Investigating Risks and Opportunities for Children in a Digital World:

A rapid review of the evidence on children's internet use and outcomes

Mariya Stoilova, Sonia Livingstone and Rana Khazbak

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INVESTIGATING RISKS AND OPPORTUNITIES FOR CHILDREN IN A DIGITAL WORLD: A RAPID REVIEW OF THE EVIDENCE ON CHILDREN'S INTERNET USE AND OUTCOMES

Mariya Stoilova, Sonia Livingstone and Rana Khazbak

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EXECUTIVE SUMMARY

Children's lives are increasingly mediated by digital technologies, yet our knowledge of how this affects their well-being is far from comprehensive. We know, for example, that the online environment exposes children to new ideas and more diverse sources of information. The use of digital technologies can expand their opportunities, reduce inequalities and contribute to the realization of children's rights. We also know that when children seek information online and want to learn, they risk being exposed to inappropriate or potentially harmful content. Yet, when it comes to determining the long-term effects of internet use and online experiences on children's well-being, mental health or resilience, the best we can do is make an educated guess.

This is just one evidence gap among many that need to be filled in order that society can support children's positive use of digital technologies, develop children's skills and protect those who are vulnerable. Filling these gaps would benefit children. Their education, relationships, entertainment, and participation in a connected world increasingly depend on digital technologies. Filling these gaps would also help to guide policy and programme responses and maximize the potential of technological advancements. Our need for this knowledge has become even more acute as internet use rises during the global COVID-19 pandemic.

This report identifies, evaluates and synthesizes what has been learned from the most recent research about children's experiences and outcomes relating to the internet and digital technologies. It aims to inform policymakers, educators, child protection specialists, industry and parents on the latest and best evidence, and it proposes a future research agenda.

The conceptual framework for the report is based on the well-established models of children's internet use that underpin research by three international projects: EU Kids Online,[1] Global Kids Online[2] and Disrupting Harm.[3] We add to this in two ways. First, we pay particular attention to research on children's sexual experiences and related risks online. We do this because of the growing concern about the potential for harm online and because it reflects the priorities of the UNICEF Office of Research — Innocenti, which funded this research as part of the Disrupting Harm project. Second, we examine research on children's privacy in the digital environment, because of its importance to children's online opportunities, risks and rights.

The methodology is a rapid evidence review of two of the largest databases of peer-reviewed outputs in science, technology, medicine, social sciences, and the arts and humanities: Web of Science and Scopus. We searched for all empirical studies concerned with digital technology and children published since 2016. We then screened the 2,090 search results for relevance and methodological robustness. The resulting 359 studies were coded using a version of the Global Kids Online framework. We grouped our findings under seven research themes: (1) access; (2) activities and opportunities; (3) digital skills; (4) privacy online; (5) risk of harm online; (6) sexual activities and risks online; and (7) mental health and well-being.

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1   (Livingstone et al., 2018; Livingstone, 2016)

2   (Byrne et al., 2016; Global Kids Online, 2019)

3   A multinational research project on technology-facilitated child sexual exploitation and abuse, implemented in partnership by UNICEF Office of Research – Innocenti, ECPAT International and the International Criminal Police Organization (INTERPOL).

Four overarching questions guided our review and helped us to identify the key evidence gaps:

■ What is the most recent evidence on how children's internet use contributes positively to child outcomes and well-being?

■ What is the most recent evidence on how children's internet use can amplify the risk of harm and potentially undermine their well-being?

■ How can we identify the pathways to harm and vulnerability, and the protective factors that help to build resilience in children?

■ What are the remaining research gaps?

Below, we summarize the findings in relation to these questions.

What do we know about how children's internet use can contribute positively to child outcomes and well-being?

Children around the world primarily use mobile devices to access the internet for information and entertainment, to connect with their friends and to engage with their community. Increased internet and device uptake by society diminishes the gaps in internet access experienced by different groups of children. In low-access contexts, children lead the way in the adoption of new technologies and are online more than adults.

Some children experience the benefits more strongly than others. Children from global South countries and poorer backgrounds face significant inequalities in relation to access to devices and the internet, the quality and cost of connectivity, and the availability of competent support from those around them. Such inequalities create a domino effect in other areas, resulting in cross-country inequalities in online activities and digital skills.

The online environment exposes children to new ideas and more diverse sources of information. This helps children to engage with others and become aware of different views. The internet is also an important source of physical and mental health knowledge for children. They value that it offers anonymity, access to reliable information, peer experiences and support-seeking options.

The internet can have a positive effect on mental health and well-being. Children who receive mental health support online or who can talk about their problems with friends online have improved outcomes.

What happens to children offline affects their experiences and outcomes online. Their age, gender, home context and relationships with family, peers and school are all important factors. So too are such factors as the safety of their neighbourhood or whether they are overweight, engage in substance abuse, take sexual risks or are a survivor of violence or sexual abuse.

How can children's internet use amplify the risk of harm and potentially undermine their well-being?

What children do online is much more important for their outcomes than how much time they spend online. The more children use the internet, the more skills they develop and the more activities they can undertake. But as they engage in a wider range of online activities, children are also more likely to

encounter risks. However, greater exposure to risk does not necessarily translate into more harm. Children can be exposed to inappropriate or potentially harmful content when they are seeking information online. For example, some children view sexual content online to learn about sex, but this content can expose them to sexually violent behaviours or gender-based sexual objectification. Exposure to online risks may result in harm to the child. Some studies show a positive association between internet use, risk encounters and negative outcomes. These outcomes include anxiety, depression, suicidal thoughts and panic disorder.

Many studies show that cyber-bullying victimization is associated with lower psychological well-being and externalizing behaviours such as feeling angry or 'acting out'. More children are bystanders of cyber-bullying than they are bullies or victims. This experience can have an adverse effect on children's well-being over time. 'Cyber-bystanders' display higher moral disengagement and lower feelings of responsibility than those who witness bullying in person at school.

What do we know about the pathways to harm and vulnerability?

Children who are vulnerable offline are also more likely to be vulnerable online, while protective offline factors can also reduce exposure to online risks. Offline factors that create vulnerability or protection influence how children engage with the online environment. Vulnerable children, or those living with offline risks or disadvantage, are more exposed to online risks and, in turn, find themselves more likely to experience harm and less able to find support.

Children's overall well-being seems to affect how they engage with the internet. For example, a lower level of happiness and life satisfaction is found to be associated with exposure to negative online content, cyber-hate, discrimination and violent extremism, but we do not know enough about why this is the case. Children who experience violence, neglect, physical punishment, psychological victimization, parental conflict, sexual harassment and offline solicitation are more likely to also be exposed to sexual solicitation online, but again it is unclear exactly how or why this happens.

Some children are more vulnerable than others, but who is vulnerable varies based on the type of online risk. For example, older teenagers, LGBTQI[4] children and those from lower socio-economic backgrounds are more likely to engage in 'sexting' behaviour and be victims of 'sextortion'.[5] Girls are more likely to be victims of online sexual solicitation coercive sexting, and cyber-dating violence. They are also more likely to receive and be asked for sexts from strangers, and to have negative sexting experiences, and are more negatively affected by cyber-dating violence.

Children who experience one kind of online risk are also more likely to experience others. For example, online sexual solicitation is associated with exposure to online pornography, posting personal information or pictures online, having contact with unknown people on social media, voluntary sexting, and video chatting with strangers. Cyber-bullying victimization and perpetration is associated with children's greater exposure to negative online content and to cyber-dating violence.

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4   Lesbian, gay, bisexual, transgender, queer and intersex.

5   In our search of the recent literature we found no studies of the experiences of children with special educational needs or disabilities, though there are reports documenting their greater exposure to online risks.

There is a connection between offending and victimization. For example, both the victims and perpetrators of cyber-bullying tend to report weaker offline social ties and support from friends and family, higher rates of loneliness, being less liked at school, and lower psychological well-being. Perpetrators of cyber-bullying and sextortion are also more likely to be victims. Online and offline perpetration and victimization are also highly correlated. This suggests that when children become the target of hurtful behaviour, some respond in the same way, creating a snowball effect of risky conduct.

What do we know about protective factors?

There is limited evidence on what can protect children from negative online experiences and harm. Some exploratory studies suggest that social support and children's positive relationships with the people around them can act as protective factors. Children who lack such social resources face a double disadvantage: they are more likely to experience online risks and are less likely to seek help.

Protective factors may differ based on the type of online risk, though existing evidence addresses only a few risks. For example, a positive relationship with parents, parental monitoring of children's activities, teacher care, enforced school rules, higher self-efficacy, self-confidence and resilience are all protective factors for cyber-bullying. For cyber-dating violence, parental monitoring and emotional bonding can be protective factors.

Encouragement and support from parents, teachers and peers can help children to become more confident internet users. This is especially true for younger children. Parents can reduce risks by imposing restrictions such as limiting the time children spend online. But this can impede children's skills and hinder opportunities.

Children who are concerned about their privacy and aware of online risks are more engaged in safety strategies. Privacy discussions with parents and teachers positively affect children's privacy behaviours.

Protecting children online is more efficient when combined with supportive parenting more generally (i.e., offline). For example, emerging evidence on cyber-bullying shows that children's overall relationships with their parents and general offline monitoring of their day-to-day activities reduces children's risk of cyber-bullying – more so than monitoring their online activities specifically.

What research gaps do we need to fill?

- Robust, high-quality and comparable research is still necessary. In many areas, knowledge remains tentative. The large majority of studies we found are based on small or non-representative samples, involve correlational analyses of cross-sectional data and control for a limited number of background variables. While such studies offer some insights, their limitations make it difficult to establish whether the effects observed are due to digital technology use or other factors from the child's wider life environment.

- We need a better representation of the diversity of children's circumstances. At present, most research examines the experiences of older children and those from the global North. Evidence regarding the pre-teenage years and from global South countries is sparse. Filling these gaps will enhance our understanding of the pathways to harm and vulnerability, and the protective factors that help to build resilience.

- We still need to learn more about the positive effects of children's internet use. Only one fifth (79 out of 359) of the studies identified by the search explore opportunities and benefits of internet use. In contrast, children's encounters with certain online risks – particularly excessive internet use, cyber-bullying, gambling and problematic gaming – feature heavily in the research literature.

- Many studies examine the effects of the time children spend using the internet, without including variables related to the perceived quality or context of their internet use, for example, negative experiences related to online victimization or cyber-bullying. The focus on time spent above quality or context of use is a serious limitation, which constrains our understanding of which activities and risks are more likely to influence children's outcomes.

