

Parental controls: reimagining technologies for parent-child interaction

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Abstract. This article questions existing approaches in designing parental controls and puts forward a hypothesis to reimagine technologies to mediate parent-child interactions. First, we present an overview of the current parental controls. Second, we explain the gradual shift away from the idea of ‘harmful’ digital media in parental mediation studies and introduce previous work in CSCW and HCI that has proposed solutions to support discussions about digital media between parents and children. Then, we hypothesize that an emphasis on collaboration and mutual learning might help researchers and designers to rethink and reimagine technologies that support parent-child interactions with and through digital media. Finally, we share our findings of two co-creation workshops with children and parents on ways to instill parental involvement in children’s digital media use. The workshop yielded insights on the differing views between parents and children about how technologies might instill long-term negotiations based on parents’ and children’s experiences, enriched by real-use data.

Introduction

Parental concerns regarding children’s use of digital media devices and applications at home have gained considerable attention in academic research and popular discourse. Parents and children report on conflicts that arise at home with regards to establishing and negotiating rules as well as adhering to them (Ko, Choi, Yang, Lee, & Lee, 2015). These conflicts are particularly pronounced when both parties lack a shared understanding or experience of the devices (Clark, 2011). It is common for parents to express a lack of control and a sense of

uncertainty over their children's information consumption, content production and social lives (Blackwell, Gardiner, & Schoenebeck, 2016). In the context of such uncertainty, parental controls can serve as a handle for parents to achieve a sense of control by keeping an eye on their children's online activities. However, the short and long-term effects of these controls on family relationships and dynamics remains an under researched area. In this paper, we situate parental controls at the intersection of CSCW and HCI research and media studies (particularly parental mediation theories). Within both research lines, the role of parents in children's digital media use varies and can be placed along two extremes on a spectrum: from the *parent as responsible actor in keeping children safe online* to a *role as a guide in children's self-exploration of online opportunities*. Commercially available parental controls mainly focus on the former and their current uses fail to support families in managing digital media at home in a satisfactory way. In this paper, we hypothesize that an emphasis on collaboration and mutual learning might help researchers and designers to rethink and reimagine technologies that support parent-child interactions with and through digital media. To this end, we share our findings of two co-creation workshops with children and parents on ways to instill parental involvement in children's digital media use. Building on these findings, we zoom in on the consequences the current parental controls afford and 'test' what possibilities our hypothesis affords.

Background

Do parental controls keep children "safe" online?

Today's young generation is said to be the most watched-over. Parents monitor every aspect of their children's behavior (Howe & Strauss, 2000), including children's online activities. Technological advancements facilitate parental monitoring for their children's "own good" (Herring, 2008), online safety and protection. The technologies used to monitor and/or limit children's access and time online are usually referred to as 'parental controls' and can be set-up on smartphones, tablets, laptops, desktop PCs and game consoles, either by installing external software or by using built-in functionalities provided by hardware manufacturers. In our past research, we have identified four key functionalities afforded by parental controls (Zaman & Nouwen, 2016):

- Time restrictions: parents can define time slots in which children can go online (un)supervised;
- Content restrictions: parents can define what type of content the child cannot see or search online, or parents can block the type of information that can be uploaded or shared;

- Activity restrictions: parents can restrict economic activities (like in-app purchases), social activities (like approving friends children can interact with online), entertainment activities (like blocking multiplayer games);
- Monitoring and tracking: parents are provided with an overview of their children's online activities.

One might think that by installing parental controls, children are kept from harm. However, there is no evidence regarding the effectiveness of these controls (Dürager & Livingstone, 2012) for keeping children safe online. While parents commonly check their children's browsing history, social media accounts and phones, they mainly do this without using parental controls (Pew Research Center, 2016). Also, there is no consensus on the characteristics of parents who use parental controls (see Mitchell, Finkelhor, & Wolak, 2005; Nikken & Jansz, 2014; Pew Research Center, 2016). Moreover, children often show discontent when their parents use these types of apps (Ko et al., 2015) and often find ways to circumvent or uninstall parental controls (Richardson, Resnick, Hansen, Derry, & Rideout, 2002).

