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Long-term study of safe Internet use of young children

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ABSTRACT

The Internet is an evolving medium that continuously presents new functionalities. Accordingly, also children's Internet usage changes continuously. This requires being vigilant about related Internet risk behavior and safe Internet use. The present article presents a structured overview of Internet risks and summarizes approaches to foster safe Internet behavior. Based on a long-term cross-sectional study, Internet usage of young children has been researched. The focus is on contact risks and content risks. Based on the analysis of survey data from 10000 children, trends in their (un)safe Internet usage are studied in the years 2005–2006, 2007–2008, and 2008–2009. An Unsafe Internet Usage Index (UIUI) is calculated. The average results point at a rather low level of unsafe Internet usage. But these average results hide between-subject differences and a number of children clearly reflect risky unsafe Internet usage. Also, no consistent reduction in unsafe Internet behavior is being observed over the years. Parental and teacher control hardly increase, and hardly seem to impact the level of unsafe Internet behavior. Considering a number of limitations of the present study, directions for future research are discussed.

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1. Introduction

During recent years – in developed countries – a continuous increase in Internet access at home can be observed. At a global level, an increase of 342.2% in Internet access is noticed since 2000 (Internet World Stats, 2009). When focusing on the particular geographical context for the present study (Flanders, the Dutch speaking area of Belgium), Internet access has increased with 250.3% since 2000, resulting in 67.3% of the population in Belgium having access to the Internet.

The former is reflected in the proportion of children having access at home. A recent study of Walrave, Lenaerts, and De Moor (2008) points out that 92.8% of the children between 12 and 18 years old have access to the Internet at home. Additional research indicates that Internet usage is mainly a home-based activity. Up to 91.2% of primary school children surf on the Internet at home; in contrast to about 66% at school (Valcke, Schellens, Van Keer, & Gerarts, 2008). According to research of Valcke et al. (2008), up to 36% of the children between 8 and 12 years old have access to the Internet in a separate room. 17.6% of the children use the computer in their bedroom (Valcke & Decraene, 2007). Other studies confirm this observation and point at an increase in Internet access in a separate room such as a study or bedroom, without parent supervision. Walrave et al. (2008) notice that 56% of the teenagers between 12 and 18 years old use the computer in this setting. International research of Livingstone and Helsper (2008) is in line with this finding and shows that in only 41% of the cases a computer with Internet access is placed in the living room.

In the present article, we focus on the characteristics of current Internet use of primary school children and more in particular we focus on the extent to which Internet use at home reflects unsafe behavior. The role of parents is critical in the context of increased access to the Internet. Livingstone (2007) points, against this background, at a generational divide. Children know more about computers and the Internet as compared to their parents. Grossbart et al. (2002) introduce in this context the concept of “reversed socialization” to mark this difference in expertise levels between children and parents. The current generation of youngsters is also the first generation that has not known a world without computers and the Internet, hence the label “digital natives” (Prensky, 2001) or “the net generation” (Oblinger & Oblinger, 2005). Despite the fact that young children are often called “whiz kids” (Lee & Chae, 2007), other authors, however, point at potential negative side-effects of intensive computer usage and Internet access and prefer the label “risk-kids” (see for example, Kuipers, 2006).

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Lastly, although Internet usage and the related potential and risks have to be studied from an international perspective, we have to stress that localized studies are necessary. The level of Internet access, the nature of the user experience, and the impact of local policies and legislation seem to differ widely between countries and continents. It is therefore not unexpected that results from studies – even set up within a comparable time frame – can differ widely; see for example the comparison of Internet usage in China and the UK (Li and Kirkup, 2007) or the within-country and between-country differences in Internet access and usage as reported by Orviska and Hudson (2009).

2. Internet usage of young children

According to Livingstone (2003), typical Internet usage of young children can be described following three dimensions: (1) entertainment, (2) education, and (3) edutainment. We prefer to add a fourth category that stresses the consumer role of children via the Internet. Young children are more and more considered as active consumers via the Internet and engage in e-commerce or are addressed by e-advertising (Tufte, 2006). Research in the geographical context of the present study confirms this Internet usage typology (De Moor et al., 2008; OIVO, 2008; Valcke & Decraene, 2007; Vandebosch, Van Cleemput, Mortelmans, & Walrave, 2006). According to the study of the OIVO (2008), the focus on gaming is dominant in 10–12 year olds and decreases after this age (Flanders, $N = 2662$, 6–18 years old). The focus shifts to chatting, social networking and commercial usage from the age of 11 years on. Social networking dominates all types of Internet usage from 13 years on. The increase in the usage for commercial objectives is strange, against the background of the legislation stating that youngsters can only open a bank account – without their 'parents' consent – at the age of 18 and that only 18 year olds can make autonomous use of payment modalities via the Internet. The OIVO study (2008) shows already 15% of the children of 11 years, 20% of children of 12 and 40% of 13 year old children report using the Internet for commercial purposes. In these cases, the children build on the support of the parents to pay for the goods.

Next to differences in Internet usage depending on age, researchers also stress differences related to gender. Gros (2004), for instance, observed no significant differences in Internet use of boys and girls of the 7th and 10th grade ($N = 261$). However, she noted significant differences between boys and girls in older children; older boys used the Internet to a longer extent. This difference was not observed in the younger children. The latter suggests the emergence of a “generation” effect in Internet usage. In addition, she noted that girls use the Internet significantly more for social networking or chatting; boys tend to focus more on games and entertainment-related activities. Nevertheless gender differences seem to become less relevant (Brandtzeg, Heim, & Karahasanović, 2011).

It is critical to note that the observed types of Internet usage evolve with the changing faces of the Internet. The Internet has become an environment that allows constructing a personal social space online (Anderson, 2007). The growth in Web 2.0 applications such as MySpace and Facebook, the sharing of pictures, videos and the use of webcams, have affected the types of popular Internet applications picked up by children.

The usage of the Internet will be discussed in the next sections from the perspective of potential threats to young children. After a discussion of literature about unsafe Internet usage and the potential consequences of unsafe Internet use, we discuss the design and results of a research study adopting a long-term perspective. Given the observations above that Internet usage has increased and the nature of its usage keeps changing, we have to be vigilant when building on less recent research data about Internet use of youngsters. This also implies that measures taken at a certain moment in time may no longer be that adequate when newer Internet applications have been adopted.

3. Unsafe Internet use

De Moor et al. (2008) present a synopsis of Internet risks for young children. Fig. 1 gives a structured graphical overview of these risks. In the literature, next to the terms (un)safe Internet use, and Internet risks, also the concept Digital Safety is regularly used (Gasser et al., 2010).

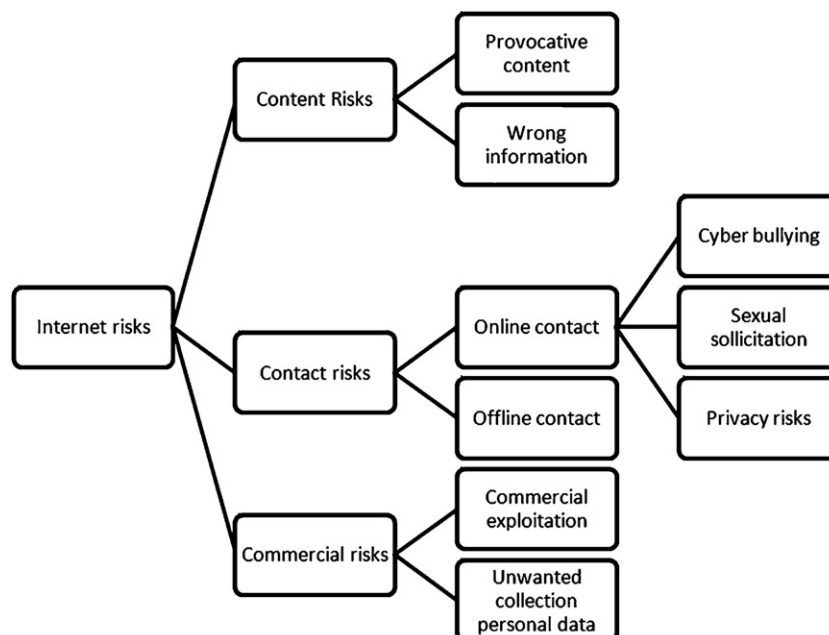


Fig. 1. Overview of Internet risks (based on De Moor et al., 2008).