- There are significant cross-country differences in children's exposure to opportunities and risks. We need to draw on conceptually and theoretically sound models of children's internet use to develop a better understanding of what factors determine such differences and for which groups of children. To do so, we also need more consistent definitions and measures of those factors to enable comparative research. This has been a key objective of research conducted by the EU Kids Online and Global Kids Online research networks.

- More evidence is needed on the outcomes of children's internet use. While studies may link children's online experiences to risk and protective (predictive) factors in their life circumstances, they rarely follow up on the consequences of children's internet use over time, to document either benefits or harms. The evidence is particularly scarce in relation to long-term outcomes such as well-being, mental health and resilience, which require longitudinal research. To develop the longitudinal evidence base in this field, long-term investment and commitment to explore the outcomes of children's internet use is needed.

- We still lack an understanding of how the different research themes covered in this report are linked, for example, children's online risks and opportunities and the factors that influence both. Although Global Kids Online and other projects have proposed models to explore these relations, and generated hypotheses about how these shape children's well-being in an increasingly digital world, few recently published studies have tested these models.[6]

- We need a better understanding of children's digital ecology. There needs to be some exploration of the nature of digital devices, and online platforms and their policies, applications, services and networks to understand how these may facilitate or protect against online risk and harm.

- The pathways between children's online and offline vulnerability, exposure to both offline and online risks, and children's responses to risk remain underexplored. Investigating these pathways would entail developing a model of mechanisms mapping the digital ecology, perpetrators' behaviours, children's digital skills and online activities, and children's background and living environment (home, school, community) with the occurrence of different types of risk and harm online. This is a main purpose of the Disrupting Harm project.

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6   We have begun this process in our recent 11-country comparative report, comparing Global Kids Online findings for cross-national similarities and differences (see: Global Kids Online comparative report). See also Setting the agenda for future research and analysis (Stoilova et al., 2020) and the projects CO:RE – Children Online: Research and Evidence and Youth Skills (ySKILLS).

- There is an urgent need for child-centred research methods to complement the recent evidence.[7] We still do not understand enough about how children see these issues. We need research on cultures of childhood, as they are experienced by children, and how these cultures change (or not) due to the online environment. For example, are there online sexual activities that may be tolerated or even encouraged because they have positive impacts on children's evolving identities, even though they may involve a level of risk? If so, how much risk is acceptable, and how do children themselves view and mitigate such risks? Above all, researchers should conduct more studies that allow children to talk about online experiences in their own words.

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7   For more on child-centred research, see: Third et al. (2017, 2020).

1. INTRODUCTION

An estimated one in three internet users globally is a child. This number is likely to be even higher in the global South.[8] Access to digital technology can help children to develop the skills and literacies they need to learn and prepare for life in an increasingly digital society. It can give them access to health or education services or information on topics that are important for young people but may be taboo in their societies. Yet internet access may also compound risks to children that, unless managed, could undermine their well-being. Most importantly, engagement with technologies is increasingly a means of realizing children's rights, as set out in the United Nations Convention on the Rights of the Child. Use of digital technology is a key driver of change and partly underpins the realization of the Sustainable Development Goals.[9]

To develop appropriate policy and programme responses, stakeholders need robust evidence on how children use the internet. They need evidence on whether children can make use of the many opportunities it offers. They also need to identify which risks of harm children may face online. Such evidence can significantly contribute to the development of policies and programmes that support children and their parents, teachers, law enforcement officers and others who bear responsibilities for the protection of children. It can also help the private sector to protect child rights and make decisions informed by the best interests of the child.

There have been numerous efforts to improve the global evidence base and support advocacy, policy development and programming in this area. Two such research efforts are particularly important to this review because they generate an international comparative evidence base of cross-sectional, nationally representative research with children and parents.

The first is Global Kids Online, which was initiated in 2015 by the UNICEF Office of Research – Innocenti, the London School of Economics and Political Science, and the EU Kids Online network. The project, conducted in collaboration with country partners around the world, uses a research framework that seeks to assess the balance between online opportunities and risks of harm for children's well-being. The framework takes into account how interactions between offline and online factors may make a difference to children's experiences and outcomes.[10] It facilitates North-South and South-South collaboration and builds the capacity of national research institutions to increase sustainability in evidence generation. Since 2016, directly comparable survey research has been fielded in 18 countries, covering more than 25,000 children and 12,000 parents.[11] In 2019, the EU Kids Online network expanded upon the Global Kids Online methodology and fielded comparable survey research in an additional 20 countries. We use the Global Kids Online research framework as a point of reference.[12]

The second research effort is Disrupting Harm, a project established in 2019 by the Global Partnership to End Violence Against Children and implemented by the UNICEF Office of Research – Innocenti; the International Criminal Police Organization (INTERPOL), which facilitates global police cooperation; and ECPAT International, a global network working to end the sexual exploitation of children. Disrupting

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8   (Livingstone et al., 2015)

9   (Livingstone, 2014)

10   (Livingstone, 2016)

11   (Byrne et al., 2016; Livingstone and Stoilova, 2019)

12   (Livingstone, 2016)

Harm explores in depth children's experiences of online violence and sexual exploitation and abuse in 14 countries in Eastern and Southern Africa and Southeast Asia.

This evidence review supports these research efforts by contributing to the development of the Disrupting Harm survey methodology, as implemented by UNICEF. It also responds to the broader need for evidence on the positive and negative effects of internet use on children's well-being. It assesses recent advances in the understanding and measurement of children's online experiences, identifies recent developments in the field, and highlights pressing research gaps and limitations.[13] In light of growing concerns about the potential for harm to children in the digital environment, we pay particular attention to research on children's online privacy and the risk of online violence and sexual exploitation and abuse.

Our research was guided by the following questions:

■ What is the most recent evidence on how children's internet use contributes positively to child outcomes and well-being?

■ What is the most recent evidence on how children's internet use can amplify the risk of harm and potentially undermine their well-being?

■ How can we identify the pathways to harm and vulnerability, and the protective factors that help to build resilience in children?

■ What are the remaining research gaps?

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13 For a review of the earlier research literature, see: Kardefelt-Winther (2017) and Radford, Allnock and Hynes (2015).

2. METHODOLOGY

2.1. Evidence review methodology

A rapid evidence review method was used for this report. This rapid review used systematic methods to search for and critically appraise published research.[14] Rapid evidence reviews are rigorous and explicit in their methodological approach, and thus systematic, but make concessions to the breadth or depth of the process (for example, by limiting the amount of grey literature, extracting only key variables and performing a simpler quality appraisal). This report groups the rapid review findings around key aspects of children's internet use, and identifies future research needed to address evidence gaps.

We conducted keyword searches of the title, abstract and text of studies in the Web of Science and Scopus databases. We blended several groups of keywords: technology-based, child-based, method-based and violence-based (*see Appendix*). This yielded 2,090 search results, which were screened initially by title and abstract only and then by the full text. Details of the search protocol are discussed in the Appendix. The screening was based on whether the studies met the following predefined inclusion criteria:

- publication based on primary survey research with children (under 18 years) or review article offering a summary of recent high-quality studies

- from any country but published in English

- published since 2016 to account for advances in technology and how children use the internet

- deriving from research that was of a high quality, methodologically robust and preferably published in a peer-reviewed journal

The requirement for a high-quality methodology was applied differently across the research themes. For themes where we found little research (such as activities and opportunities in relation to civic participation, learning and socializing), the criteria were more inclusive and some exploratory studies are discussed. In such cases, we treat the findings as indicative, offering an insight into where more robust research could be productive. For themes where more research is available (notably risk of harm online in relation to cyber-bullying), we focus on studies with more robust methodologies and representative survey samples.

After applying the inclusion criteria, the resulting of 359 studies – the final sample – were coded and summarized for the review.

2.2. Analysis

We developed a code for each of the key research themes, using a top-down coding framework based on well-established models of children's internet use.[15] The final search results were allocated to the relevant themes, allowing for one article to receive multiple codes. New codes were formulated to facilitate the development of a more comprehensive review of online violence and sexual exploitation and abuse. Each study was analysed for its findings, methods and measures, and suggestions for further research.

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14   (Grant and Booth, 2009)

15   (Livingstone et al., 2018; Livingstone, 2016; Byrne et al., 2016; UNICEF, 2019b)

Table 1. Coding the studies

Theme	Description of the content included	Number of coded studies relevant to each theme
Access	How children access the internet (devices, places of access, time spent online, barriers to access, Internet of Things)	15
Activities and opportunities	Activities that can create opportunities (socializing, entertainment, learning, digital health, civic participation and digital citizenship)	44
Digital skills	Digital skills, literacies and competencies (operational, informational or browsing, social, creative, related to mobile devices)	7
Privacy online	Awareness, knowledge, strategies and skills related to privacy online and information disclosure	13
Risk of harm online	Online risk exposure (14 studies) Seeing user-generated negative content (e.g., self-harm, suicide, pro-anorexic, violence) (7) Excessive internet use, online gambling, excessive gaming (141, excluded from the analysis)[16] Hurtful and bullying behaviour (cyber-bullying, cyber-bystanders) (81) Cyber-hate, discrimination and violent extremism (3)	246
Sexual activities and risks online[17]	Receiving or sending sexual messages and other peer-to-peer online sexual activities ('sexting', 'cyber-sex') (30) Viewing sexual content online (pornography) (18) Sexual exploitation and abuse (online sexual solicitation, 'sextortion', sexual violence, child sexual abuse materials) (22)	70
Mental health and well-being	Positive and negative outcomes affecting children's mental health and well-being	34
Total number of coded studies (some studies were coded in more than one theme)		**359**

2.3. Limitations

Limitations of the rapid evidence review

This evidence review updates previous reviews of the evidence on children's internet use,[18] and cross-country comparisons by the Global Kids Online network.[19] It includes only the most recent studies (published since 2016) across a range of research themes. As a result, valuable earlier studies were omitted and should be considered separately for a full, in-depth review. Our purpose was to discover new developments and the themes studied most recently, how they have been researched (methods and gaps) and what the newest evidence suggests. We did not expand the search with additional

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16   These studies were coded but then excluded from the analysis as this area has already been extensively covered elsewhere. A full review would be required to account for existing methodological shortcomings and limitations inherent to this sub-field, which was beyond the scope of this assignment. For a recent review and discussion paper by UNICEF covering excessive internet use and gaming, see: Kardefelt-Winther (2017); UNICEF (2019a).