The mere existence of parental controls affirms concerned parents' view of the Internet as an unsafe and unprotected place. The functions parental controls promote predominantly center around (covertly) surveying children's activities online or limiting their access or choices; both of which can lead to conflicts between children and their parents. Existing research on parental controls does not provide a conclusive account on whether their use is a sensible choice for parents. Considering these issues, we raise two questions. Should parental controls be introduced if their role in keeping children safe is largely unknown and their use is a potential source of conflict between parents and children? If not, how can we approach technical interventions that support parents and children in creating a satisfactory media environment at home?

Parents' role in risk mitigation

Parents often feel responsible in helping their children navigate digital media, including digital devices and online applications, despite their unfamiliarity with the technology uses of their children (Wisniewski, Jia, Xu, Rosson, & Carroll, 2015). The strategies parents employ are constitutive for the research produced in parental mediation research, a focus of scholars in media studies since the 1960s. In our past work, we have distinguished five types of parental mediation (Zaman, Nouwen, Vanattenhoven, Deferrerre, & Van Looy, 2016):

1. *Restrictive mediation*: parents impose restrictions with regards to how much time children spend with digital media, the activities children engage in, the content children consume, and where children can use digital media;
2. *Co-use*: parents and children use digital media together. Parents join children when they need help or because they enjoy sharing the activities the children engage in;

3. *Active mediation*: parents and children talk about digital media such as time spent using digital media, use of devices, or the content children consume and/or purchases;
4. *Participatory learning*: parents and children learn about digital media together while using digital media;
5. *Distant mediation*: parents supervise their children's digital media use from a distance. Parents employ this strategy either because they trust their child and thus grant them a degree of responsibility when using digital media (i.e., deference); or, when they decide they can allow their child to use digital media independently while keeping an eye on them from a distance (i.e., supervision).

In the past, research on parental mediation has been predominantly concerned with mitigating negative effects that media (like television, games, the Internet) might have on children. Similarly, many parents are concerned with the safety of their children in the online, digital world (Livingstone, 2009). These concerns include cyberbullying, exposure to inappropriate content, antisocial behavior and excessive use, which might be harmful for the child's development. Previous research indicated that monitoring – i.e., checking the child's online activities after use covertly or overtly (Livingstone & Helsper, 2008), active mediation as well as imposing restrictions are all effective strategies to reduce harmful online experience in children (Mascheroni, Murru, Arestodemou, & Laouris, 2013; Shmueli & Blecher-Prigat, 2011). However, more recently, parental mediation scholars found there are tradeoffs to be made when adults intervene to protect their children from the risks associated with the digital world. It is increasingly acknowledged that too much emphasis has been placed on children's protection at the expense of children's participation and the provision of their needs in the digital, online world (Livingstone, 2014).

Towards an alternative approach: technologies in support of parent-child interaction

Parental interventions that mainly focus on mitigating online risks overlook the possibilities of exploring and learning about and through media by children, which has been termed as 'online opportunities' in Europe (Hasebrink, Livingstone, Haddon, & Ólafsson, 2009). Indeed, even the perceived risks can be repositioned as learning experiences for children to raise awareness of and gain confidence to overcome future harmful situations (Vandoninck & d' Haenens, 2014). Parents recognize their role in facilitating these learning experiences, but feel worried about how to manage the tensions between keeping children safe and allowing children to learn, develop media skills and have fun (Vincent, 2015). To reduce this tension, parents have to educate themselves about and engage in their children's digital media use (Palfrey, Boyd, & Sacco, 2008) by collaborating and bonding through interaction with digital media.