3.1. Content risks

In their study, integrating the findings of 235 European studies on Internet risks and children, Livingstone and Haddon (2008) conclude that a larger proportion of studies focuses on content risks as compared to contact risks.

Content risks are related to the exposure of children to content that might be harmful. Examples of such content are: images or text reflecting pornography, violence, racism, or hate. In an early study, Valkenburg and Soeters (2001) reported that of 8–13 year olds, 4% had encountered pornography and 4% had experienced violence on the Internet (The Netherlands, $N = 194$, 8–13 years old). But this picture has clearly changed. Research of Valcke et al. (2008) indicates that about 40.7% of children between 10 and 12 years were exposed to such shocking content (Flanders, $N = 1700$, 8–12 years old). Livingstone and Bober (2004) observed that up to 57% children-teenagers accessing the Internet once a week, did already witness pornographic content (UK, $N = 1511$, 9–19 year olds). Kierkegaard (2008) states that, on average, children have access to Internet pornography at the age of 11 (based on set of EU studies). In addition, research of Mitchell, Finkelhor, & Wolak (2003) indicates that up to 25% of youngsters indicated being disturbed due to the nature of this type of content (USA, $N = 1501$, 10–17 years old). Particularly upsetting is the finding of Livingstone, Bober, and Helsper (2005) that high proportions of teenagers viewed – on purpose – pornographic, violent, or racist online content (UK, $N = 1257$, 9–19 years old). Less research is available focusing on other types of harmful content, such as suicide websites, eating disorders, and drug abuse.

A second content risk is related to wrong or untrustworthy information. The integrity of the information distributed via the Internet is rarely questioned by children (Valcke & Decraene, 2007). Livingstone and Bober (2004) showed that four out of 10 children trust and believe Internet content. Only about 33% of the children between 9 and 19 years old learned to verify the reliability of Internet information (UK, $N = 1511$, 9–19 year olds). In a study, involving secondary education learners, Kortum, Edwards and Richards-Kortum (2008) found that the learners selected and used mainly incorrect information from the Internet (USA, $N = 34$, 12–18 years old). In this respect, it is argued that an educational intervention is needed, since younger children are – currently – less able to check whether information is accurate and/or trustworthy (Johnson, 2008).

3.2. Contact risks

3.2.1. Online contact

Online contact can result in a variety of risk situations, such as cyber-bullying, sexual solicitation, and threats to privacy. Research of Berson and Berson (2003b) pointed out that a significant number of girls adopts unsafe online contact behavior: they disclose personal information, send personal pictures, and engage in face-to-face contact after initial online contact (USA, $N = 10800$, New Zealand, $N = 347$, 12–18 years old). Contact risks seem to be related to specific types of Internet usage, such as blogging, chat room use, and instant messaging (Ybarra, Mitchell, Wolak, & Finkelhor, 2006, USA, $N = 1501$, 10–17 years old; Ybarra & Mitchell, 2008, USA, $N = 1588$, 10–15 years old).

Cyber-bullying builds on the abusive use of email, Instant Messaging, chat rooms, or other communication types to bully, intimidate, threaten, or insult others (Insafe/Liberty Global-UPC, 2008). Examples of cyber-bullying are sending threat mails, insulting mails, creating hate sites about a person, verbal attacks in a chat room, and distributing offensive pictures of others. The fact that one can hide his/her own identity is an important reason for the Internet being a favorite bullying tool (Ybarra & Mitchell, 2004). Canadian research indicates that about 54% of 12–13 year olds ($N = 177$) had been a victim of cyber-bullying. Up to 15% admitted to be an offender of cyber-bullying (Li, 2007). In the Turkish setting, up to 33% of the youngsters ($N = 276$, 14–18 years old) reported being bullied online (Erdur-Baker, 2009). The large scale UK study of Livingstone, Bober, and Helsper (2005) shows that 33% of youngsters reported being bullied online or via SMS (UK, $N = 1257$, 9–19 years old).

In the geographical setting of the present study, Vandebosch et al. (2006) analyzed the occurrence of cyber-bullying among Flemish teenagers of 10–18 years old (Flanders, $N = 2052$, 10–18 years old). Interesting is their analysis from the perspective of both victims and offenders. Insults or threats are reported the most by victims (33.7%) and offenders (23.7%), followed by sending misleading information (27.3% victim; 30.8% offender), spreading rumors about someone (18.9% victim; 14.6% offender), and fooling around with someone's email or changing passwords (15.9% victim; 14.6% offender).

Internet-based sexual solicitation has become more and more frequent due to the use of webcam technologies and instant messaging (Mitchell, Finkelhor, & Wolak, 2001, 2003). From the study of the latter authors, we learn that about 4% of the teenagers reported explicit sexual solicitation experiences (USA, $N = 1501$, 10–17 years old). In the Australian context, Stanley (2001) reported that 27% of 10–17 year old youngsters experienced sexual solicitation via the Internet, mainly through chat rooms ($N =$ unknown). Research of Ybarra, Leaf, and Diener-West (2004) shows that 12% of male and 27% of female frequent Internet users experienced at least one case of sexual solicitation during the last year (USA, $N = 1501$, 10–17 years old). These results are confirmed in the geographical context of the present study. Walrave, Lenaerts, and De Moor (2008) report that up to 16% of the youngsters received sexually tinted questions; 10% were incited to carry out sexual activities via the Internet (Flanders, $N = 1318$, 12–18 years old).

Threats to privacy are apparent, considering the anonymity of the Internet. In addition, children run a larger risk to pass personal details to others (De Moor et al., 2008; Kierkegaard, 2008). Youngsters seem to be more willing to pass their age, name, address, and phone number. Up to 70% of the children felt easy about giving someone their home address or email address (Kierkegaard, 2008). Research involving children of 10–12 years, indicates that 26% of respondents did not know who they are chatting with; 13% passed personal details; 12.7% sent personal pictures (Valcke et al., 2008). In a recent study, Dowell, Burgess and Cavanaugh (2009) reported high frequencies of privacy violations in online behavior of 9–15 year olds (USA, $N = 404$, m age = 12 years old). Both boys (31.1%) and girls (27.0%) indicated they posted personal information online; 20.3% posted their email address, 20% uploaded a personal picture, 3% put their phone number in a social website, and 1.2% even added their home address. A potential consequence of this loss in privacy is undesirable offline contact, harassment and/or abuse. Privacy risks are therefore considered to be an antecedent of offline contact risks. Nevertheless, recent studies show changing trends. In a follow-up study of the privacy behavior of young MySpace users, Patchin and Huinduja (2010) found that the users exerted more discretion in posting personal information at a later stage. It is less clear whether this is related to an increase in experience, Internet safety awareness, parent supervision, or other measures that are intended at the reduction of privacy risks (USA, $N = 2423$, 16–19 years old).