17   We explore sexual activities separately from risks of harm online, partly to provide a more specific focus on risks related to sexual activities, but also to suggest that not all of children's sexual activities are risky; some may be part of children's sexual exploration and identity.

18   (Livingstone and Bulger, 2014)

19   (Byrne et al., 2016; UNICEF, 2019b)

keywords specific to each theme, such as access- or skills-related words, because each theme-specific search could constitute a separate evidence review. Restricting the search to the English language and to databases mainly oriented to the global North limited the evidence found from non-English-speaking countries and the global South.

Limitations of the available research literature

We found a substantial imbalance across the reviewed research themes of children's internet use (*see Figure 1*). While some areas, such as addiction, gambling and problematic gaming, receive considerable attention, others remain comparatively under-researched. We excluded the body of literature concerned with hypothesized addiction to the internet, gambling and excessive gaming, partly because these areas have been covered elsewhere, but also because of methodological shortcomings that make it difficult to interpret these results reliably. A reliable interpretation would require a tailored review to query specific methodological issues, which was beyond the scope of this assignment.[20] Generally, we found more literature on children's encounters with online risks than on their positive experiences, activities and skills. This suggests a need for a better balance in research on children's internet use. Another imbalance relates to the type of research participant. Studies most often sample older teenagers, while research on children under 12 years of age is generally missing from the evidence base. Some studies conflate children with young adults.

The studies we reviewed vary significantly in the definitions and the measures used for ostensibly the same construct, for example, cyber-bullying. This makes comparability across studies difficult. The large majority of studies are based on small or non-representative samples that make it difficult to generalize from the findings. Where such studies are included in the review, the findings should be considered with caution. They are exploratory in nature and highlight possible areas for further research. Many studies conduct correlational analyses of cross-sectional data. This means that they cannot establish what is cause and effect or determine long-term consequences. This makes the task of establishing a pathway to harm and vulnerability, or protective factors for resilience particularly difficult. The analysis cannot determine whether an effect, for instance, a high level of harm, is the cause or the consequence of a child using digital technology. We draw insights, where available, from the small number of longitudinal studies found in the review. More longitudinal research, or research that deploys research designs that support causal inferences, is needed to reach conclusions about the effect of children's internet use on their well-being in the long term.

Also problematic is that, in their statistical analyses, most studies control for a limited number of background variables. These tend to prioritize children's psychological characteristics or their internet use. They only rarely examine the role of factors relating to the child's life situation, home environment or parental mediation. A broad consideration of neighbourhood or community effects, country-level indicators, poverty and inequalities is often missing. As discussed in a 2017 UNICEF review, this makes it difficult to establish whether the effects observed are due to digital technology use or other factors from the child's wider environment.[21]

Bearing the above in mind, we begin the discussion of each research theme with a brief note to explain the definitions and research methods typically used. We note the limitations of the research, highlight the key findings and draw out suggestions for further research.

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20   For an overview of this literature, see: Kardefelt-Winther (2017: 21).
21   (Kardefelt-Winther, 2017)

3. ACCESS

Access refers to how children log on to the internet. It includes what devices they use to go online and the places of access, such as home, school, a friend's house or an internet café. It also includes how much time children spend online, and whether they can go online when they need or want to, or experience some barriers in terms of permission, cost or connectivity.

We reviewed 15 studies on this theme. They are diverse in relation to their geographical location as well as the areas they address. The locations were Chile, Malaysia, the Russian Federation, Singapore, Spain, Switzerland and the United States of America. A comparative study looked at Belgium, Denmark, Ireland, Italy, Portugal, Romania and the United Kingdom of Great Britain and Northern Ireland. The areas covered included the connections between access and learning outcomes, reading habits, and online activities and opportunities, and the links between access and digital skills. A few studies examine the impact of inequalities on internet access. Most of these reports provide only descriptive statistics derived from samples that are small or close at hand, and sometimes both. While it is unsuitable to use these limited studies for cross-country comparisons of prevalence, they broadly support the trends identified by the larger, representative surveys reviewed.

Key findings

■ Regardless of the country or context, children tend to mainly use mobile phones to go online.

■ There are important differences in access between countries based on the level of internet and device uptake. Countries with lower levels of uptake tend to have more access inequalities. Children from poorer backgrounds face more barriers to going online.

■ Countries with high internet and device penetration see narrowing gaps in relation to access. Here, disparities relate more to the quality and cost of connectivity, which affects what children do when they are online.

■ There are important differences in access relating to the age of first access and the number of devices used. Children from wealthier backgrounds and country contexts tend to go online from a younger age and have access to a larger number of internet-connected devices.

■ Access inequalities also relate to the availability of competent support and mediation, especially when children are younger.

■ In contexts with lower internet penetration, children tend to lead the way and be online more than the adults around them. This raises important questions about parental support and mediation.

A few high-quality studies examine access inequalities among children. In their 2016 study,[22] Mascheroni and Ólafsson use data collected through the Net Children Go Mobile survey of approximately 3,500 respondents aged 9–16 years across seven European countries (Belgium, Denmark, Ireland, Italy, Portugal, Romania and the United Kingdom). They conclude that a combination of social inequalities and differences in access to digital technologies results in disparities in online activities. In these countries, the probability of children owning a smartphone increases by 58 per cent on average for each year they grow older (from the age of 9 years), though the exact figure varies by

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22 (Mascheroni and Ólafsson, 2016)

country. Boys and girls get their first smartphone at a similar age. While in these countries socio-economic status is not related to smartphone ownership, children who start to use the internet later than average are less likely to own a smartphone, as are children whose parents do not use a smartphone to go online.

A longitudinal study in Switzerland of 1,083 students aged 10–15 years and 914 parents also shows that a family's socio-economic status on its own predicts neither children's internet access nor the availability of digital devices, when controlling for children's academic performance.[23] This may be due to a number of factors such as devices being relatively inexpensive, affluent parents trying to limit their children's access to devices, or parents with a lower socio-economic status trying to 'catch up' and buy devices for their children to avoid social exclusion. A family's socio-economic status is, however, associated with how children use the internet. In this study from Switzerland, children from lower socio-economic backgrounds tended to use the internet more often as a form of communication and entertainment and less often for educational purposes. Children who had access to a larger number of digital devices also tended to use the internet more often for entertainment and socializing, but this was not related to socio-economic status.

Children's smartphone ownership depends partly on how their family uses mobile devices. It also depends on where the country stands on smartphone adoption – in terms of the availability and cost of devices and data as well as the mainstream culture of adoption. Age creates important differences. Younger children are less likely to use a smartphone to go online daily and are less likely to have an internet plan on their phone. The availability and cost of connectivity also matter, as do parental decisions to limit children's unsupervised internet use, especially at a younger age. Some access inequalities can create further divides in relation to how children use the internet. If children start to use the internet at an older age or do not use a mobile phone daily, they tend to engage in fewer online activities. Research from Global Kids Online suggests that engaging in fewer online activities can have a detrimental effect on the development of digital skills.[24] While this effect decreases with age, it remains significant even for older children.[25]

Several studies with samples too small or unrepresentative to generalize from the findings offer interesting, though only indicative, insights into children's internet access. For example, a survey of children aged 16–18 years living in Moscow shows that even when children are not allowed to use mobile devices at school, many still do. The lack of integration of digital technologies into the educational process may, however, affect the type of activities they do online. Instead of using mobile phones to learn and look for information, children may focus on entertainment and socializing.[26]

A United States-based study researching the internet access of 181 runaways or homeless children and youth shows that children and youth who are better educated or employed are more likely to own a mobile phone. Digital devices are an important source of connection for homeless children, including staying in touch with family members, who in some cases pay the phone bills.[27]

Finally, a survey of 251 parents and 381 children in Chile showed that children use different strategies

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23   (Camerini et al., 2018)

24   (UNICEF, 2019b)

25   (Mascheroni and Ólafsson, 2016)

26   (Koroleva, 2016)

27   (Harpin et al., 2016)

to influence their parents' adoption of new technologies. Whether children are successful depends on various factors, including the type of device they want. Success also depends on whether they use argumentative strategies (taking into account their family's or parents' perspectives by reasoning or bargaining) or non-argumentative strategies (begging, demanding or whining) to influence technology adoption.[28]

Limitations and suggestions for further research

- Most studies offer a narrow understanding of access to the internet. It is most often researched in relation to being able to go online and having a digital device available. Other important factors that can create access inequalities are rarely explored, including cultural factors and parental attitudes. In some contexts, cultural factors may even create additional inequalities, for example, in relation to gender, which should be explored further, especially among non-internet-using children.[29]

- More research is needed on the effects on access of the quality, cost and availability of connectivity. Impacts of parental mediation strategies that encourage or discourage children to go online need to be better understood, together with the effects of the availability of devices in different settings, including at school.

- We need to better understand how access inequalities create further divisions in terms of the range and complexity of online activities that children engage in, and the extent to which these differences become long-term effects.

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28   (Correa, 2016)

29   For gender inequalities in low- and middle-income countries, see: Banaji et al. (2018).

4. ACTIVITIES AND OPPORTUNITIES

4.1. Activities and opportunities in general

Children engage in a broad range of activities online. These include learning, community and civic participation, creativity, engagement in social relationships, and online communication. These activities may result in tangible benefits to children. Sexting and watching pornography may be experienced as opportunities by some children and as risks by others. These activities are discussed later in the report.

The review includes 33 studies of online opportunities for children. An additional six studies examine digital health. Five explore digital citizenship. These were reviewed separately to gain additional insights. The main 33 studies on activities and opportunities focus mostly on Europe and North America. Some also cover Australia, China, Malaysia, the Russian Federation, the Republic of Korea, Singapore and the United Arab Emirates. The studies mainly use survey methods but some use mixed methods, focus groups or interviews. The quantitative research comprises a panel study[30] and a few school-based surveys with stratified sampling.[31] But the majority of surveys use small, convenience or self-selected samples. Some studies control for only a limited number of variables. A few samples include young adults, aged 18 years and above.

Key findings

■ The online activities in which children engage depend on their gender, country context, socio-economic status, smartphone ownership and age.

■ What children do online is much more important for their outcomes than how much time they spend online.

■ Platforms can be used for different purposes and result in different benefits for children. For example, social media are mainly used for communication and socializing but can offer learning opportunities for those children who seek such benefits.