The fields of CSCW and Human-Computer Interaction are concerned with finding a balance between the influence of parents in determining the use of certain technologies and assisting the child while using these (Read & Bekker, 2011). Much of this work emphasizes the complexity of providing families with adequate technology-mediated means (Taylor, Swan, & Durrant, 2007). Previous work in these fields has hinted towards the shortcomings of the current parental controls in proposing functionalities that allow parents to engage with young children's digital media use (Nouwen, Van Mechelen, & Zaman, 2015), or support the trust relationship between parents and teens due to a lack of transparency in the design (Hartikainen, Iivari, & Kinnula, 2016). Also, research emphasizes the importance of mutual agreements about screen time for all family members. In FamiLync (Ko et al., 2015), for instance, researchers experimented with a virtual place where families with teenagers can become socially aware of the smartphone use of all family members and familiarize with the apps other family members use. Similarly, technology-mediated screen-time "endings" might instill routine for families with young children (Hiniker, Suh, Cao, & Kientz, 2016). Researchers and designers have also looked into ways families can come to a mutual understanding of appropriate online content. The focus has been on designing technologies that help children define and search appropriate and relevant content (Glasse, Elliott, Polajnar, & Azzopardi, 2010), or technologies that instill discussions between parent and child when defining what is appropriate content (Hashish, Bunt, & Young, 2014). In the latter, the design aims to support children's education on appropriate content from the perspective of the parent, while learning from the child's interests.

All these studies encourage alternatives to the functionalities of the commercially available parental controls and enable parents to come to mutual agreements about children's digital media use. This work supports a move away from the generalized notion of the parent as an all-knowing authority in children's online engagement and experiences (Zaman & Nouwen, 2016) towards mutual responsibility, learning experiences and interactions with and around digital media. This alternative view could serve as a powerful alternative *hypothesis* (JafariNaimi, Nathan, & Hargraves, 2015) to conceptualize current and future challenges and a beginning for rethinking parental controls altogether. Indeed, we might begin by questioning the dominance of the risk mitigation approach that is reflected in the term describing them: technologies for parents to "control" a predominantly harmful environment. How might an emphasis on collaboration and mutual learning help researchers and designers to rethink and reimagine technologies that support parent-child interactions with and through digital media?

Method: co-creating parent-child interaction

There is an enormous potential for technologies to provide adaptive support to parents in close collaboration *with* the child to explore and gain the benefits from engaging, learning and interacting online. This work is part of the MeToDi-

project that aims to build a methodological toolkit for developers and designers of digital (learning) material for children. Developers and designers have expertise in game design but lack the knowledge to include functionalities to involve parents in children's games, apps and platforms. To come up with ideas for this toolkit, we organized a series of co-design sessions with families and schools. In this paper, we discuss the outcomes of two co-design sessions with parents and their children aged 9 to 12 (3 parents, 3 children) and 13 to 15 (4 parents, 4 children). The sessions were organized at our research lab in Belgium, with 7 parent-child dyads in total. We used the CoDeT (Collaborative Design Thinking) procedure as a basis to prepare and conduct the co-design activities and the GLID (Grounding, Listing, Interpreting, Distilling) method to analyze the outcomes (Van Mechelen, 2016). CoDeT is conceptualized to scaffold Design Thinking and facilitate effective collaboration in co-design sessions with children. GLID suggests a way of analyzing CoDeT outcomes, beyond the surface level of children's ideas.

The co-creation activities revolved around the research question: how can digital tools stimulate interaction between parents and children to support online opportunities? The motivation for this research question lies within the challenge to increase digital literacy skills of both parents and children. To this end, we envisioned that the features that will be implemented in future technologies should instill mutual learning between both groups, while respecting the individuality of both parent and child.

Procedure

The CoDeT-procedure proposes two contact moments. During the first contact moment at the families' homes, we explained that parents and children are the experts of their own experiences and therefore are best equipped to identify problems and come up with solutions. After signing the informed consent form, we introduced a sensitizing activity as a means to make the families reflect on the challenges they face with digital media at home. The parent and child could share this challenge from their own perspective. The parents wrote their experience down in the form of a story and the children made a storyboard (see Figure 1). We provided help by introducing questions on a template; like 'where am I when this happens?', 'What do I do in this situation?', 'What went well?', 'What went wrong?' The families had one week to finish their assignments, and send it back to the researcher by mail. In order to increase the engagement of the participants with the research, we summarized their input from the sensitizing assignments for the second contact moment. The assignments yielded two or three main challenges per session related to making agreements between parents and children, sharing interests and knowledge sharing.