3.2.2. Offline contact

When it comes to offline contact, research shows that children are clearly at risk. This is therefore a central topic in Internet media campaigns. Already in early Internet safety studies, researchers reported proportions of offline contact resulting from online contact. For instance, Stahl and Fritz (2002) reported that about 4% of their respondents reported attempted or actual offline contact (USA, $N = 213$, 11–16 years old). More recent research of Valcke et al. (2008) shows how 7.5% of children between 10 and 12 years old did already set up a meeting with an unknown person as a result of online contact. One fifth of them went alone to this offline meeting. Of course, some of these offline contacts are hardly risky if children meet with peers or same-age Internet friends. Nevertheless, some online contact can be intended as “grooming” (Kierkegaard, 2008). This refers to adult offenders who develop an online relationship with young children and gain their trust. Their objective is to finally meet these ignorant children offline. Offline contact, resulting from online Internet contact, is a reality and presents clear risks. In a recent study of Dowdell (2010), 14.6% of youngsters started online contact with strangers and the majority (84%) of these 59 youngsters met offline with the unknown person, and three reported having been assaulted (USA, $N = 404$, $m\ age = 14$ years old).

3.3. Commercial risks

The consumer role of children via the Internet can also result in Internet risks. Young children are approached via “gamevertising” (Youn, 2008). Valkenburg (2002) emphasizes in this context the emergence of “branded communities” that are geared towards young Internet audiences. They are – sometimes unconsciously – involved in activities as active consumers (Tuft, 2006). A particular example is the unwanted purchase of ringtones for mobile phone, resulting in hefty phone bill charges after getting a “free offer” (Denmark, $N = 220$, 10–12 years old). Livingstone (2003) gives different examples of such commercial exploitation; such as placing an order without consent, or games that are concealed sales offers. Swinburn et al. (2008) refer to promotion of particular foods and beverages to children. In a study, involving 9 year olds, Costa and Damasio (2010) demonstrate that much depends on the experiences young children had prior to their Internet experience (such as shopping, talking to parents, or chatting with friends). In their study, the nine year olds recognized brand and advertisement even though they did not know the products being advertised. The same authors stress that these children nevertheless do not have the critical literacy to understand that “they like what they like” and easily follow the “suggestions” in the advertisement. It was also found that parents do not fully understand potential commercial risks (Chisholm, 2006; Livingstone & Bober, 2004). An exploratory qualitative study of Henke and Fontenot (2007) showed that only about 13% of children of 9–13 years olds realized that the aim of their favorite website is advertising (USA, $N = 39$, 9–11 years old). The majority of children (74%) thought the website aim was to entertain. Recent review studies confirm these findings. For instance, in the recent study of OIVO (2008), none of the children indicated spontaneously to know a commercial website (Flanders, $N = 306$, 6–7 years old and $N = 2363$, 11–18 years old). The younger children (<12 years old) were hardly able to identify commercial websites from a list of popular sites. In addition, 10% of the children even opted for a commercial website to be their favorite site.

A rather hidden Internet risk is the solicitation for background information of Internet surfers. Children are invited to register and pass their name, age, or email address. They are invited to respond to small surveys about their consumer behavior, their preferences, the extent to which they like a product. Up to 67.5% of the teenagers reported having visited such websites. About three quarters of the teenagers indicated that they did not know what happened at that stage (Walrave et al., 2008).

The structured discussion of the empirical studies focusing on the risks run by children on the Internet demonstrated clearly that content, contact and commercial risks are a reality and cannot be neglected. This raises the question what the consequences of unsafe Internet behavior are. This topic is studied in the next paragraphs and is at the same time an introduction to the variety of measures to foster safe Internet usage. This will bring us back to the aim of the present study that focuses on a long-term study about - (un)safe - Internet use and to what extent the safe Internet usage measures have an impact.

4. Consequences of unsafe Internet behavior

There is growing research about the impact of unsafe Internet behavior; though available research mainly focuses on content and contact risks. Cho and Cheon (2005) summarized studies about the negative consequences of risky Internet content: aggression, fear, symptoms related to psychological trauma, negative self-image, and identity confusion. Other researchers focusing on emotional consequences indicate that about one fourth of the teenagers between 10 and 17 years old were upset to extremely upset due to exposure to harmful content. Mitchell et al. (2003) indicate that about 19% indicated they felt stressful during the days after the negative experience (USA, $N = 1501$, 10–17 years old).

Peter, Valkenburg, and Schouten (2006) revealed a relationship between exposure of boys to sexual explicit content and their focus on females as lust objects (The Netherlands, $N = 412$, 12–14 years old). The authors also found correlations between exposure to sexual explicit content and attitudes about sex, respect for females, and the place of sex in a healthy relationship.

Ybarra (2004) found that about 5% of the teenagers who felt being harassed via the Internet, also felt threatened or stressed. In addition, 13.4% of these 5% showed symptoms of a severe depression (USA, $N = 1501$, 10–17 years old). This is significantly higher as compared to the prevalence of depressions in normal teenager populations. Vandebosch et al. (2006) revealed that there is a significant positive relationship between being a victim of cyber-bullying and stress. Victims clearly feel less safe (Flanders, $N = 2052$, 10–18 years old).

In relation to online contact risks, Mitchell, Finkelhorn, and Wolak (2001) observed that 25% of teenagers who received a sexual solicitation via the Internet were very upset, and expressed anxiety feelings (USA, $N = 1501$, 10–17 years old). These findings were confirmed in their more recent study indicating that youngsters receiving an invitation to make explicit pictures about themselves run the risk of developing stress (Mitchell et al., 2007). This is in line with the study of Bremer (2005) stating that after an online sexual solicitation, 23% of children felt upset, 20% felt ashamed, and 20% developed stress symptoms (USA, incomplete details).

The negative impact of offline contact, as a result of online contacts are hardly described in the literature. We can expect this to be in line with the negative consequences of unwanted online contact, resulting in even higher risks related to their physical and social-emotional health.

5. Towards safe Internet use

Safe Internet use by children is being promoted in a variety of ways. At macro-level, we observe national governments installing a legislation to protect children. Already in 1998, the Federal Trade Commission questioned the treat to privacy of children on the Internet. This resulted in the 'Children Online Privacy Protection Act' (COPPA). This law limits the possibilities to collect information from children, and requires putting warning signs on websites if harmful content will be presented. In 2000, the 'Children's Internet Protection Act (CIPA) was installed. This act focused on schools and libraries. If the latter implemented a safe Internet policy (rules, filter software), they could receive a grant to develop their educational ICT use (FCC, 2001). In line with the approach of the American government, also other countries implemented a specific legislation. However, the Internet is not a "national" issue. An international legislative focus is needed; national laws can hardly tackle international illegal practices (Kierkegaard, 2008).

Whereas legislation is a repressive way of monitoring Internet use, alternative approaches focus on developing awareness, knowledge, and skills about safe Internet use. Existing approaches can be structured into four categories: awareness campaigns, the use of Internet filters, parental supervision strategies, and activities set up via schools. We summarize key characteristics below. More extensive overviews have already reported in detail elsewhere (Valcke et al., 2008).

5.1. Awareness campaigns

Awareness about safe Internet is and has been the dominant focal point of international campaigns. Under the umbrella of the European Commission, such activities started in 1999. The most recent campaigns, resulting from this coordinated European action line, were set up in 2005 and 2008. The main focus of the "Safer Internet Program" was to make the Internet a safer place (European Commission, 2009a). Four key action lines were laid out: (1) fighting illegal or harmful content by setting national hotline networks; (2) fighting harmful content by promoting filter software; (3) the installation of the Safer Internet Forum, bringing together political and non-governmental organizations to promote safer internet use and (4) the organization of large scale awareness campaigns. The current campaign runs from 2009 to 2013, and focuses on the following objectives (European Commission, 2009b):

- Fostering awareness of children, parents, and teachers about safe Internet behavior.
- Starting national contact points to report illegal or harmful online content; with a particular focus on child abuse and grooming.
- Promotion of self-regulation initiatives.
- Stimulating children to set up themselves a safer Internet environment.
- Developing knowledge acquisition of children and teenagers about safe Internet use, Internet risks, and promoting related European collaborative research.