■ How children engage with the internet depends on a range of factors, including their needs, preferences and abilities.

■ Information-seeking activities are particularly valuable to children dealing with sensitive issues such as sexuality and health. Receiving support can be helpful for children dealing with hardship.

The Net Children Go Mobile survey shows that girls are more likely to use the internet for schoolwork and social networking than boys. It was conducted in seven European countries (Belgium, Denmark, Ireland, Italy, Portugal, Romania and the United Kingdom). There are, however, cross-country differences. For example, children in the United Kingdom are significantly less likely than those in Italy, Portugal and Romania to use social networking sites.[32] Findings from the same study also indicate that European children from medium and higher socio-economic backgrounds are more likely to use the internet for schoolwork and learning activities than those with a lower socio-economic status. Some of

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30   (Vossen and Valkenburg, 2016)

31   (Gluer and Lohaus, 2016; Vanden Abeele et al., 2017; Kim et al., 2017; Sampasa-Kanyinga et al., 2019)

32   (Mascheroni and Ólafsson, 2016)

these findings are contradicted by a study conducted in the Republic of Korea. It shows that neither gender nor the parents' academic background is significantly related to a child's use of the internet for studying.[33] This points to the possibility that some of these relationships vary by country and regional context.

The evidence suggests that there is a relationship between which devices children use, how long they stay online and the type of online activities they engage in. For example, Mascheroni and Ólafsson (2016) found that daily smartphone use is not related to using the internet for schoolwork, but is associated with more engagement in entertainment and communication activities. These activities are considered more participatory than schoolwork because they involve things like playing games; sharing or downloading photos, videos or music; sharing files; posting messages; and creating a pet or an avatar.

Some indicative research suggests that there may be a relationship between the time spent online and the type of activities in which children engage. According to a study in Sweden, children who spend 90 minutes or more online per day are more likely to play games and surf the web (e.g., to seek leisure-related information), while children who are online less tend to engage more in social communication and information-seeking.[34]

There is longitudal evidence that using social media can develop children's affective and cognitive empathy. This enables them to share, understand and recognize other people's emotions.[35] Some studies also emphasize the importance of self-disclosure for receiving support from peers. Children who use social networking sites discuss more personal information with their offline friends than children who do not have a social media account, according to a study in Germany of a stratified sample of 1,890 children aged 10–16 years.[36]

A Belgian study of 1,943 high school students, aged 10–20 years and recruited via random stratified sampling, found that self-disclosure is positively associated with higher emotional support received from friends.[37] Exchanging messages online with friends reinforces a sense of companionship because of its characteristic of 'any time, any place' connectivity, which allows them to chit-chat and micro-coordinate activities.[38] Intimate self-disclosure is also associated with children's perceived privacy and control over the content in messaging with friends.

Socializing can also be linked to online learning opportunities, particularly in countries where such opportunities are facilitated by the education system. Children sometimes use social media to manage homework tasks or engage with content related to homework.[39] When time spent on social media is used for studying, it is associated with better school performance.[40] On the other hand, the evidence shows that spending more time on social media (more than two hours a day) is negatively associated with school performance if social media are not used for study-related activities.[41]

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33 (Lim and Nam, 2017)

34 (Thulin and Vilhelmson, 2019)

35 (Vossen and Valkenburg, 2016)

36 (Gluer and Lohaus, 2016)

37 (Vanden Abeele et al., 2017)

38 (Vanden Abeele et al., 2017)

39 (Blair et al., 2017)

40 (Sampasa-Kanyinga et al., 2019; Kim et al., 2017; Badri et al., 2017)

41 (Sampasa-Kanyinga et al., 2019)

Some indicative findings from smaller studies suggest that the internet can offer benefits to hard-to-reach children and those in vulnerable situations, such as children dealing with drug use, mental health problems[42] or self-harm,[43] by making it easier to access information and seek help. These indicative findings suggest that technologically driven interventions to improve child well-being may be useful for some children.

Limitations and suggestions for further research

■ While there is evidence that smartphone use is linked to variations in children's online activities, it is not clear how the type or number of devices used is associated with different activities.

■ Some activities, such as learning, socializing and play, have received more attention in the recent research evidence, while others, such as creativity, health and participation, are discussed much less. More evidence is needed across the full spectrum of online opportunities to understand which activities lead to positive outcomes and how existing inequalities may be overcome.

■ A broader range of predictors of online activities and opportunities should be considered. Most studies omit variables related to digital skills, parental mediation or the influence of peers and the community. This makes it difficult to understand how different skills or family attitudes enable or restrict children in taking advantage of online opportunities.

■ Future research should also explore whether and how positive online experiences of children are related to tangible, long-term benefits. If some children yield greater benefits than others, research should uncover the factors that create these differences. The potential of the internet to provide social and emotional support for children requires more attention in future research. This would include what type of support is most beneficial and how to reach those children who most need support. There is also very little research on peer versus intergenerational communication and its impact on well-being. The potential of peer support needs to be better examined.

4.2. Digital health

On an individual level, digital health refers to the use of the internet and digital technologies to maintain or improve health and lifestyle. It may involve searching for a broad range of health-related information. This includes information on healthy eating and nutrition; exercise or sports, sexual or reproductive health, mental health, disease or injury, and treatment or medication. Digital health also refers to using specific applications, software programs or devices to monitor, plan, share or discuss issues related to health or lifestyle. Such issues include weight loss, exercise, food intake and mood.

The six studies reviewed mainly cover countries in Europe and North America, including Germany, the Netherlands, Northern Ireland (in the United Kingdom) and the United States. One study was conducted in Nigeria. The methodologies encompass a range of methods, from secondary data and meta-analysis[44] to web-based focus groups[45] and surveys. The surveys are mostly cross-sectional, involving convenience samples and multi-stage random sampling of schools[46] or clustered random

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42   (Curry et al., 2016)

43   (De Riggi et al., 2018)

44   (Fedele et al., 2017)

45   (Doornwaard et al., 2017)

46   (Shabi and Oyewusi, 2018)

sampling of schools.[47] The one longitudinal panel study used a small, non-probability sample.[48] The methodological shortcomings of the studies include small samples and insufficient information about controls.

Key findings

■ The digital environment is an important source of health information and support for children, both in relation to physical and to mental health.

■ Children value that the internet provides anonymity, access to reliable information, glimpses of the experiences of peers, and support-seeking options.

■ Children use a variety of online channels to access digital health content. They usually try to judge the reliability of the source and the particular benefits it provides, but this can sometimes be difficult for them.

■ Not everyone is equally able to benefit. Looking for health information online is positively associated with having a higher level of digital skills.

■ Digital health outcomes are rarely discussed and the evidence on effectiveness is somewhat mixed and insufficient.

Several studies explore how children seek health information online. They show that trusted and high-quality online health information is important to young people. A survey in Germany of 1,162 students aged 13–16 years shows that the aspects most frequently cited as important for digital health information are: easily comprehensible wording (cited by 88 per cent of respondents), clear layout (81 per cent) and perceived reliability of the website's publisher (79 per cent). The visual style of a website and whether it is explicitly aimed at students are deemed less important. Girls are nearly twice as likely as boys to attach importance to the publisher's reliability, especially those girls who do not have a migrant background or who attend a school in the highest academic tier.[49]

Children also evaluate the reliability of online information by determining whether the same information appears on multiple websites, and if it corresponds with what they know from offline sources such as family, friends or school. Websites associated with medical institutions, such as pharmacies or health care providers, are generally considered reliable, as are websites explicitly aimed at educating youth about sexual and reproductive health.[50] Forums with user-generated content are seen as beneficial for offering glimpses of the experiences or opinions of others,[51] and for providing opportunities for informal support through online peer networks.[52]

A survey in Nigeria of 1,186 students aged 11–19 years found that 63 per cent of children and young people use the internet to seek health information on a weekly basis.[53] The most popular search topics

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47   (Best et al., 2016)

48   (Curry et al., 2016)

49   (von Rosen et al., 2017)

50   (Doornwaard et al., 2017)

51   (Doornwaard et al., 2017)

52   (Best et al., 2016)

53   (Shabi and Oyewusi, 2018)

include: healthy diet and nutrition; body size, shape and image; sexually transmitted infections; and other sexual issues. The availability of easily accessible online information is particularly valuable for the hard-to-reach children who struggle to seek help face to face. A study of 527 boys from Northern Ireland aged 11–16 years found that one quarter of those who seek information online will not tell anyone about a mental health issue. They place particular value on the anonymity of digital health information, resources and support services.[54]

The internet also provides opportunities for children to access information on sexual health and relationships, mental health support and general health services. A study in the Netherlands shows factors related to children's identity and circumstances may influence how they engage with online information.[55] For example, LGBTQI children and those with more knowledge about sex and sexuality are more likely to consult sexual information online. Girls, children who know more about sex and sexuality, and those who communicate with friends (rather than parents) about sex tend to seek sexual information from professional websites. Boys and children with low sexual self-esteem and high sexual curiosity are more likely to use, interactive, user-generated online content.[56]

The study in Nigeria revealed that children who have more advanced digital skills are more likely to use the internet for health information.[57] The study in Northern Ireland found no significant impact of economic status, geographical location or educational attainment on the online help-seeking habits of boys in relation to health.[58] The study suggests that boys who use online help-seeking to supplement offline support may gain more mental health benefits. Boys who have larger online friend networks, and those who have confided in online friends regarding personal problems, also have better mental health outcomes.[59] This suggests that a lack of online social support may create inequalities among children.

Long-term digital health outcomes are rarely discussed. The evidence on effectiveness is both insufficient and somewhat inconsistent. A review of the evidence on changes in children's health behaviour found that mobile health interventions can have a positive effect on children's health outcomes.[60] Furthermore, interventions supported by caregivers produce larger changes in health outcomes, on average, than those that exclusively target children.[61] Yet, another review of the evidence on the effects of mobile health, including use of wearable activity trackers to increase physical activity outcomes among healthy children, found no evidence of an effect among all interventions.[62]

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54   (Best et al., 2016)

55   (Nikkelen et al., 2019)

56   (Nikkelen et al., 2019)

57   (Shabi and Oyewusi, 2018)

58   (Best et al., 2016)

59   (Best et al., 2016)

60   (Fedele et al., 2017)

61   (Fedele et al., 2017)

62   (Böhm et al., 2019)

Limitations and suggestions for further research

■ More evidence that is methodologically robust and comparable is needed to assess how children benefit from digital health information, resources and support services. The conclusions from current findings are limited by the small number of studies, differences in measurement, dissimilarities in the digital health content assessed, and the methodological challenges of the study designs.