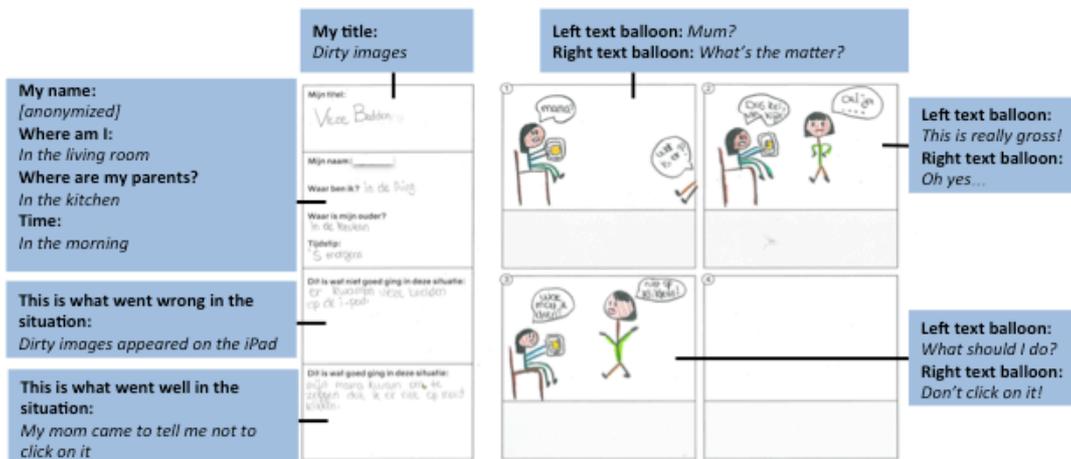


Figure 1. Sensitizing assignment child

The second contact moment took place at our research lab. In each session, two groups of three or four parents and children worked together. We separated the parents and children in order to understand the different experiences and ideas of parents and children. This way, we wanted to ensure the children could express themselves freely without possible corrections from their parents. Throughout the workshop, both groups received the same instructions.

First, we presented the differing experiences for parents and children. This way, both groups were introduced to the perspective of the other group. We also defined the related challenge for the family, in such a way that they implied a need for collaboration between parents and children. For instance, parents and children do not trust the other's assessment on digital media. Parents worry about how they can help their children to not get hurt online. Children, however, experience digital media as a fun environment and feel their parents' interventions do not match their experiences. The challenge that followed from this observation was: how can parents and children make agreements so that they can trust each other. Next, we asked each group to pick the challenge that is most important for them and to define a concrete problem in their own words (problem definition), starting with "How can we...". We asked several 'why' questions, to make sure both groups were keeping in mind the element of collaboration between parents and children. Each group defined the criteria the solution to the problem should meet, in order to guide the further process. Next, we asked each group to write down ideas for the problem individually on post-its (idea generation). They were encouraged to write down as many ideas as possible (even the 'crazy' ones) and to focus on their specific problem definition. Then, each group member presented their ideas to the other group members. At the end of this presentation each group member received two green stickers, to indicate two ideas they thought were best suited, and two red stickers, to indicate two ideas they deemed unsuitable. Ultimately, both groups were asked to bring ideas together into one concept that could solve their problem. Parents and children

were reminded to look back at their problem statement and to consider whether their concept was a good fit for their problem. Once the group reached consensus on the concept, all group members worked together to visualize this concept using craft materials provided by the researchers. The resulting artifact was checked with the criteria defined during problem definition, and adapted if needed. The groups made use of a template to describe their artifact (title, slogan and description). Finally, the child group presented their artifact to the parent group – and vice versa. Children and parents could ask questions about or give comments to each other’s artifact. This jury moment was audio recorded.