At a national level, the international campaigns have influenced local actions. In the geographical context of the present article, we can mention the Click Safe campaign focusing on children, parents, and teachers and involving all the media to discuss safe Internet use (UKCCIS, 2010). In addition Child Focus was set up in 2002 as a national contact point for concerned parents about – among other child-related issues - unsafe Internet behavior.

5.2. Filter software

A second key element in the adoption of strategies and solutions to achieve a safe Internet environment, is based on filter software (Meeder, 2005; Mitchell, Finkelhor & Wolak, 2005; Wishart, 2004). Three main types of filter software are currently used: inclusion (based on safe or "white" pages), exclusion (based on unsafe or "black" pages), and content filtering software (focus on instant scanning of web pages). Research of Mitchell et al. (2003) shows that up to one third of parents installed filter software. Livingstone and Helsper (2008) come to comparable numbers. But only 33% of the parents knew whether filter software was installed; 23% indicated they used monitoring software to check the surfing activities of their children; 20% of the parents was unaware of the purpose of filter software. More recent research, commissioned by the European Commission (2008), comes to a less positive picture. Only 22% of the parents reported to use filter software. Up to 60% of parents, not installing filter software, indicated they did not see the need; they trusted their children (Mitchell et al., 2005).

Filter software has become a standard Internet usage feature in schools. This is partly due to legislation and national projects (see CIPA). For example, the Local Education Authorities (LEA) and the Regional Broadband Consortia (RBC) in England support schools with a school Internet safety coordinator and the active promotion of filter software (Barrow, 2006). Related research shows that this has resulted in 80% of the schools using filter software. Other studies point at a filter software penetration of 97% (Wishart, 2005). In the geographical context of the present study, schools are not obliged to install filter software. The Department of Education promotes the use of such tools in combination with the attainment of curriculum goals related to the critical use of the Internet (Department of Education, 2007). This also reflects the approach promoted by Byron (2008, p. 103): "It is important to note that, as with access at home, technical tools such as filtering can make children safer online but they are no substitute for teaching children to use the internet safely and responsibly."

5.3. Parental supervision

The latter introduces the critical need for parental supervision (Wang, Bianchi, & Raley, 2005). Lwin, Stanaland, & Miyazaki, 2008 distinguish between two types of strategies: restrictive mediation and active mediation. Restrictive mediation implies the definition of rules about Internet usage. These rules can be related to timing or to the use of or access to specific Internet applications. Restrictive mediation precedes actual Internet usage. Active mediation is linked to actual Internet usage. Parents adopt an active position and stay around, talk about Internet usage, or check the computer screen.

Research of Wang et al. (2005) indicates differences in perceptions about Internet-related rules between parents and children. Parents and children seemed to agree in 30% of the families as to the rules; in 31% of the families both parents indicated there are no rules and in

about 40% of the cases parents and children disagreed as to the existence of Internet rules. In many cases, parents stressed rules that were not recognized by the children. In the study of Livingstone and Helsper (2008), 53% of the parents stated they established rules about timing of Internet usage; 67% forbade to pass on personal details; 59% prohibited to buy things online; 43% blocked email usage; 13% ruled out access to chat rooms; and 7% bared instant messaging. These data are mostly in line with the results of the Eurobarometer-study (European Commission, 2008), in which parents were asked to list types of Internet rules. The latter study also pointed at problems in obtaining information about parents who tend to reply in a socially desirable way.

The study of the European Commission (2008) clarified that parents define more rules when they are active Internet users themselves. Parents without Internet experience define the smallest amount of Internet rules. Mothers seem to adopt to a larger extent restrictive mediation as compared to fathers. Also younger parents establish more rules; again this can point to a generation effect in Internet users. There seems to be no differences in the nature and amount of rules for boys or girls. This is in line with the findings of Livingstone and Bober (2004).

The study of Livingstone and Helsper (2008) also focused on active mediation. The results show that 64% of the parents talked with their children about the Internet; 34% staid around during Internet access; 46% checked the screen regularly; 38% helped their children; and 33% of the parents indicated they control Internet usage in an explicit way. The Eurobarometer-study (European Commission, 2008) presents comparable findings: 35% of the parents did always and 39% did regularly ask what their children do on the Internet; 30% staid always and 31% staid around regularly during Internet access; 22% stated they always check the Internet history afterwards; 13% indicated they sit always and 23% reported to sit regularly next to their children; 13% always checked the email and instant messaging of their children; 11% reported to do this regularly.

Some authors question the impact of active or restrictive mediation (Lee & Chae 2007). However, the study of Lwin et al. (2008) shows that both active and restrictive mediation help to lower the chance of risky online contact (for example: passing personal information). They therefore prefer to label the combination of active and restrictive mediation as “selective mediation”. They also found that “promotive mediation” is effective when parents especially adopt active mediation and to a lesser extent restrictive mediation. The least effective is a laissez-faire style. This is partly in line with the findings of Valcke et al. (2008). They found that active and restrictive mediation predicted a lower level of unsafe Internet behavior. In contrast, Livingstone and Helsper (2008) indicate that neither active nor restrictive mediation was helpful to reduce unsafe Internet behavior. Gender, age, and Internet experience were better predictors for unsafe Internet behavior. This implies that mediation might not influence Internet behavior in a direct way. The complex and indirect impact of parental supervision was already mentioned in earlier research of Liau, Khoo, and Ang (2005) and Mitchell, Finkelhor, and Wolak (2001). Next to inconclusive research results, we also have to consider that parental control is not a definite solution. Access to the Internet is not restricted to the home context. Especially restrictive parental control is no longer effective once children access the Internet elsewhere.

5.4. School-based approaches

Schools have been targeted to play a role in the promotion of safe Internet use. In the Flemish context, this has resulted in curriculum changes. Specific final curriculum goals have been defined that focus on the use of Information and Communication technologies (ICT) and on the Internet in particular. One of the new final goals – implemented since September 2007 – states that primary school children should be able to access and use the Internet in a safe and responsible way (Department of Education, 2007).

A study of O’Connel, Price, and Barrow (2004) in England shows that the school context is considered by children to be the most important place to learn about safe Internet usage (73%). Parents are considered by 72% of the respondents as the next most important information source. Other sources mentioned by the children are: television (37%), the Internet (23%), friends (19%), magazines (12%), radio (17%), and the movies (8%). The follow-up nature of this study also helped to understand that the importance of the school as an information source did increase as compared to an earlier study. This suggests that schools probably might have adopted a more active role in this context. In line with the former, we can repeat the legislative actions installed in a number of countries that oblige schools to install filter software and to adopt Internet usage rules.

Nevertheless, not all schools seem to adopt the same rigorous approach. In a study of Valcke and Decraene (2007), 80% of the teachers reported to have installed Internet rules. In contrast, only 40% of the pupils confirmed that such rules had been established and communicated. Additionally 55.4% of the pupils between 8 and 12 years old reported that their teacher “always” to “mostly” controlled their Internet access. In 14.4% of the cases, children did not experience teacher control. This is in sharp contrast with the opinion of the teachers who reported a higher control percentage (50%). There seems to be a difference in the perceptions about the nature and impact of school Internet rules. Next to rules, schools can also play an active role by introducing children to safer Internet usage. Wishart (2005) reported that 85% of the schools in her study developed a curriculum about safe and adequate Internet usage. However, in a more recent study of Sharples, Graber, Harrison, and Logan (2009), researchers found that only 58% of the teachers teach about safe Internet usage. Only 11% did this on a regular base. In 55% of the cases teachers reported their school had adopted a safe Internet policy; 3% indicated that no such policy existed, and 42% was not aware of such a policy. This raises doubts about the current school-based safe Internet actions.