■ More evaluations are needed of digital health interventions. Another area for future research is to explore how the relationship between youth health behaviours and outcomes is related to factors at the individual, family and community level, and influenced by health care systems.

■ Further analyses of the relationship between seeking mental health information and support and children's exposure to online harm could be helpful, especially in relation to targeting online harm interventions.

4.3. Digital citizenship

Digital citizenship is an umbrella term. It covers the role of digital technologies in the development of children's political interest, civic identity and engagement in politics. It also covers their understanding of citizenship values, their civic engagement and their rights in the digital world.

The five studies reviewed cover four European countries and Indonesia. They are mainly quantitative in nature, with a mixture of convenience or small samples and longitudinal panel surveys using random cluster sampling of schools.[63]

Key findings

■ Digital technologies are children's preferred medium for learning about new ideas and civic participation. On their own, however, digital technologies have a somewhat limited ability to create proactive and ongoing civic participation among children.

■ Children who actively seek political content online are more likely to develop a stronger interest in politics over time than children who come across this content by chance, even if they engage with it by commenting or sharing.

■ Offline engagement in civic activities, such as taking part in a demonstration, distributing leaflets or wearing a T-shirt, is more likely to create a sense of connection and responsibility to fellow citizens. Online participation in civic activities, such as expressing an opinion on social media, writing a blog, creating an online group or voting in an opinion poll, is less likely to create a civic identity.

■ Still, civic participation online can create exposure to more diverse sources of information and help children to create new and independent opinions.

A five-year longitudinal study in Sweden on the relations between online media use and political interest among children aged 13–14 years (wave 1) and young people aged 18–19 years (wave 5) found that children who actively engage with political content online develop a stronger interest in politics over time. This effect is relatively weak. On the other hand, children who come across political content

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63   (Machackova and Serek, 2017; Moeller et al., 2018)

online by chance do not develop a stronger interest in politics over time. The study also found that a range of other factors, such as changes in family socio-economic status, children's total news consumption across different platforms, and interpersonal discussions with parents or peers, appear to have no effect on later political interest.[64]

The importance of proactive engagement with political information is also demonstrated by an Austrian study with 294 children and young people aged 15–20 years. The study explored intentional (proactive seeking) and incidental (coming across politics material randomly) engagement in politics offline and online. The study also asked whether the effects differ based on children's motivations for internet use. These include using the internet for self-expression, entertainment, socializing or to look for political information. Children who use the internet because they are interested in political information or self-expression are significantly more likely to intentionally engage in politics both online and offline. Children who use the internet mainly for entertainment purposes, which defines most of the children in the sample, are unlikely to engage in politics offline but may spontaneously engage in politics online. This may be via activities such as liking, sharing or commenting on political posts in a random or non-proactive way. Hence, exposure to online political content can lead to higher engagement in politics but only for children who are already interested in politics or self-expression, and only if they come across political content online intentionally.[65] For the other children included in this study, engagement with online political material did not seem to lead to active or long-term civic participation.[66]

A similar approach, distinguishing offline and online civic participation, was adopted in a two-wave panel study conducted in Czechia with 768 adolescents aged 14–17 years.[67] The findings show that the development of civic identity (the sense of connection and responsibility to fellow citizens) is not affected by online participation, but it is positively predicted by offline participation. In this study, online participation involves signing an online petition, expressing an opinion on social media, writing a blog, creating an online group or voting in an opinion poll. Offline participation is about taking part in a demonstration, distributing leaflets, wearing a T-shirt or another symbol, or signing a paper petition. Surprisingly, the study found no effect of either online or offline participation on children's political self-efficacy (trust in government and belief that they can influence politics). Online participation, on the other hand, is linked to greater acceptance of unconventional, authority-challenging activism and to more negative attitudes towards social authorities and conventions. A possible explanation is that participating online can create exposure to more diverse sources of information and create new and independent opinions in a way that offline participation does not.[68]

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64   (Moeller et al., 2018)

65   (Heiss et al., 2019)

66   (Heiss et al., 2019; Moeller et al., 2018)

67   (Machackova and Serek, 2017)

68   (Machackova and Serek, 2017)

Limitations and suggestions for further research

■ Political participation is covered by a substantial part of the literature. It would benefit from a more comprehensive approach whereby digital citizenship is also understood and studied in relation to child identity and belonging, civic engagement, children's agency and rights, and the formation of values through online engagement.

■ It would be beneficial to develop our understanding of the factors that help children to advance their engagement in digital citizenship activities. This would help us to understand how the digital environment can facilitate and enhance children's agency and rights.

■ We need to know more about groups of children who are marginalized and under-represented, or even persecuted, in relation to their digital citizenship activities, and identify ways in which their voices can be heard in all cultural, social and political contexts.

5. DIGITAL SKILLS

The definition of skills in the literature we reviewed varies from the general ability to use the internet[69] to specific skills related to the digital environment. These specific skills include the ability to determine the credibility of online sources and information,[70] possession of online social skills,[71] and the ability to identify whether people met online are who they say they are.[72] More comprehensive, multidimensional models include operational skills, browsing skills, social skills, creative skills, mobile skills, personal-security skills, critical skills and device-security skills.[73]

We reviewed seven studies on digital skills. They used both qualitative[74] and quantitative methods.[75] Two studies include parents as well as children.[76] The quantitative research ranges from large representative surveys used for cross-country comparisons, used in two studies, to small and convenience samples and studies, which do not clarify their sampling methods. The research is mostly based in Europe, except for two studies that focus on Malaysia and Latin America (the Plurinational State of Bolivia, Colombia, Ecuador, Mexico, Peru and Uruguay).

Key findings

- Better digital skills are associated with more online opportunities but also more online risks.

- Parents tend to use restrictive mediation when they or their child have a lower level of digital skills. Restrictive mediation reduces online risks mostly at the expense of digital skills and online opportunities.

- In countries with low internet adoption, children tend to be better internet users than their parents. In such cases, parents rely on their children and use the internet less on their own, hence they are less able to provide support to their children when needed.

- It is difficult to measure children's digital skills. The studies mostly rely on children's self-assessment rather than performance testing, which means that some more confident children may overestimate their digital skills.

Several studies suggest that better digital skills are associated with more online activities but also more online risks.[77] Skills have a decisive role in how children engage with the internet and in what their parents allow or encourage them to do online.[78] A nationally representative survey of 6,400 parents of children aged 6–14 years from eight European countries shows that children who are encouraged to take advantage of online opportunities and are actively supported by their parents tend to do more

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69   (Galperin and Arcidiacono, 2019)

70   (Nygren and Guath, 2019)

71   (Mantzouranis et al., 2019)

72   (Groenestein et al., 2018)

73   (Livingstone et al., 2017; Teimouri et al., 2018; Rodriguez-de-Dios et al., 2018)

74   (Groenestein et al., 2018; Livingstone et al., 2017)

75   (Galperin and Arcidiacono, 2019; Mantzouranis et al., 2019; Nygren and Guath, 2019; Rodriguez-de-Dios et al., 2018; Teimouri et al., 2018)

76   (Livingstone et al., 2017; Galperin and Arcidiacono, 2019)

77   (Livingstone et al., 2017; Teimouri et al., 2018; Rodriguez-de-Dios et al., 2018)

78   For review of the evidence on antecedents and consequences of digital skills, see: Haddon et al., (forthcoming)

things online and have better digital skills.[79] However, they also face higher levels of risk. To limit that risk, parents sometimes use restrictive mediation, such as taking away devices, not allowing children to go online or limiting what they can do. This reduces risk but it also reduces children's digital skills and, through this, reduces the activities children engage in. Children are more likely to be restricted when they are younger, when they have a lower level of digital skills or when their parents have a lower level of digital skills.[80] However, a school-based survey in Spain of 1,446 students aged 12–18 years shows that associations between digital skills and online opportunities are stronger than those between digital skills and online risks.[81] This means that restricting children is reducing online risks mostly at the expense of online opportunities.

A 2019 study explored the intergenerational transmission of digital skills and internet use in the context of countries with low to moderate levels of internet adoption. The authors look at how children's internet use and skills affect parental internet use and skills. The study is based on large-scale surveys with children and young people aged 5–27 years in six Latin American countries (the Plurinational State of Bolivia, Colombia, Ecuador, Mexico, Peru and Uruguay). It found that the intergenerational transfer of motivation and skills from children to adults is, on average, outweighed by 'leaning effects'. This means that parents rely on children to perform online tasks for them. Hence, parents whose children are better internet users tend to rely on them and use the internet less on their own.

A qualitative study with 102 girls aged 12–13 years and 15–17 years in the Netherlands explored skills and confidence in determining whether an online stranger was an adult or a peer.[82] The findings suggest that most girls are confident in their ability to identify an adult with possible sexual intentions, but less than half of them (45 per cent) are actually able to do it. When unsure about whom they are in contact with, most girls apply a strategy that does not involve interaction with the person. They scan the profile page of the stranger, checking the contact information, the profile picture and whether they have friends in common. When mutual friends are present, trust increases significantly and girls are less critical. If still unsure, girls ask their friends in common about the stranger or, more often, continue the conversation with the stranger to find out more. Important cues that alarm girls are when the other person ignores personal questions, shows an exaggerated amount of interest, acts as a friend and makes sexual comments. The study also found that girls in the younger group (aged 12–13 years) report more distress when such incidents occur than those in the older group.

The potential unreliability of children's self-assessment of their digital skills is addressed by a Swedish study on news credibility.[83] The study asked 483 students aged 16–19 years to assess their competence in finding and evaluating online information. While most respondents rated themselves as quite skilled at fact-checking (68 per cent rated their ability as good or very good) and searching for information online (79 per cent good or very good), most of them (88 per cent) could not separate news from advertisements in a popular online newspaper. Self-reported skills of fact-checking and searching ability are inversely associated with performance, but children are better at recognizing manipulated images (75 per cent) and identifying such images as poor evidence (81 per cent). The students also had a difficult time determining the trustworthiness of credible, biased and false information online. Hence, the study concludes that claiming to be good at finding information online is associated with an inability to determine the trustworthiness of information.

