.78	0.83	153	2.28	0.79	9117.0
Upload photos, videos or music *	100	1.55	0.73	156	2.17	0.72	4389.0
Download free apps *	118	1.18	0.43	161	1.61	0.58	5674.5
Use IM services *	130	1.15	0.42	160	1.33	0.55	8724.5
Watch video clips *	125	1.13	0.34	162	1.30	0.46	8421.0

Note: * significant difference between children and parents at *p*<0.05. Each statement was rated on a 3-point scale where *1 Allowed any time, 2 Allowed with permission or supervision, and 3 never allowed*.

They were the strictest about their children giving out personal information to others online (77% never allowing it), downloading pay apps to their mobile phone (73% never allowing it), registering their location (64% never allowing it), and keeping a profile in social media (60% never allowing it). These activities were generally never allowed or allowed with permission and supervision. On the other hand, most parents seemed to be quite lenient concerning their children watching video clips, using instant messaging services, and downloading free apps to their mobile phones.

Overall, the children reported a similar level of restriction towards the online activities that are never allowed or allowed only with supervision (top 4 rows in Table 8). However, there were also significant differences: Children perceived less restriction towards downloading paid apps ($p < 0.001$) and keeping a profile in social media ($p < 0.001$) than parents self-reported. Children also perceived less restriction to watch video clips, use IM services, download free apps, and upload photos, videos or music, which is in line with parents' self-reports, but with significantly lower restrictions than parents acknowledged (p values for these variables were equal or less than 0.001).

4.7 Children's gender differences as to their perceptions on parental mediation

Generally, the girls perceived more active parental mediation, technical mediation, and monitoring than the boys did. Significant differences between the girls' and the boys' perceptions were related to girls more often than boys identifying active parental mediation with regard to all strategies in Table 5, except the first, third, sixth, and eightieth categories. Thus, boys and girls agreed to some extent as regards the help given by their parents to find something online, to explore things, to behave towards others, and to do things online, but in all the other categories girls reported more parental mediation than boys. Regarding the perceptions on technical mediation, there was no significant gender difference. Regarding the perceptions on monitoring, girls reported more often (49%) than boys (18%) that their email is monitored ($p = 0.04$), and girls also reported more often (39%) than boys (18%) that their social media profile is monitored ($p = 0.001$).

Regarding restriction strategies, there were also significant differences between the genders. Boys more often than girls perceived as less restricted to give out personal information online (58% of boys stating that this is never allowed vs. 76% of girls, $p = 0.042$). Similarly, boys (65%) more often than girls (26%) perceived that it is allowed any time, with permission or with supervision, to load pay apps on their phones ($p < 0.001$). Moreover, 38% of boys as compared with 17% of girls perceived

that it is allowed any time or with permission or supervision to register their location ($p = 0.03$).

5. CONCLUDING DISCUSSION

This study examined children's online safety skills and conduct with a particular interest in parental mediation strategies and comparison of the parents' and children's views. We conducted a survey study in three Finnish primary schools and found out that the children have encountered a variety of different online threats, but not many have been scared or disturbed by what they have seen or experienced online. Our study also revealed that children have a significantly more positive opinion about their own safety skills than their parents, and that parents have a significantly more positive view on the amount of online safety mediation they engage in than their children. Next, we will discuss our findings and their implications in more detail, finally proposing an approach of **family-negotiated online safety of children** as an implication of our study.

5.1 Children's experiences and skills

The children that took part in our research reported having encountered online safety threats that have been identified in the literature (Magkos, Kleisiari et al. 2014), including information security threats like viruses and having their passwords misused, contact threats like cyberbullying, and contact with strangers and content threats like scary videos or photos. While some children also reported engaging in downloading, for example, music and movie files from the Internet, few admitted other conduct threats like bullying others. Despite being exposed to a variety of online threats, only a quarter of the children remembered having seen or experienced something on the Internet that scared or bothered them. Those children that were bothered mostly reported to turning to their parents for help. No statistically significant differences were found in the experiences of girls and boys concerning the threats encountered, except that some of the girls reported as disturbing messages circulating in social media.