The study of Berson (2000) and Berson and Berson (2003a) already pointed out that despite school-invoked discussions about safe Internet usage, children continued to adopt risky Internet behavior. They also pointed out that this type of risky behavior might be part of the youth culture. An intervention study of Wishart, Oades, and Morris (2007), based on role play, confirms these less positive findings. Only 34% of the children reported they learned not to distribute personal details via the Internet; 27% reported not to trust everybody online; 14% reported to stay away from specific Internet sites; and only 6% learned that chat rooms can be unsafe.

Pulling together the conceptual background and available empirical studies about the approaches to foster safe Internet use, we can conclude that all authors stress the importance of this type of campaigns and actions. At the same time, little information was found about the impact of these approaches on the actual Internet surfing behavior of young children. This brings us to one the key research questions tackled in the study outlined below.

6. Research design

Building on the observation that the technical functionalities of the Internet continuously evolve and constantly present new challenges in view of safe Internet usage, the present study adopts a long-term perspective to study actual Internet usage by children and the extent this

behavior presents risks. There are hardly studies available in the literature adopting a long-term perspective to monitor Internet usage (Livingstone and Haddon, 2008). A rare exception is the study of Mitchell, Wolak, and Finkelhor (2007) who studied trends – between 2000 and 2005 – in the sexual solicitations, harassment and unwanted exposure to pornography of children on the Internet. A long-term perspective can be helpful to check whether policies or specific action lines have had an impact and whether newer generations of Internet users reflect a safer Internet usage profile. In the present study, we build on research data about actual Internet usage of primary school children gathered during three school years: 2005–2006 ($n = 1702$), 2007–2008 ($n = 4632$), and 2008–2009 ($n = 3666$). As a result, a long-term cross-sectional research design study has been set adopted, in which the same research instrument was administered to successive cohorts of comparable age/grade levels.

In the present study, we especially focus on (1) the quantity and (2) the nature of actual Internet usage; (3) the content risks and contact risks reflected in Internet usage; and (4) the extent to which parents and schools have implemented restrictive and/or active mediation measures and how this impacts (un)safe Internet use.

6.1. Research questions

Building on the available conceptual and empirical base, we focus on the following research questions, and this from a long-term perspective. The latter implies that we consistently check what trends can be observed over time:

1. What is the nature of Internet usage of 4th, 5th, and 6th graders at home?
2. To what extent does the Internet use of 4th, 5th, and 6th graders reflect unsafe Internet use?
3. To what extent is their Internet use supervised at home and/or at school?
4. Is there a relationship between the restrictive and/or active mediation measures taken at home and at school and safe Internet use of 4th, 5th, and 6th graders?

It has to be stressed that in this long-term study, the focus is on content and contact risks. Commercial risks are – rather recently – considered as an emerging risk. They will be considered in future studies.

6.2. Research sample

In total, 10,000 pupils of the 4th, 5th, and 6th grade of 78 schools in Flanders were involved in this study. The schools were – in view of each research cycle – selected randomly from a total of 2146 primary schools. A multi-stage sampling approach was adopted. At a first stage, villages/cities were selected from the different provinces in Flanders. At a second stage, schools within this geographical location were approached to check their willingness to participate in the study. Thirdly, all pupils of the fourth till the sixth grade, enrolled in each school, were involved in the study. Given the fact that mainly three types of instances organize primary education and are subsidized by the government, we checked post hoc the extent to which a balanced participation of schools was achieved: private organizations (68.8–63.8%), local authorities (province, city, town; 22.7–22.4%), or central government (8.5–13.8%). Between brackets we report the observed proportion in the sample, followed by the expected proportion, based on the data of the school year 2008–2009. This implies that there is a slight underrepresentation of primary education organized by the government and a slight overrepresentation of primary education organized by private organizations. This affects to a certain extent the representation of principals and pupils in the sample as compared to the population. When it comes to other background variables we focus on principals and pupils separately. The background characteristics of the principals in the sample are in line with population characteristics: gender (female 43.66%–male 56.34%), age (50 year, 1 month).

Within the research sample, nearly equal proportions of pupils of different grades were interviewed: 4th grade = 33.3%, 5th grade = 33.3% and 6th grade = 33.4%. The sample was representative when it comes to the variable gender: girls = 50.6% and boys = 49.4%. The average age of the pupils in the sample is 11 years and 15 days.

6.3. Research instrument

The research instrument consisted of two sections: a pupil section and a school principal section. A copy of the instruments can be obtained from the authors.

The pupil questionnaire gathered background information (age, gender), information about the quantity and nature of 'children's computer and Internet use at home (7 items) and at school (), the location of their home computer (2 items), of where they access the Internet (2 items), the degree of computer and Internet supervision at home (2 items) and at school (2 items), their school on the Internet (3 items), and information about unsafe computer use at home (11 items).

Survey items presented statements to the respondents. On a five or seven-point Likert scale, they could indicate to what extent they did agree or disagree with a specific statement; e.g., Are you being controlled by your parents when you use the Internet at home? In a number of cases, agree/disagree or yes/no answers were required. For instance: "Did you already pass pictures to other people online?". When the focus on getting a picture about how often they surfed on the Internet or carried out specific Internet activities, the survey items presented five answer categories (examples: less than once a month, once a month, once a fortnight).

In view of assuring content validity, the instrument builds on the different content and contact risks, as discussed in the literature. Pilot versions of the instrument were reviewed by independent experts to judge the link between the items and the related constructs.

In view of calculating an Internet safety index, replies to these questions were clustered as will be explained below.

The school principal was presented a questionnaire focusing on the quantity of computer use at school, the degree of computer and Internet supervision, the extent to which an introduction to safe Internet use had been given, and the extent to which a safe Internet use policy was established in their school. The school principal questionnaire was administered once and in view of the different grades in his/her school.

6.4. Research procedure

The study was set up in the months February–March of each school year 2005–2006, 2007–2008, and 2008–2009. The same research procedure was followed during the consecutive research years. Interviewers received a detailed protocol that defined the step-by-step approach to interview the primary school children. Informed consent was obtained of the legal guardian of the pupils through the school principal. Each individual child was interviewed outside the classroom (library or computer room). The first questions about background information were read together with the pupils and the interviewer helped the pupils to answer these questions. The remaining questions were answered individually by the pupil, without intervention of the interviewer. If the pupil was in doubt as to the way a question had to be answered, he/she could ask for help. In those cases, the interviewer paraphrased the question to give some additional support. The school principal filled out the specific version of the instrument during the sessions with the pupils.

6.5. Statistical analysis

After data cleaning, descriptive statistics were computed to explore the data. Next to variables that can be derived directly from the data, additional variables required the calculation of cluster scores. This was the case to determine the 'children's level of unsafe Internet usage. The Unsafe Internet Usage Index (UIUI) was calculated by adding together indicators referring to Internet contact and content risks. For each variable of the UIUI index, a respondent could give a 1 or 0 score; with the exception of the chatting indicator where a differentiation was made between knowing nobody, most of the chat partners and all the chat partners. Given the high contact risk of meeting unknown people online, the index contains three indicators of this type of unsafe behavior: making appointments, meeting these people, and meeting these people alone without guardians/friends being aware of such a face-to-face meeting. A sum-score was calculated Overall these variables, resulting in a new UIUI variable (maximum 10). This implies that a high UIUI score reflects a high level of Internet risk behavior and thus unsafe Internet use. We put forward the following interpretation of UIUI index values: 0–2 = low risk, 3–5 = medium risk, 6–8 = high risk and 9–10: very high risk.

1. I do not know everybody I'm chatting with (0, 1, 2).
2. I use the Internet-connected computer mainly in my own room and not in a living room or room shared with other family members (0, 1).
3. I did already pass my address details via the Internet (0,1).
4. I did already pass my picture to people I meet via the Internet (0,1).
5. I already made appointments with people I learned to know via the Internet (0,1).
6. I already met face-to-face people I learned to know via the Internet (0, 1).
7. I met – alone – people I learned to know via the Internet (0, 1).
8. I have already found shocking content on the Internet (0, 1).
9. Surfing on the Internet does not present dangers (0, 1).