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79   (Livingstone et al., 2017)

80   (Livingstone et al., 2017)

81   (Rodriguez-de-Dios et al., 2018)

82   (Groenestein et al., 2018)

83   (Nygren and Guath, 2019)

Limitations and suggestions for further research

■ The reviewed literature offers little discussion of how particular skills may be related to higher or lower exposure to risks and to what types of risk. A more comprehensive model of skills is needed, which can explain what role skills play, if any, in children's pathways to harm and vulnerability, or in the protective factors that help to build resilience.

■ The skills literature is almost exclusively digital. It does not examine how offline skills, such as critical thinking or social skills, may support children when applied to online situations. More research is needed on the possible benefits from the application of such skills in an online environment.

■ We found no longitudinal research that could explain differences between children's digital skills. Do children who acquire better digital skills at a younger age have improved outcomes from their internet use, and are such effects long-lasting? There are gaps in our knowledge of what factors from children's offline and digital environments create the best conditions for learning digital skills, and how best to support children to acquire digital skills.

6. PRIVACY ONLINE

Privacy relates to children's understanding of a range of related issues at the personal, institutional and commercial level, and their ability to mitigate privacy-related risk.[84] The issues include knowledge of how to protect their own and other's personal information online, what to share and with whom, how to use privacy settings and how personal data are collected by businesses or institutions and used for monitoring, analyses or commerce.

The studies we reviewed are mostly from Europe and North America. There are several studies from Asia, including from China, Malaysia, the Philippines and Singapore. The quantitative research is cross-sectional, with most of the studies using convenience or small samples. Some studies include a mixture of children and adults. All findings should be considered indicative.

Key findings

■ Overall, children are less concerned about certain aspects of online privacy than adults and are less engaged in privacy management.

■ Children who are concerned about their privacy and aware of online risks are more engaged in safety strategies.

■ Girls have greater privacy concerns than boys and are more likely to have parental involvement in managing their online privacy.

■ Privacy discussions with parents and teachers positively affect privacy behaviours (e.g., having a private profile). Privacy conversations with parents decrease with age, while peer mediation increases. This is similar to other aspects of internet use.

■ The evidence of how skills affect privacy is inconclusive. Having the relevant skills does not necessarily mean that children will engage in better privacy protection strategies.

Most of the studies in our sample examine privacy by exploring the relationship between privacy risks and other online risks, such as sexting, sexual exploitation or contact with unknown people. The focus is often on children having a public social media profile, sharing information with people they have got to know online, using privacy settings, sharing passwords with friends and being concerned about privacy.[85] Mostly, the studies are interested in exploring the factors that influence online privacy, both positively and negatively. These factors include device use; media literacy; mediation by parents, teachers or peers; and personal characteristics such as gender, age and personality traits. Some studies examine the violation of privacy. Examples include the manipulation or dissemination of personal information or images without consent,[86] or being monitored by others, such as partners or parents.[87]

The findings suggest that gender and age influence online privacy behaviours. A web survey administered to 3,763 social media users in Norway, aged 13–50 years, investigated the impact of privacy concerns on 'selfie' behaviours across gender and age groups. The groups were: adolescents

84 For a summary of the evidence on children's privacy online, see: Livingstone et al. (2019).
85 (Marret and Choo, 2018)
86 (Montiel et al., 2016)
87 (Reed et al., 2016)

aged 13–19 years, young adults aged 20–30 years and adults aged 31–50 years.[88] The adolescents in the sample were much less concerned about privacy and less engaged in privacy management than the older groups. Female users had greater privacy concerns than male users (across all three age groups) and the degree of privacy concern was not influenced by the use of privacy management strategies. Adolescent girls who had greater privacy concerns engaged less in taking personal selfies, cropping or editing photos, and using photo enhancement filters. There was no influence on group selfie-taking, and none of these factors was significant for adolescent boys.

A United States-based survey of 333 children and young people aged 13–21 years, though limited in terms of generalizability, found that gender can be an important factor in determining privacy concerns. Girls in the study were more likely to have a parent who accessed their online profiles. They were also more likely to have had a discussion with a parent about privacy settings.[89] The findings suggest that children who have privacy discussions are more likely to have private profiles on social media. However, this does not affect how often they use social media. The children in the study who said that their parent knew their passwords were less likely to have a private profile. If we speculate, this may be because they are already very cautious about what they post online, knowing their parents will see it. Those who had discussions with teachers about social media safety and privacy settings were more likely to have a private profile. Approximately one half of the participants reported that they discussed the importance of privacy settings with parents (55 per cent), teachers (52 per cent) and peers (52 per cent). Privacy conversations with parents decrease with age, while discussions with peers increase.

Other exploratory studies show that significant factors for children's online privacy practices also include device use and digital literacy. Findings from a survey of 300 participants aged 11–25 years living in the capital region of the Philippines — which is again limited in generalizability — show that children who use more devices have better online privacy behaviours.[90] The relationship is even stronger for children with better information literacy. However, another exploratory study looking at online privacy, digital literacy and actual exposure to online risks shows that digital skills may be less important than privacy concerns in driving privacy behaviours. This study comprised a survey conducted in Malaysia among 420 children aged 9–16 years.[91] It shows that the participating children were less exposed to online risks when they were highly aware of the severity of online risks and had high online privacy concerns.

These findings may be explained by a qualitative study with children and young people aged 14–18 years. It shows that online privacy is perceived as likely to be infringed as children struggle to maintain the boundaries between different social circles (digital crowding) and to control how information about them travels (audience segregation).[92] Despite this lack of informational privacy, there is an element of social or psychological privacy online. It is based on trust in others and expectations that personal information will be handled correctly. Hence, whether or not children are concerned about their privacy affects how they engage with the internet and deal with risky situations.

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88   (Dhir et al., 2017)

89   (Romo et al., 2017)

90   (Bernadas and Soriano, 2019)

91   (Teimouri et al., 2018)

92   (Setty, 2018)

The offline–online connection is explored in a survey with 1,644 children aged 10–16 years in China. It demonstrates the importance of differentiating between children with high and low levels of self-disclosure, both online and offline. Children who use the online space as an extension of offline relationships and share information in a more balanced way (both offline and online) are more likely to experience positive outcomes and to show signs of resilience (low personal scores for neuroticism). When online self-disclosure occurs at the expense of offline self-disclosure, this tends to be associated with low personal scores for conscientiousness, agreeableness and extroversion and high scores for neuroticism.[93]

Limitations and suggestions for further research

■ A lot of privacy research proceeds with adult definitions of privacy and does little to account for what children think and know about privacy. Paying attention to children's definitions of privacy, or, more precisely, drawing connections between their definitions and the issues that adults are concerned about on children's behalf, could help us to strengthen children's privacy practices.

■ In a previous piece of research,[94] we emphasized that the majority of research concerns privacy in interpersonal contexts, with less attention paid to commercial or institutional contexts. Relatedly, most research conceives of data that are deliberately and knowingly provided, with fewer studies recognizing that data traces and inferred data (or metadata) also matter for children's privacy. This evidence review found the same gaps and a lack of extensive measures of online privacy, which go beyond using privacy settings, having a public profile and sharing information with strangers.

■ More research is needed on the effect of skills on online privacy behaviours, particularly in relation to privacy strategies, values and behaviours, or peer pressure, which could inform peer training and empowerment methods.

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93   (Chen et al., 2017)

94   (Stoilova et al., 2019)

7. RISK OF HARM ONLINE

The large majority of the studies identified by the review dealt with different aspects of online risk and harm. This review includes a total of 316 studies divided into sexual risks (70 studies), which are discussed in section 8, and non-sexual risks (246 studies). Of this latter set, 141 studies on excessive internet use, online gambling and excessive gaming were coded for research theme but excluded from further analysis and this report.

The non-sexual risks reviewed include:

■ General or overall online risk exposure (14 studies)

■ Seeing user-generated negative content (7 studies)

■ Hurtful and bullying behaviour (81 studies)

■ Cyber-hate, discrimination and violent extremism (3 studies)

Sexual risks include:

■ Receiving and sending sexual messages (30 studies)

■ Viewing sexual content online (18 studies)

■ Online sexual exploitation and abuse (22 studies)

Each topic is defined and reviewed separately below.

7.1. Online risk exposure

Online risk covers exposure to a range of threats related to online: (1) content (child as a recipient of advertising content, spam, violent or hateful content, pornographic or unwanted sexual content); (2) contact (child as a participant in situations related to being bullied, harassed or stalked, receiving unwanted sexual messages, being groomed, meeting in person contacts first met online); and (3) conduct (child as an actor engaging in hacking, gambling, bullying or harassing behaviour, sending sexual material to others).[95] Harm refers to the negative consequences some children experience from exposure to risks (e.g., feeling bothered or upset). Not all risks necessarily lead to harm and children can be affected differently by exposure to the same kind of risk.

The 14 sources, which for this report we allocated to the broader category of general risk, include survey-based, cross-sectional studies, with samples ranging from representative to small convenience samples. The geographical area covered by the studies goes beyond Europe and the United States to also include Japan, Malaysia, Singapore, Taiwan Province of China, Thailand and Turkey.

Key findings

■ Digital skills positively predict both online risks and online opportunities. Better digital literacy and safety skills are associated with more engagement not only in online opportunities but also in risky online activities.

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95   (Hasebrink et al., 2009)

■ Parental mediation can affect children's exposure to risks but there is no combination of enabling and restrictive mediation that both increases opportunities and reduces risks. Reducing risks is always at the expense of opportunities.

■ The evidence on what types of risk lead to harm is insufficient. It is often assumed, rather than assessed, that exposure to risk leads to harm. There are also gaps in relation to how offline risks, vulnerability or support influence children's exposure to online risk and subsequent feelings of harm, and the severity of that harm.

Many studies in the sample point out the interconnectedness of online risks with digital skills, online opportunities and parental mediation.[96] A survey of 1,446 children aged 12–17 years in Spain found that the variation in children's exposure to online risks is not explained much by their level of digital skills. The intuitive expectation that children with better skills experience fewer risks was not confirmed. The authors speculate that this may be due to the greater strength of other predictors, such as peer norms and pressure, sensation-seeking and offline victimization.[97]

Similarly, a smaller-scale survey conducted in Malaysia among 420 children aged 9–16 years found that skills were less important for exposure to online risks than awareness of risks and privacy concerns.[98] The indicative findings suggest that children who think that the internet is risky and dangerous (perceived severity of an online risk) are less likely to encounter risks online. However, whether children think that they are likely to experience online risks (perceived susceptibility) does not affect how much they are exposed to online risk. The findings, limited in terms of generalizability, suggest two things: internet-related self-efficacy does not seem to reduce a child's exposure to risk or affect privacy concerns; and greater digital literacy and safety skills are associated with riskier online activities, which may cause more harm. This suggests that digital literacy education needs to find new ways to build on children's digital self-efficacy to ensure that risk exposure, or at least the experience of internet-related harms, is avoided or reduced.