Analysis

We used all the text (problem definition and artifact description), tangible (artifact) and audio (recording) materials to analyze the outcomes. First, we analyzed which ideas were retained in the artifact to understand which decisions were taken throughout the session. Then, we described the artifact in detail to understand the functionalities this artifact affords based on the artifact itself, the description of the artifact and the audio recording of the exposé at the end of the session. Next, we put the artifact into context by defining the involved stakeholders (like parents, children, teachers, government) and the way the artifact might change the life of these stakeholders. This provided us with in-depth insight to craft a story or discourse around the artifact and to compare the artifacts of the children and parents.

Findings

This section discusses the differences and similarities between the artifacts that children and parents produced independent from each other. We also introduce the challenges the parents and children selected, the discourse that resulted from the analysis of the co-creation materials, and the discussions parents and children had with each other about the artifacts.

How to ... make agreements on an equal basis

In the session with families with children aged 13 to 15, the children and parent group chose to work on the same challenge: “Parents and children use digital media at home. It is difficult for parents and children to reach good agreements”. The children’s problem related to creating more equality at home. The parents worked on ways to come to agreements at home.

The artifact shown on the left in figure 2 is produced by a group of three children aged 13 to 15. It shows the current dysfunctional situation as a metaphor: an unstable three-legged table. They denounce the fact that they cannot make decisions on which rules apply in their house, or as child 2 mentions: “*The parents always set the rules for us: ‘You cannot use the PlayStation, quit playing with your phone, no you can’t...’ We can never make any decisions.*” In contrast,

the ideal situation is one where all family members are part of rulemaking and -enforcement on equal terms. The children aim to reach this by talking around the table as a family. The fourth leg of the table does not necessarily represent one child, but can refer to one parent, a brother, all siblings etc. As the children mentioned on their artifact description: without the fourth leg, everybody is a fool. During the discussion between parents and children, the parents mentioned their solution was similar to the children's one:

Parent 2: *"I don't know whether they will look at it that way, but..."*

Parent 3 (interrupts, and addresses the children) *You will not look at it that way. If you hear there is something extra, maybe you will. We didn't only think about agreements for you. But also for ourselves."*



Figure 2. (left) "Table of inequality", an artifact produced by children aged 13 to 15. The artifact emphasizes the importance of reaching agreements collaboratively in the family. The focus lies on giving children more to say. (right) "Peacemobile", an artifact produced by parents of children aged 13 to 15. The artifact acknowledges the example parents should set for their children and underlines the responsibility of all family members in self-exploration and -regulation. The ultimate goal is to reduce the amounts of discussions in the family.

The parent group built an 'app device' (see figure 2, right) that connects the devices of all family members as a means to control these from a distance (e.g., turning off a device when an agreement was not met). The agreements that lay at the basis of the device should be renewed on a monthly basis. Both parent and child have to confirm all actions by means of a fingerprint. Parent 2 explains: *"This way we can set each device. And every month, it starts flickering and then we have to do it [define the agreements] all over again. Because it is possible that we have to change things. When something isn't right it has to be discussed again. Otherwise, all the devices are turned off, for everybody."* Ultimately, the parents hope that this device will reduce the amounts of arguments parents have with their children about their digital media use. The trade-off is a new responsibility granted to the children and the recognition that parents do not follow their own rules themselves (e.g., non-use of smartphone when watching television). The children express their liking towards the parents' solution, for instance child 1 mentions: *"And, like, if someone from the family is doing something they're not supposed to, than we can turn it [the device] off."*

The artifacts in figure 2 both propose parents and children engage on a more equal basis, compared to their current situation. While the children emphasize the

negotiation of the agreements, the parents emphasize the enforcement and re-evaluation of these agreements. Curiously, both parents and children define ‘good’ agreements as agreements they both agree with regardless of the divergent motivations (i.e., less strict rules versus less arguments). This stands in contrast to the current top-down setting of rules by parents, which causes discomfort for both parents and children.