The children were not unskilled when it comes to online safety. According to their self-report, the majority knew for example how to block messages from people they do not want to be in contact with and how to find safety advice online. Around half could change the privacy settings of social media, block pop-up windows and judge the quality of a website which is in line with previous results about European teens and preteens (Livingstone, Haddon et al. 2011). The majority also reported of knowing how to change their passwords and what information they can share online and when it is OK to do so. Boys had a more favorable opinion about

their skills than girls. Concerning some skills, gender differences were significant. Boys reporting more confidence about their skills might be due to, for example, boys usually undertaking more variety of activities (Livingstone, Smith 2014), more use often equaling more skills (Livingstone, Haddon et al. 2011).

Generally speaking, both the children and their parents had a positive opinion on the children's online safety skills and conduct. However the children had significantly more positive opinion about these than their parents. The children were also significantly more confident than their parents that the parents know what they do online. This is understandable in the light of previous research discussing parents' uncertainty of technologies children use and their online activities (Yardi, Bruckman 2011) as Internet use is becoming more private (Noppari 2014, Livingstone 2009)

5.2 Mediation by parents

When it comes to online safety mediation, the parents reported restricting and monitoring their children's Internet use by using various methods. For example, they checked the websites the children visit and controlled children about giving out personal information online. The parents also reported engaging in technical mediation through checking browsing history and using virus protection. However, the use of so called "cyber nanny" programs that restrict access or block content was not very popular. This might be partly because of the reasons mentioned in the earlier research, such as these tools not being good in blocking non-English language content (Magkos, Kleisiari et al. 2014). Out of all the mediation strategies, the parents reported engaging most in active mediation of children's online safety, as is also advocated in the previous literature (Dürager, Livingstone 2012, Tynes 2007).

Overall, the majority of both parents and children agreed that the parents are engaging in different strategies of online safety mediation. However, the parents had a significantly more positive view than their children about the amount of online safety mediation they engage in. There were also some gender differences in the children's results, girls reporting significantly more parental engagement in certain kind of active mediation, monitoring, or restriction activities than boys.

When looked as a whole, our results indicate that children trust in their own abilities to manage in the digital world, and they believe that their parents are aware of what children do online even though they are not doing that much mediation. The parents, however, are less certain of their children's abilities or online activities and maintain a view of engaging a lot in mediation activities. From the parents' perspective, these findings are well aligned: worried

parents are reporting of engaging in mediation activities to protect their children. The findings derived from children, however, lead to asking many questions. Aren't the parents actually doing these mediation activities they say they are? Or don't the children know or remember that mediation takes place? Why are the girls reporting more parental mediation? Do their parents view them as less skilled or more vulnerable or do the girls just notice the mediation better? As regards the mediation strategies, one can ask are the parents deliberately keeping the children in the dark as regards technical mediation or monitoring their Internet use. This might well be the case. The parents might not want to share with their children that they are checking their children's browsing histories or using a cyber nanny program. The parents might feel that it defeats the purpose – if you told the children beforehand that you will be checking their browsing history, wouldn't they just delete the parts they wouldn't want you to see? We can ask, however, what explains the significant differences in the opinions concerning whether or not the parents engage in active mediation and restrictions. Do the parents just want to appear as proactive 'good parents' (boyd, Hargittai 2013) and for that reason exaggerate their actions? Or is active mediation too abstract for the children to understand or too mundane to remember? As for the restrictions, one could expect that parents would rather clearly tell about those to the children. Hence, whose story is closer to the reality – the children's or the parents'?

5.3 Implications

HCI research has already shown interest in exploring children's risky actions (Pater, Miller et al. 2015), parental concerns (Ammari, Kumar et al. 2015, Ammari, Schoenebeck 2015), and mitigation of children's online activities (Renaud, Maguire 2015, Wisniewski, Jia et al. 2015, Nouwen, Van Mechelen et al. 2015, Hiniker, Suh et al. 2016). Children's resilience (Wisniewski, Jia et al. 2015), translucence in online safety solutions (Yardi, Bruckman 2011), parental involvement (Nouwen, Van Mechelen et al. 2015), and child-centered security as a research discipline (Dempsey, Cassidy et al. 2016) have been addressed. Our findings complement and support HCI research on children's online safety and mitigation. Along this line, we propose guidelines for developing better and more family-centered means and tools for ensuring children's online safety.