A few studies point to the protective effect of parental mediation on children's exposure to risks.[99] However, the relationship between the two is complex. No combination of enabling and restrictive mediation has been found that both increases opportunities and reduces risks.[100] A high-quality, cross-national European study found that the maximum increase in opportunities occurs when parents engage in high enabling and low restrictive mediation. But this also increases risks. The maximum decrease in risks can be achieved by choosing a high level of restrictions but this will also result in the greatest reduction in opportunities.[101] Restrictive mediation diminishes online risks through the reduction of digital skills and mostly at the expense of online opportunities.[102]

Some studies found that active parental mediation is not significantly associated with exposure to online risk, while active mediation by teachers and peers can reduce risk.[103] Parental and teacher

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96   (Bayraktar, 2017; Teimouri et al., 2018; Rodriguez-de-Dios et al., 2018)

97   (Rodriguez-de-Dios et al., 2018)

98   (Teimouri et al., 2018)

99   (Bayraktar, 2017; Chang et al., 2016b; Rodriguez-de-Dios et al., 2018; Livingstone et al., 2017)

100 (Livingstone et al., 2017)

101 (Livingstone et al., 2017)

102 (Rodriguez-de-Dios et al., 2018)

103 (Shin and Lwin, 2017)

mediation also tends to focus more on making instructive remarks, such as talking about information management, while peers are more likely to engage in neutral types of active mediation, such as helping or recommending.[104] The effects of parental mediation can also vary in different contexts. For example, active mediation is positively related with online risk exposure in Turkey but not in European countries.[105]

Limitations and suggestions for further research

- A substantial gap in the research is the lack of attention paid to the differences between online risk and harm. Not all exposure to risk leads to harm and children are not equally affected. More evidence is needed on what types of risk lead to harm, what groups of children are more vulnerable, and what the long-term effects are on children's development and well-being.

- There is little evidence on how children can build resilience and what protective factors exist. Is exposure to risk necessary for the development of resilience? What preventive strategies can be effective?

- There are also gaps in relation to how offline risks, vulnerability or support may influence children's exposure to online risk and their experiences of harm. A more comprehensive model of online harm is needed, which explores how the relationship between antecedents and consequences is mediated by the online environment.

7.2. Seeing negative content

This refers to potentially negative, user-generated content. This includes websites or online discussions where people talk about or show images of physically harming or hurting themselves, committing suicide, ways to be very thin (such as being anorexic or bulimic), taking drugs, and gory or violent images. The reviewed studies focus mainly on the effects of negative content on children's behaviour. Some aim to identify risk and protective factors. The online content considered includes sites advocating eating disorders, self-injury and suicide, or that involve exposure to violence.

The seven studies use a variety of methodological approaches, from small qualitative research to large representative surveys, meta-analyses and evidence reviews. The survey-based studies are cross-sectional and some use convenience samples. Geographically, they cover European countries and the United States. Bearing in mind the significant differences between the countries studied, the applicability of the findings to other contexts, particularly in the global South, needs to be established.

Key findings

- As a general pattern among the countries included here (primarily European countries and also the United States), it seems that older adolescents (aged 15–18 years) are more likely to access negative content than young adults (aged 19 years and over). Girls tend to be more likely to see eating disorder content, while boys are more likely to access pro-self-harm and pro-suicide content.

- It seems more common for children to engage in passive exposure, such as viewing violent content, than active engagement, such as liking or posting content. The evidence on how, where and why children come across this content is insufficient.

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104 (Shin and Lwin, 2017)

105 (Bayraktar, 2017)

- Lower levels of happiness with life, previous offline and online victimization, and lack of social support can increase children's exposure to negative online content.

- There are significant cross-country differences in children's exposure to negative content. More analysis is needed on whether these differences are cultural, related to national policies and regulation, or related to other factors.

- The interface and functionality of online platforms can make a difference. Image-based, anonymous and less moderated formats can facilitate the circulation of some user-generated negative content.

- The evidence on protective factors is somewhat limited. Indicative findings suggest that happiness with life and social support can act as protective factors in relation to seeing negative content.

A few of the studies discuss prevalence of exposure to negative content. A survey of 3,567 respondents aged 15–30 years across Finland, Germany, the United Kingdom and the United States suggests that sites that advocate eating disorders, self-injury and suicide are familiar to children and young people. In all four countries, 13 per cent of respondents had seen self-injury or suicide sites or both, with exposure to both types of content more common than seeing only one type.[106] The same study found that girls are more likely to see eating disorder content, while boys see more pro-self-harm and pro-suicide content. Intentional self-harm, however, is more common among young females than young males. This may be explained by the fact that some boys may follow more violent content online. The younger participants, aged 15–18 years, were also more likely to access harm-advocating online content.[107] There is some evidence that exposure to harmful content varies among online platforms (a study of black and Hispanic youth in the United States found that it was more common on Facebook than Instagram) and children usually experience passive exposure to it, such as seeing content, rather than active engagement, such as liking or posting content.[108]

A lower level of happiness and previous online and offline victimization experiences are also associated with exposure to such online material. Other risk factors relate to socio-demographic background variables such as not living with parents, migrant background and urban residence. The authors of the multi-country study conclude that "those facing difficulties in their everyday life are at higher risk of accessing online sites that may foster unhealthy behaviour".[109] However, the study found important cross-country differences. For example, exposure rates to all three types of harm-advocating material were significantly lower in Germany, possibly due to differences in regulation, digital ecology and the general mental health of the youth population.[110] The different risk factors varied in significance in the different countries.

Some studies unpack the extent to which engagement with the internet plays an important role. Using a higher number of social media and online services is associated with a higher risk of accessing harm-advocating online content; the frequency of online activity is not.[111] Similarly, a qualitative study in Wales (in the United Kingdom) with a sample of 21 children and young people aged 16–24 years, with a history of self-harm, showed that the internet played an important part in participants' self-harm

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106 (Minkkinen et al., 2017)

107 (Minkkinen et al., 2016; Minkkenen et al., 2017; Oksanen et al., 2016)

108 (Stevens et al., 2019)

109 (Oksanen et al., 2016)

110 (Oksanen et al., 2016; see also Turja et al., 2017)

111 (Oksanen et al., 2016)

practices. The internet allows users to access information about self-harm, consume images or participate in online communities of self-harmers, which can normalize the practice. It also allows them to seek support.[112] The participants discussed how seeing the images can provide a sense of satisfaction or create a desire to replicate them. Sharing of one's own images was more likely to be linked to severe self-harm. Those who wanted to share their own images preferred more visual platforms, where posting is anonymous and less scrutinized or moderated.

The evidence on protective factors is scarce and needs further research. It seems that happiness with life may be positively associated with a lower risk of accessing negative content online on topics such as self-injury and suicide. It also seems that social support can act as a protective factor.[113] Friends can create a buffering effect for some young people. For others, closeness to family members is a substantial protective factor and living without parents is a risk factor.[114]

7.3. Hurtful and bullying behaviour

Hurtful behaviour online generally involves using digital technology and the internet to purposely share private information, photos or videos in a hurtful way, or sending threatening or insulting messages via email, instant messaging, chat or texts. It also includes spreading rumours and false information about the victim or purposely excluding them from online communications.[115] Cyber-bullying is traditionally characterized by online harassment that is perpetrated repeatedly and involves a power imbalance between the perpetrator and victim. The literature reviewed here did not always differentiate between hurtful online behaviour and bullying online. Bullying is not always operationalized online using the traditional defining features of repetition and power imbalance. Thus, this review includes online hurtful behaviour and cyber-bullying jointly, whether occurring repeatedly and involving a power imbalance or otherwise. Key findings are listed for each subsection. The limitations of the material and suggestions for future research are given at the end of each subsection.

7.3.1. Cyber-bullying

This area of this theme produced some of the most extensive results, with more than 100 articles found. To narrow the results, the inclusion criteria were refined to include only survey-based research with higher-quality sampling. This reduced the sample to 72 studies, which were analysed and included in the review. Even among the 72 studies, the majority are cross-sectional and omit from their models the range of confounding variables previously shown to be significantly related to cyber-bullying or online hurtful behaviour. These include subjective well-being and social support. The majority of studies cover experiences of children in the global North (Australia, European countries and the United States) with a few focusing on Asian countries and Israel.

Key findings

■ Boys in the studies included here experience cyber-bullying mainly through video games and text messages. Girls experience it mainly through social media. Boys are also more likely than girls to be perpetrators or victims who also perpetrate bullying.

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112 (Jacob et al., 2017)

113 (Minkkinen et al., 2016; Minkkenen et al., 2017; Oksanen et al., 2016; Turja et al., 2017)

114 (Minkkinen et al., 2016; Minkkenen et al., 2017)

115 (Choi et al., 2019)

■ Perpetrators of cyber-bullying are more likely to also be victims. Online and offline perpetration and victimization are also highly correlated.

■ Cyber-bullying perpetration and victimization have common predictors. These include having weaker offline social ties and support from friends and family, loneliness, lower social likeability at school, lower psychological well-being, and having an impulsive personality.

■ Cyber-bullying victimization is associated with lower psychological well-being and externalizing behaviours.

■ Protective factors in relation to cyber-bullying include a positive relationship with parents, parental monitoring of children's activities (generally rather than online only), teacher care, enforced school rules, higher self-efficacy, self-confidence and resilience.