How to... disclose children’s experiences

In the session with children aged 9 to 12, the challenges picked by the parents and children were different. Whereas the children focused on ways for families to spend more time together, the parents emphasized the importance of using multimedia devices in a safe and responsible manner.

The artifact shown in figure 3 (left) represents one challenge the children envision on a track with challenges that children and parents can solve collaboratively. The goal of this track is for parents to spend more time with their children. Child 1 explains their motivation based on a personal experience: *“If I play a game, you [the parent] say it’s too childish and then you’re on your phone the whole time.”* The focus is not so much on the whole family, but rather on a one-on-one relationship between the child and their parent. The children propose an activity they like, but recognize the added value of the parents’ role as a helper to finish the track. It does not suppose a one-off activity, but rather a long-term engagement of a parent with the child. During the discussion, the children actually made the parents engage with their solution. The parents had to look for a little pot in the research lab, somewhere. Inside the pot was a map, with different dots that represent things parent and child have to look for together. To conclude, parent 1 exclaims: *“This is much better than ours [solution]!”*

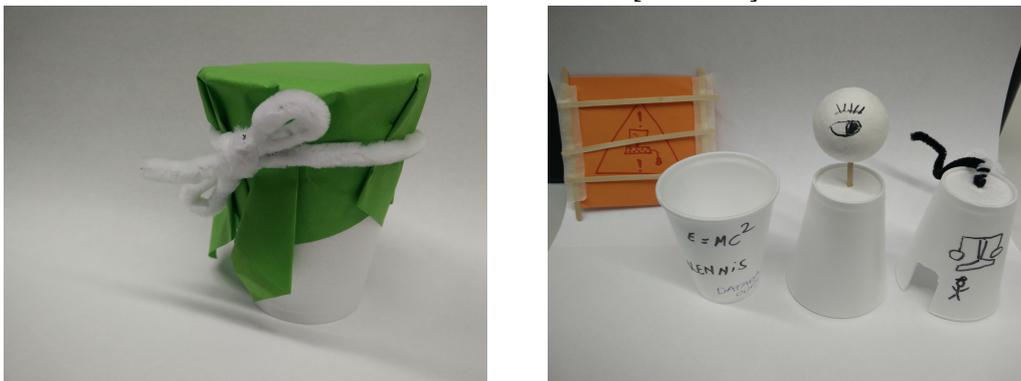


Figure 3. (left) “The quest for the lost objects”, an artifact produced by children aged 9 to 12. The artifact stimulates playing together and sharing interests between children and parents. The image represented here is the pot that the parents had to look for during the discussion. (right) “Big mother/father is watching you”, an artifact produced by parents with children aged 9 to 12. The artifact proposes different possibilities to gather information on the media use of children. The artifact underlines the responsibility of parents, teachers and the government to guide children from a young age.

The artifact conceptualized by the parents of children aged 9 to 12 (figure 3, right) proposes close collaboration between law makers, teachers and monitoring data to keep children safe online. The main focus lies on reassuring parents based on information (provided by law makers, teachers and monitoring data) of what the children do. Parent 2 explained: *“If we know what you’re doing, and we know what it all entails, we will feel, also, safer, actually. That we know for sure that you’re doing good.”* When the parents presented this artifact, the children opposed to constant monitoring.

Child 1: *The eye...*

Parent 1: *What’s wrong with the eye? That we can monitor you?*

Child 1: *That it follows the whole time. For instance when I want to fix a date to meet my friend...*

Child 2: *It doesn’t have legs, does it.*

Parent 3: *But we don’t go that far. We’re not gonna read personal conversations.*

(...)

Parent 1: *No, we just look, or something. When you were on Facebook, but you were unsafe. For instance, you didn’t log out or you shared your password with someone.*

Child 1: *I have never done that.*

The parents had a hard time explaining the children they do not wish to monitor them all the time, but instead long for an informed indication of the safety risks of their children.