Our findings showed that parents view themselves as engaging a lot in different activities related to mediating children's online safety. Mostly they reported active mediation of children's online safety, as is also recommended in the previous literature. The children agreed that their parents are engaging in different mediation activities, but not to the same extent as the parents were reporting. These results

can be interpreted to indicate that there is a need to make parental mediation more transparent for children (cf. Hartikainen, Iivari et al., Yardi, Bruckman 2011), and that families may also benefit from the development of new means and technical tools for the purpose of active mediation.

Our results also showed that children have stronger confidence in their own skills as Internet users than their parents do, and only few report being bothered about what they experience online. These results can be interpreted to indicate that there is a need to build trust regarding children's skills as Internet users between family members.

Hence, we propose an approach of **family-negotiated online safety of children** for the development of tools and methods for ensuring children's online safety. With that we mean that both children and their parents are actively involved in setting the shared rules (Hartikainen, Iivari et al. 2016) and using the tools for online safety mediation.

The approach of family-negotiated safety takes into account findings from the previous research as well as from more practical advice offered for ensuring children's online safety (see e.g. www.betterinternetforkids.eu). Giving children an active role in the design and use of the tools for their online safety mediation would give them agency and autonomy on matters concerning their own life (Yardi, Bruckman 2011), and take into account their growing need for independence from parents (Wisniewski, Xu et al. 2014). In addition to helping build resilience to online risks (Wisniewski, Jia et al. 2015), this would also help in building trust between family members: as children in any case use more and more technology and encounter potentially harmful situations, sometimes parents will just have to rely on children behaving responsibly (Kerr, Stattin et al. 1999). Giving children more control would also show the children that their parents trust them to make good decisions. Family-negotiated safety would also give a possibility for arousing 'clan and self-control' (Kirsch 1997) as Hartikainen and colleagues (cf. Hartikainen, Iivari et al. 2016) suggest. Technical tools should enhance a suitable mixture of parental control, trust and involvement (Hartikainen, Iivari et al. 2016). Parents would be actively involved in their children's online activities (Nouwen, Van Mechelen et al. 2015), and making the solutions more transparent and allowing children more control would take into account the related ethical considerations (Magkos, Kleisiari et al. 2014, Mathiesen 2013); hence, the children would know that their parents care, but they would not feel like being spied on. Transparency would also allow for the children to understand better their digital footprint, helping in arousing self-awareness of their Internet use (Wisniewski, Jia et al. 2015)

Even though there is a difference in the opinions as regards children's online safety skills and mediation provided, we maintain that parental mediation is needed also in the future: The children of today need their parents to help them to manage and navigate safely in the digital world, no matter how competent the children themselves think they are. It is to them that the children turn for help. More family-centered means and tools for ensuring children's online safety would help in this as well as encourage a close and caring relationship between children and adults (Fletcher, Steinberg et al. 2004).

5.4. Conclusion

This study has given voice to parents and children as regards child-centered security (Dempsey, Cassidy et al. 2016), suggesting an approach of **family-negotiated online safety of children** as a possible way to combine parental concerns and wish to be involved in their children's lives with giving children more agency in their technology use and helping them grow to skilled technology users who understand the consequences of their actions. Our results show that children trust in their abilities to manage in the digital world, and they believe that their parents know what they do online even though they might not engage in mediation that much. The parents are less certain of children's abilities and online activities and maintain a view of engaging in mediation. We also found some gender differences; boys believe in their skills more, and also report less parental mediation of their online safety.

Regarding limitations of the study, an effort was made to encourage honest answers by promising anonymity and privacy. However, any survey takes place within some social context. Socioeconomic status of children and their parents was not considered in this study as Finland is not a class society and Finnish schools are public schools. That would be interesting to study in the future, however. The fact that the children's survey was conducted in school environment with teachers and peers present may have influenced the answers of some children, meaning they gave more 'socially desirable' answers. Moreover, as regards both parents and children, it is perhaps natural to see own skills and efforts in a more positive light than others do. Additionally, one might exaggerate if one believes that their skills and efforts are under some sort of review and being judged. The study was conducted in Finland, therefore some of the results may be particular to one country. On the other hand, our implications are partly based on previous research results from other countries. As to the further research on the topic, particularly interesting would be to research further the gender differences in the children's online safety skills and the mediation they receive from their parents.

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