Exploratory factor analysis (principal components analysis with varimax rotation) of the items that compose the UIUI index scale, resulted in a three factor solution, explaining 53% of the variance in UIUI scores (all items reflect a factor loading > .40). The first factor clusters the four contact risk items. The second factor clusters the three content risk items. The third component brings together the two items that refer to supervision at home and the place where children access the Internet.

Differences between groups of subjects (year, gender, grades) were analyzed on the base of independent samples *t*-tests and ANOVA with post hoc analysis (Tukey's Honestly Significant Difference test). Eta² values are interpreted as follows: .01 ~ small, .06 ~ medium, .14 ~ large (Pierce, Block & Aguinis, 2004). Differences in proportions were tested by Chi-square analyses. Only significant differences in proportions that exceed 5% will be considered as being relevant. Regression analysis was applied to determine the impact of Internet management approaches of parents and schools on 'children's (un)safe Internet usage.

Statistical analyses were carried out by using PASW (Predictive Analytics SoftWare), version 18. A significance level of $p < .01$ was put forward.

7. Results

7.1. What is the extent and nature of Internet usage of 4th, 5th, and 6th graders at home?

Respondents could indicate their level of Internet usage at home on a 7-point Likert scale. From the analysis, it is clear that we observe—though the differences are significant – only small changes in the mean level of Internet usage at home ($F_{(2,9983)} = 4.79$; $p = .008$; *partial* $\eta^2 = .001$): $M_{2005-2006} = 4.47$; $M_{2007-2008} = 4.53$; $M_{2008-2009} = 4.61$.

There is a clear quantitative increase in the types of Internet usage. In Fig. 2 we can observe that in 2005–2006 most types of Internet usage were selected by around 15–20% of the respondents, from 2007 to 2008 on, we see that most types of Internet usage are used by over 35% of respondents. It is interesting that on the whole, Internet usage reflects both entertainment, infotainment and educational uses of the Internet. The proportion of Internet usage, labeled as "other" (see last category in Fig. 2) is somewhat large and comprises activities such as developing games, developing websites, making multimedia applications (such as movies, clips, and animations).

7.2. To what extent does Internet usage of 4th, 5th, and 6th graders reflect unsafe Internet use?

As explained above, for each year in the study, an unsafe Internet usage index was calculated (UIUI) clustering all the content and contact risks reported by respondents. The analysis results are clear. Overall, we can conclude that - considering an average UIUI < 2 - Internet usage is rather safe.

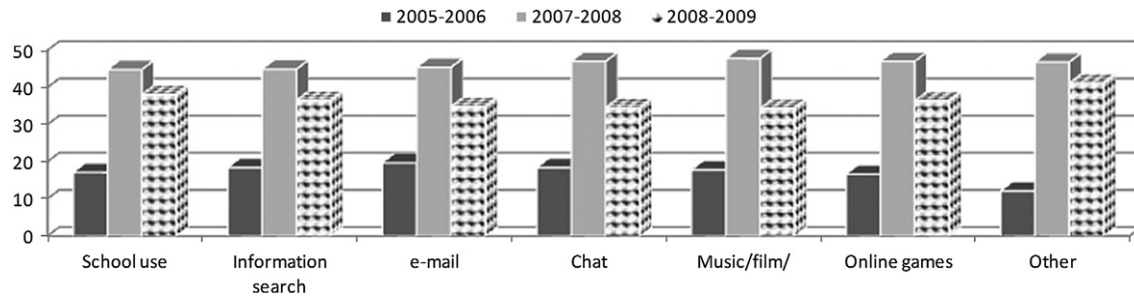


Fig. 2. Patterns in Internet usage at home (in percentages, respondents could select/deselect each alternative option).

There are significant, but minor differences in the reported level of unsafe Internet usage by respondents over time ($F_{(2,9402)} = 21.74$, $p < .01$, $partial\ Eta^2 = .005$). The significant decrease in unsafe behavior between 2005–2006 and 2007–2008 is too small to be meaningful. No significant differences are found between 2007–2008 and 2009–2009. This is reflected in a plot of the UIUI over time as depicted in Fig. 3.

Boys clearly reflect a significantly higher level of Internet risk behavior (UIUI) as compared to girls, but this difference is too small to be of practical relevance ($t_{(9376)} = -10.72$, $p < .01$; $M_{boys} = 1.92$; $M_{girls} = 1.55$). It is also interesting to compare the risk behavior of respondents in the different school grades. Lower grades reflect a significantly higher level of risk behavior, but the between group differences remain very small ($F_{(2,9402)} = 25.29$, $p < .01$; $M_{4th\ grade} = 1.91$; $M_{5th\ grade} = 1.68$, $M_{6th\ grade} = 1.73$).

When we analyze the types of risk behavior indicators that compose the UIUI one by one, the following picture emerges. Risk behavior while chatting seems to start from 2007 to 2008 (46.2%) on, and increases slightly in 2008–2009 (53.8%). More and more children do not seem to know every person they are chatting with. The differences over time are significant and relevant ($X^2_{(2, N=10,000)} = 526.72$, $p < .01$).

When it comes to the place where respondents have access to the Internet, the proportion of children that access the Internet from a private room (mostly their bedroom) is high and decreases only slightly: from 52.2% in 2005–2006 to 47.8% in 2007–2008 and 47.0% in 2008–2009. The fluctuations are significant but small and not relevant ($X^2_{(2, N=10,000)} = 13.31$, $p < .01$).

Children also seem to be less careful when it comes to passing address details to people online; this fluctuates from year to year: 2005–2006 = 13.3%; 2007–2008 = 8.9%; 2008–2009 = 12.1%. We observe significant differences over the years ($X^2_{(2, N=9491)} = 33.40$, $p < .01$). Focusing on the last two data collections, the initial decrease in this type of risk behavior increased again ($X^2_{(1, N=7862)} = 21.69$, $p < .01$). This implies that currently, the extent to which children pass on address details hardly differs since the start of the research series.

When it comes to sending pictures via the Internet, an initial decrease in this type of unsafe behavior disappears at a later stage: 2005–2006 = 12.7%; 2007–2008 = 6.5%; 2008–2009 = 9.3%. This reflects small, significant fluctuations over time ($X^2_{(2, 9457)} = 62.27$, $p < .01$). The largest significant decrease in this type of risk behavior is observed when comparing data from 2005–2006 with 2008–2009, but this change is not relevant ($X^2_{(1, N=5085)} = 13.68$, $p < .01$).

Making appointments with unknown people reflects significant and relevant differences over time ($X^2_{(2, N=9456)} = 117.16$, $p < .01$). Youngsters seem to adopt increasingly unsafe behavior in this context: 2005–2006 = 7.7%; 2007–2008 = 18.5%; 2008–2009 = 19%. Despite the Internet safety programs from 2008, we see that the proportion of children making such appointments did not decrease during recent years.

Whereas the former UIUI-risk indicator refers to the basic act of making an appointment, the indicator “actually meeting someone face-to-face” is evidently a higher level risk. There are significant and relevant differences over time that point at an increase in this type of risk behavior ($X^2_{(2, N=10000)} = 121.17$, $p < .01$). Youngsters seem to adopt increasingly risky behavior: 2005–2006 = 7.8%; 2007–2008 = 18.2%; 2008–2009 = 19.2%. We observe that Internet safety programs set up since 2008 did - yet - have not an impact on this type of risk behavior.