The artifacts of the parents and children aged 9 to 12 are based on a different challenge, and thus more complex to understand in relation to each other. Both groups conceptualize the online world in a completely different way. For the children it is a fun place that they (partly) want to share with their parents. In contrast, the parents are concerned and insecure about what their children might encounter online. Despite the opposing views, both children and parents pay attention to the disclosure of children’s experiences (i.e., children want to share their interests and parents want to be informed).

Discussion

In this discussion, we link the discourse surrounding the artifacts with their possible outcomes in order to ‘test’ our hypothesis and explore the possibilities of technologies to support parent-child interactions with and through digital media.

New directions for family agreements

In the group with children aged 13 to 15, the artifacts mainly revolve around the tensions in the family with regards to the definition and regulation of agreements about media use at home. These tensions originate in the management of digital media and influence general family well-being. Surely, software might be optimized to enforce rules by, for instance, blocking access to devices. Unlike

promising results for young children to instill routine with screen-time endings (Hiniker et al., 2016), our findings suggest the technology-mediated enforcement of rules would not end the arguments about the rules in families with teens when they have not been discussed beforehand. In fact, the consequences of the technological intervention in the family context would remain the same. With a focus on collaboration in the family, previous research has suggested technologies could be designed to attain mutual agreements on family screen time (Ko et al., 2015). In addition, our findings suggest technologies might support continuous discussion about agreements on digital media in order to avoid discontent among family members. Considering parents' and children's experiences and interactions change over time, the latter is paramount to make supportive technologies relevant in the long term.

New directions for disclosing children's experiences

In the session with children aged 9 to 12, parents and children had opposing views on digital media and the online world. Whereas the children just want to spend more time with their parents (online or offline), the parents want to know what their children do. Moreover, the findings suggest that parents are more likely to trust technology and intermediaries than their children's experiences with digital media. When parents have access to data about their children's online activities, they lack the skills or knowledge to discuss the content children encounter online (Hashish et al., 2014) or to understand what actions parents should and/or can take. Consequently, when technologies do not support mutual learning opportunities (e.g., discussions to generate understanding of children's activities), parents lack the necessary engagement with and education about their children that is needed to take away their uncertainty (Palfrey et al., 2008). When technologies prioritize learning opportunities as an outcome of parent-child interaction through digital media, they might provide clues to help parents engage in conversations with the child based on the available data.

Conclusion

The goal of this paper is to question existing approaches related to parental controls and introduce new directions for designers and researchers to imagine how technology can support parent-child interactions with and through digital media. To this end, we provided an overview of the current parental controls parents can use to keep their children safe online. Notwithstanding the low effectiveness, these parental controls are successful in convincing parents who are concerned with their children's online safety and support a top-down management of digital media at home. We oppose the latter view by introducing the gradual shift away from the idea of 'harmful' digital media in parental mediation studies. The shift towards designing technologies to support parents in attaining mutual media agreements concerning screen time and the appropriateness of digital content has been initiated in CSCW and HCI. To further advance this work, and

reflect on technologies to support parent-child interactions, we put forward a hypothesis to support designers and researchers to reimagine how technologies can mediate parent-child interactions with and through digital media. In our attempt to ‘test’ this hypothesis, we presented the findings of two co-creation sessions that aimed to understand how technology might stimulate parent-child interactions. The findings reveal that parents and children have different views on what the role of parents should be in children’s digital media use. Consequently, children aged 13 to 15 and their parents emphasize different ways in which technologies can improve the negotiation of media agreements between family members. Possibly, the main challenge for designers lies within coming up with solutions for prolonged negotiations as parents and teenagers gain new experiences. Moreover, children aged 9 to 12 and their parents perceive digital media in opposing ways. Hence, supporting families to disclose children’s experiences with media is complex. Apart from gathering and presenting data to parents, designers should think of ways to enrich data on children’s online activities by providing families with clues on how to engage with each other in these activities. Besides a focus on decreasing parental concerns, more effort is needed to explore ‘designerly’ opportunities that instill mutual learning on digital media between parent and child.

Acknowledgments

The Tetra-MeToDi-project receives funding from VLAIO. We would like to thank Sofie Vandoninck for her help in collecting the data.

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