The most unsafe behavior, actually meeting unknown “friends” made via the Internet alone, initially decreased, but returned to a slightly higher level in the last year of the study: 2005–2006 = 3.4%; 2007–2008 = 2.9%; 2008–2009 = 4.5%. This behavior reflects significant but less relevant fluctuations ($X^2_{(2, N=10000)} = 14,605$, $p < .01$). The fact that we do not observe a significant decrease can be considered as not reassuring ($X^2_{(1, N=8298)} = 14,32$, $p < .01$).

Unsafe Internet usage is also reflected in the extent youngsters are confronted with shocking content via the Internet. There is a significant and relevant decrease in the degree respondents report being challenged by such content ($X^2_{(2, N=10000)} = 202.48$, $p < .01$); though this decrease is only significant when comparing the first and second period: 2005–2006 = 39.0%; 2007–2008 = 22.0%; 2008–2009 = 23.2%. The decrease in this type of risk behavior is in particular significant and relevant when comparing the first and second data collection ($X^2_{(1, N=6334)} = 182,92$, $p < .01$).

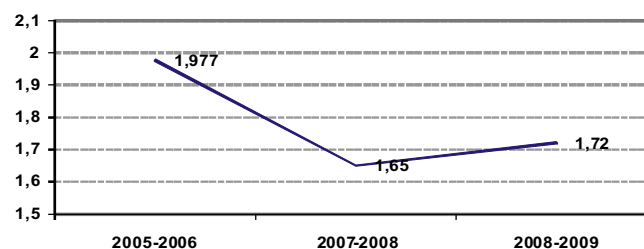


Fig. 3. Evolution in unsafe Internet behavior over time.

Lastly, the UIUI is also based on the awareness of respondents whether the Internet potentially presents dangers. There are significant and relevant fluctuations in the proportion of youngsters reflecting a lack of awareness about Internet risks ($X^2_{(2, N=10000)} = 328.25, p < .01$): 2005–2006 = 33.3%; 2007–2008 = 13.9%; 2008–2009 = 16.1%. There is clearly a significant and relevant decrease in the proportions of this risk behavior when comparing data from the first and second study ($X^2_{(1, N=6334)} = 299.89, p < .01$). The increase in “unawareness” in the last study is significant but not relevant ($X^2_{(1, 8298)} = 7.63, p < .01$).

7.3. To what extent is there Internet use supervision at home and/or at school?

Parental control was measured on a five-point Likert scale; reflecting no control to continuously control on Internet usage at home. It is striking that 23.2% of all children reports never to be controlled and 23.6% reports to be hardly ever controlled, while accessing the Internet. Next, 31.7% reports to be controlled only now and then. Additionally, 12.5% indicates that they are nearly always controlled. Only 9.0% reports to be checked all the time. When comparing the level of parental control over time, we observe a significant – but less relevant – decrease in parental control ($F_{(2, 9486)} = 448.32, p < .01, \text{partial } \eta^2 = .086$). This small decrease is most clear when comparing the findings of the first study: $M_{2005-2006} = 2.39$; $M_{2007-2008} = 1.46$; $M_{2008-2009} = 1.42$. Fig. 4 gives a graphical representation of this small drop in parental control. This drop is significant – but hardly relevant – when comparing 2005–2006 and 2007–2008 ($t_{(3176)} = 28.71, p < .01$). The difference between the two last measurement periods is not significant ($t_{(7548)} = 1.61, p = .11$).

When inviting respondents to indicate the level of control by their teachers at school, the following picture emerges. Important is again that 11.4% of the children reports never to be controlled and 10.2% reports to be controlled hardly ever while accessing the Internet at school. Next, 21.2% reports to be controlled now and then. Interestingly, 22.3% indicates they are nearly always controlled. Further, it is significant to observe that 29.9% report to be checked all the time. When comparing the level of teacher control over time, there is a small decrease in the control level over time ($F_{(2, 9888)} = 86.52, p < .01, \text{partial } \eta^2 = .017$). Teacher control has decreased since the first study: $M_{2005-2006} = 2.99$; $M_{2007-2008} = 2.52$; $M_{2008-2009} = 2.50$. Though this decrease is significant, the value of $\text{partial } \eta^2$ indicates that this only reflects a very small drop in teacher control. This is also clear when represented in Fig. 4.

The reported level of parental control does not differ, depending on the grade level of the children ($F_{(2, 9486)} = 0.27, p = .764$). The level of reported teacher control differs marginally, with a slight – but hardly relevant – reported increase in control depending on the grade level ($F_{(2, 9888)} = 37.36, p < .01, \text{partial } \eta^2 = .008$: $M_{4\text{th grade}} = 2.47$; $M_{5\text{th grade}} = 2.56$; $M_{6\text{th grade}} = 2.75$).

7.4. Is there a relationship between the level of control at home and at school and safe Internet use of 4th, 5th, and 6th graders?

A hierarchical linear regression in which first the level of perceived parental control and next the level of perceived teacher control are entered as predictors of the Internet usage risk shows that teacher control is not a significant predictor of UIUI. Parental control is a significant negative predictor ($F = 58.62, p < .01$), but hardly explains a proportion of the variance in UIUI ($R^2 = 0.6\%$; $\text{adjusted } R^2 = .006$). A further analysis in which we focus on the same relationship, but in which we also consider the different grade levels, does not result in a different picture. Parental control is hardly a negative predictor of risk behavior.

8. Discussion

The results of this long-term cross-sectional study present a clear picture. When we focus on the results in view of the first research question, both the extent and nature of Internet usage is in line with the findings in other studies. As reported elsewhere (see O'Reilly, 2010), young children increasingly access the Internet. But as stated in the introduction, we have to consider the local geographical in this setting. Compared to the Greek setting, Flemish youngsters use the Internet to a significantly larger extent. Aslanidou and Menexes (2008) reported rather low levels in Internet usage of 12 year olds and were not surprised by the low usage of the Internet in view of school related activities. As to the nature of the Internet usage, the results point at a balance between entertainment-oriented use to a more functional use of the Internet. This was also observed by Tabone and Messina (2010). The observation that – next to the individual usage of the Internet – a large proportion is linked to social use, is in line with the qualitative research findings of Young (2008). The latter is important since this might introduce the most critical types of unsafe Internet behavior. Steeves and Webster (2008) found in this perspective parental supervision can have a differential effect, depending on the level of integration of the Internet in the social lives of teenagers.

Considering the second research question, the results of the present study show that the average level of risk behavior – as expressed by an Unsafe Internet Usage Index – is not dramatically high. But, particular types of unsafe Internet behavior demand our attention. As to the latter, the small percentage of teenagers that have met face-to-face with someone they first met online, is comparable to the 2005 figures reported by Livingstone, Bober, and Helsper (2005). Despite the clear investment in awareness campaigns – as exemplified above – targeting

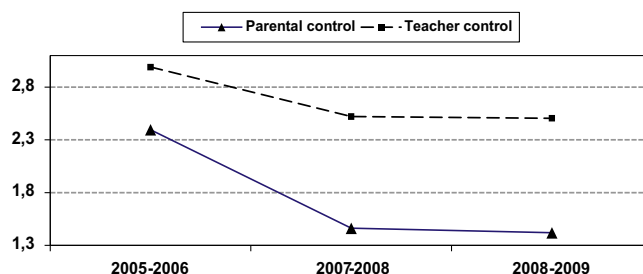


Fig. 4. Minimal changes in the level of parental and teacher control.

young children, parents, and schools, we have to conclude that Internet content and contact risk behavior have hardly decreased. This seems to be an international trend (Mascheroni, Ponte, Garmendia, Garitaonandia, & Murru, 2010). In our study, we hardly find a negative trend, since we do not observe a significant and relevant decrease in unsafe Internet usage. This finding is in line with observations related to the emerging Web 2.0 applications that are highly popular among young children (see Taraszow, Aristodemou, Shitta, Laouris, & Arsoy, 2010). Mitchell, Wolak & Finkelhor (2007) warned about this in their cross-sectional study comparing data from 2000 to 2005. Though they could conclude that – in 2005 – there was a decline in unsafe Internet usage (sexual solicitation, harassment, and unwanted exposure to pornography), they called for caution due to the new technical possibilities (online pictures, online video, chat, and aggressive pornography marketing). Taraszow et al. (2010) explicitly point at the fact that awareness campaigns remain critical, targeting both the children and their guardians. Parents, teachers, and other guardians have to become conscious of the fact that (1) young children have to be made aware – again and again – of the risks of Internet usage; (2) that each new group of Internet users has to be paid attention to. The latter does not only result from the permanent growing group of Internet users and the fact that continuously new Internet users get online, but we also have to be aware of the fact that the nature of the Internet changes. The growth in social network tools and applications (Web 2.0) that invite users to exchange e.g., private information, pictures, has resulted in a whole new setting that has to be considered when setting up safe Internet initiatives. Awareness campaigns should focus on these new types of risks. A typical example is the increased usage of – integrated web cameras. This focus on Web 2.0 Internet usage is in line with the ideas of Livingstone and Brake (2009). They point at the opportunities of these social networking sites. They offer – from a developmental psychology perspective – valuable “opportunities for the representation of the self, for learning, for construction a wide circle of relationships, and the management of privacy and intimacy” (p. 75). But they also stress the risks and refer to children-at-risk in this area and that a “children’s rights” framework should be developed, starting from a clear evidence-based policy base. In the context of the Web 2.0 applications, available research confirms the risks of the new interactive features presented by e.g., webcams (see Atkinson & Newton, 2010; Mumtaz, 2001).

Turning to the third research question about school and parent supervision, we may conclude that both parental and teacher control did not increase during recent years and that supervision is not (yet) an important predictor of (un)safe Internet usage. On the contrary, despite all the awareness campaigns, we observed no increase in reported control over the years. The critical status of parental supervision and parent control is regularly reported in the literature (see Çankaya & Odabaşı, 2009). In addition, Wang, Bianchi, and Raley (2005) stress that children report a lower level of parental supervision than their parents do. The authors stress that parents and their children might differ in their sensitivity to parental supervision and that this can become a barrier to enforcement of Internet monitoring. This calls for more research focusing on the responses of youngsters on Internet regulation (see also Livingstone & Haddon, 2008).

The former has to be linked to the expected outcomes of school or parental supervision, as focused upon in the fourth research question. Our results point at the limited to no impact of parental supervision and teacher supervision. These results are in line with findings of Liau, Khoo, and Hwaang (2005) who had to conclude that supervision approaches incorporating sitting with or checking on the child while being online, the use of filters, and control of the sites did not result in a decrease in the risk of attending a face-to-face meeting with people they met online. In this context, a number of studies focus on Internet parenting styles that point at the importance of setting clear rules (control), which is most effective when combined with a sufficient level of parental warmth (parents are also engaged in using the Internet, participate, discuss with their children). This so-called “authoritative” parenting style, was found – in a comparable geographical context – to result in lower levels of Internet usage in children (Valcke, Bonte, De Wever, & Rots, 2010). This is confirmed in the study of Livingstone, Bober, and Helsper (2005) when we focus on 9–11 year olds. Also, in an Australian study, Fleming, Greentree, Cocotti-Muller, Elias, and Morrison (2006) found that parents discussing Internet safety, made teenagers more Internet safety conscious.

But – as already stated above – we have to consider the interpretation of parental mediation in Internet usage. In their study, involving 10 and 11 year olds, Tabone and Messina (2010) found that teens do not perceive parental presence in their online practices. This confirms the earlier findings of Livingstone (2007). Parental regulation interpretation seems to depend on the types of Internet usage. Therefore, the study of Eynon and Malmberg (2011) presents an innovative perspective. It resulted in a typology of young ‘people’s Internet usage and linked these types to a number of predictors; parental regulation being one of them. In “peripherals” (least frequent Internet users) parental control seems to have the strongest impact. In “normative users” (communicating, entertaining and information seeking), the researchers report the lowest level of parental regulation. The “all-round users” (all types of Internet usage) and “active participators” (all-round users, but with a stronger emphasis on social Internet usage) report a larger level of parental control as compared to the “normative group”. The relationship between types of Internet usage and the impact of parental supervision appears frequently in the literature. Steeves and Webster (2008) report – in a study focusing on 13–17 year old Canadians – that a family installing a privacy policy framework, results in a reduction of privacy risks on the Internet. But, these authors also stress – as mentioned earlier – that the level of integration of the Internet in the social lives of teenagers, might interact with the impact of parental supervision. They found that in teenagers who engage very intensively in the social usage of the Internet, parental supervision is less adequate to reduce the Internet privacy-risks.

The study of Livingstone (2007) – already mentioned above – is interesting in this context, since it points at the slow-to-change relations between parents and children that shape patterns of domestic regulation and use” (p. 920). New technologies challenge both the relationships and the pace at which regulations have to be developed. This introduces at the same time a new dimension in relation to the impact of parental supervision on safe Internet usage. Lou et al. (2010) studied the relationship between Internet literacy of parents and their parenting styles. Lower literacy levels seem to result in a stronger parental supervision. In contrast, the parents reporting a high Internet literacy level seem to trust their children and hardly regulate Internet usage.

The former discussion clearly shows – as was already concluded by Livingstone, Bober, and Helsper in 2005 – that there is no simple direct relationship between parental supervision and the (un)safe Internet usage by their children.

9. Limitations, directions for future research and conclusions

First of all, it has to be stressed that this study is cross-sectional in nature. As a result, different cohorts have been studied and the impact of consecutive years of Internet usage, control by parents and/or teachers cannot be studied.

Secondly, the research design builds on self-reported measures. Enriching a survey-based study by means of data triangulation (for example data from both children and parents/guardians) or data derived from real life observation studies, can help to develop a fuller and

richer picture of (un)safe Internet usage. The age level of respondents is in this context critical. Reading level of respondents can affect the nature of their responses to surveys.

The UIUI index, calculated in the present study, brings together indicators of unsafe Internet use that can be considered to differ in their importance. Though contact risks already have a larger weight in the UIUI index, future research should focus on developing a UIUI index that balances the different types of risk.

Next, considering the fact that Internet applications have evolved since the first cycle of this study, new questions, risks, and problems have to be incorporated in the study: e.g., building on Web 2.0 applications, video usage, new types of immersive gaming, or the growth in online betting. A new research cycle becomes necessary that covers these new Internet features. In addition, new Internet safety measures and initiatives that target parents and/or teachers have to be incorporated. Examples of the latter can be found in Paus-Hasebrink, Wijnen, and Jadin (2010) who use Web 2.0 applications in an integrated way in Australian primary schools to develop both Internet skills and raise the awareness about Internet risks. Other inspiring examples also build on the potential of the Internet and present computer games to develop awareness and security skills (see Cone, Irvine, Thompson, & Nguyen, 2007).

Further, we will have to shift attention to the younger age groups. More and more computer and Internet applications target young to very young children that can interact with the online application via alternative input devices (touch screen, touch pads, and large computer mice). This will also challenge the design of research instruments.

Lastly, in the present study, we focused on the Internet risks, safety measures, and experiences as reported by children themselves. This is a too narrow vision. A holistic approach should be adopted embracing children, parents, and the schools. Livingstone (2001) puts this as follows: “A coordinated response across school, community and home is essential for a constructive, safe and fair use of the Internet by children” (p.17). Also the research of Gasser et al. (2010) stresses the contextualized nature of the discussion about digital safety of youngsters.

To conclude, we restate the critical nature of Internet safety measures. The results of the present study point at the lasting need for taking accompanying measures when introducing children to computers and the Internet. These measures have to be continuous and have to focus on new users, keep targeting the current users, and have to consider the changing faces of the Internet.

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