The evidence suggests that boys and girls experience cyber-bullying differently, in terms of both perpetration and victimization.[116] Overall, boys are more likely to be perpetrators or victim-perpetrators than girls,[117] although this is not supported by all studies. Girls tend to be targeted more than boys for their appearance, weight or sexuality. They are also more likely to be the victims of gender-based harassment, exclusion and reputational damage.[118] Boys and girls are targeted through different channels. Boys tend to be victimized through video games and mobile phone text messages. Girls are more likely to experience cyber-bullying through social media.[119]

There is a strong correlation between cyber-bullying victimization and perpetration, as well as between online and offline perpetration and victimization.[120] Accordingly, there are several common predictors of both cyber-bullying perpetration and victimization. These include having weaker offline social ties and support from friends and family, loneliness, lower social likeability at school, lower psychological well-being, and having an impulsive personality (e.g., lack of self-control).[121] While cross-sectional studies show that a high level of activity on social networking sites is a predictor of cyber-bullying victimization and perpetration, a longitudinal study in Germany demonstrated a reverse relationship. It showed that more frequent mobile and internet use was an outcome of cyber-bullying victimization and perpetration.[122]

Other risk factors associated with online bullying and harassment perpetration include lower self-efficacy and empathy, higher self-perceived popularity, the need for popularity, and the perception of high violence in a child's neighbourhood.[123] Being the target of cyber-bullying is associated with having a physical or developmental disability, living with a single parent, a perceived poor school environment, and social anxiety, such as a fear of negative evaluation from peers, and social avoidance

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116   (Backe et al., 2018)

117   (Aizenkot and Kashy-Rosenbaum, 2019; Backe et al., 2018; Bevilacqua et al., 2017; González-Calatayud, 2018; Gorzig et al., 2017; Baldry et al., 2019; Niklová and Makúchová, 2018; Salmon et al., 2018; Smith et al., 2019; Vale et al., 2018; Montiel et al., 2016)

118   (Backe et al., 2018)

119   (Backe et al., 2018; Przybylski, 2019; Semerci, 2016)

120   (Antoniadou et al., 2016; Athanasiades et al., 2016; González-Cabrera et al., 2018; Lazuras et al., 2017; Beltrán-Catalán et al., 2018; Backe et al., 2018; Cuadrado-Gordillo and Fernandez-Antelo, 2016; Willoughby, 2019; Festl, 2016)

121   (Heiman et al., 2018; Alvarez-Garcia et al., 2019; González-Cabrera et al., 2018; Eden et al., 2016; Brighi et al., 2019; Lee et al., 2017; Sasson and Mesch, 2017; Vale et al., 2018; Festl, 2016)

122   (Müller et al., 2018; Lee et al., 2017; Keipi et al., 2017)

123   (Eden et al., 2016; Khoury-Kassabri et al., 2019; Rodriguez-Hidalgo et al., 2018; Lee and Shin, 2017; Abeele et al., 2017)

and distress. A range of risk behaviours is also associated with cyber-bullying victimization. This includes use of alcohol or drugs at school, an affiliation with gangs involving violence, and engaging in risky internet behaviours, such as publishing personal information on social networks.[124]

The evidence on the role of parental mediation in cyber-bullying is inconclusive. While some studies found a significant association between parental control and supervision of children's online activities and lower cyber-bullying perpetration and victimization, others found no significant relationship. One study even shows that parental mediation predicts a higher likelihood of victimization.[125] The studies that found a significant relationship show that the positive effect of parental control is mediated by less time spent online and decreased engagement in risky behaviours online.[126] On the other hand, there is emerging evidence that what is important are children's overall relationships with their parents and the monitoring of children's activities in general rather than of their online activities in particular.[127]

Looking at factors that can protect children from becoming victims of cyber-bullying besides parental mediation, researchers found a significant impact of teacher care, the presence of established and enforced school rules, higher self-efficacy, self-confidence, subjective well-being and resilience. Examples of resilience include the ability to tolerate experiences such as change, personal problems, illness, pressure, failure and painful feelings.[128] Studies where cyber-bullying victimization was used as a predictor identified several negative outcomes among victims, including the internalization of problems, lower subjective well-being, suicidal ideation, depression, anxiety (including stress), lower self-esteem, physical symptoms, emotional problems and actual suicide attempts.[129]

One study showed that the most distressing incidents for children are those that involve both in-person and online elements, multiple perpetrators, and a power imbalance between the victim and perpetrator. Children in this study found technology-only harassment less distressing.[130] Mixed incidents, which occur both online and offline, are more likely to involve repeated harassment and current or past friends or romantic partners as perpetrators. This points to the potential importance of perpetrator identity in determining the negative impact of cyber-bullying.[131]

Cyber-bullying victimization is also associated with a long list of externalizing behaviours. These include self-harm (online and offline), substance use, viewing web content related to suicide and self-harm, and more frequent mobile or internet use. They may also involve social problems or peer problems, for example, children thinking that their peers do not like them. Externalizing behaviours can also encompass problems with academic achievement and behavioural problems, such as getting into fights, damaging property, and defiant behaviour.[132]

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124 (González-Cabrera et al., 2018; Choi et al., 2019; Bevilacqua et al., 2017; Alvarez-Garcia et al., 2019; Backe et al., 2018; Mesch, 2018; Pabian and Vandebosch, 2016; Sasson and Mesch, 2017)

125 (Brighi et al., 2019; Baldry et al., 2019; Mesch, 2018; Sasson and Mesch, 2017; Lee and Shin, 2017; Alvarez-Garcia et al., 2019; Gonzalez-Cabrera et al., 2019)

126 (Alvarez-Garcia et al., 2019; Brighi et al., 2019)

127 (González-Cabrera et al., 2018; Khoury-Kassabri et al., 2019; Willoughby, 2019)

128 (Hinduja and Patchin, 2017; Choi et al., 2019; Heiman et al., 2018; Rodriguez-Hidalgo et al., 2018)

129 (Fisher et al., 2016; Kim et al., 2018; Hinduja and Patchin, 2019; Lucas-Molina et al., 2018; Nikolaou, 2017; Kim, 2017)

130 (Mitchell et al., 2016a; Mitchell et al., 2016b)

131 (Mitchell et al., 2016a)

132 (Fisher et al., 2016; Gorzig, 2016; Hinduja and Patchin, 2019; Kim et al., 2018; Gardella et al., 2017; Müller et al., 2018; Patchin and Hinduja, 2017)

7.3.2. Cyber-bystanders

A cyber-bystander is someone who has observed or witnessed cyber-bullying but was not its main perpetrator or victim. Witnesses to bullying can take different roles. They can act as assistants to the bully by following the main perpetrator and participating in bullying. They can reinforce the bully by watching and laughing at the victim. They can defend the victim, interfering to protect or comfort the victim. Or they can act as outsiders, who observe but do not engage in any way.[133]

Key findings

- More children are bystanders of cyber-bullying than bullies or victims. There are conflicting age and gender patterns in predicting cyber-bystanding across different countries.

- Whether bystanders intervene or remain outsiders depends on their own and the victim's gender, as well as their relationship with the perpetrator and the victim.

- Bystanders of cyber-bullying display higher moral disengagement and lower feelings of responsibility than those who witness bullying in person at school.

- Being a witness of cyber-bullying – even if not a perpetrator or a victim – can have an adverse effect on children's quality of life over time.

We found nine studies on the topic of cyber-bystanding, mainly from Australia and European countries, with one study from the Islamic Republic of Iran and another from Israel. With a couple of exceptions, most studies use convenience sampling and correlational analyses. Overall, there is a higher proportion of cyber-bystanders than cyber-bullies or cyber-victims among children.[134] Gender seems to be a predictor of cyber-bystanding in some countries but not in others. Girls are significantly more likely than boys to be cyber-bystanders in Australia, the Islamic Republic of Iran and Spain, and among Jewish adolescents in Israel. But there is no difference by gender among Arab adolescents in Israel, and in the Republic of Korea.[135] One study[136] found that girls in Spain are more likely to witness specific types of cyber-bullying, including sexual harassment, online defamation and rumours, insulting calls, and dissemination of videos or photos.

With regard to the behaviours of cyber-bystanders, the gender of the observer (and the victim of cyber-bullying) is an important factor.[137] Girls are more likely to take the role of defender of the victim,[138] while their male peers are more likely not to interfere.[139] A 2018 study in Germany of 486 schoolchildren aged 10–16 years found that, compared with boys, girls are more empathetic, have a higher sense of responsibility and perceive more negative outcomes from cyber-bystanding. Boys are more likely to report feelings of moral disengagement.

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133 (Salmivalli et al., 1996; Salmivalli, 1999)

134 (Razjouyan et al., 2018; Lee et al., 2017; González-Cabrera et al., 2018; Lapidot-Lefler and Hosri, 2016)

135 (Razjouyan et al., 2018; Lee et al., 2017; Lapidot-Lefler and Hosri, 2016; González-Cabrera et al., 2018)

136 (Delgado and Escortel, 2018)

137 (Delgado and Escortel, 2018)

138 (Yudes et al., 2018; Patterson et al., 2017a, 2017b)

139 (Yudes et al., 2018)

Children who have larger online friendship networks are more likely to witness cyber-bullying, according to a study on Australia and the Republic of Korea.[140] Offline friendship networks are a significant predictor of cyber-bystanding in the Republic of Korea, but not in Australia. According to another study, age is a significant predictor of witnessing cyber-bullying in Colombia, but not in Spain or Uruguay.[141] That same study showed that being an assistant to the bully was more common among younger children aged 10–12 years than among young people aged 15–18 years.

Two recent studies in Australia found that an important predictor of whether a young person intervenes to help the victim is their relationship with the perpetrator and/or the victim.[142] In a qualitative study, children mentioned that it was difficult to identify an interaction as cyber-bullying or to know its harmful intentions and consequences to the target because of the vague nature of online communications.[143] Thus, knowing the people involved is important for children to know how to react and whether to intervene. This is confirmed in the German study, which compared the emotional processes underlying the behaviour of witnesses to offline and online bullying. According to this study, bystanders of cyber-bullying display higher moral disengagement and lower feelings of responsibility than those who witness bullying in person at school. They also perceive lower negative outcomes and lower self-efficacy than bystanders of school bullying. However, there was no difference in feelings of empathy between bystanders to cyber-bullying and school bullying. A study in the Islamic Republic of Iran found no association between emotional intelligence and cyber-bullying roles, including cyber-bystanding.[144]

Only one study looked at the effect of cyber-bystanding on children longitudinally. It shows that cyber-bystanders score higher on all dimensions of quality of life compared with cyber-victims and cyber-bullies. Still, the quality of life of cyber-bystanders falls significantly over time (after five months), even when they have never been a perpetrator or a victim of cyber-bullying.[145]

Limitations and suggestions for further research

■ Despite the significant amount of research on cyber-bullying, there is no unified definition or measurement for bullying. For example, some studies define bullying as involving repeated occurrences, while others measure one or more incidents as bullying. Similarly, the measurement of cyber-bystanding varies — some studies include only cases where children have directly witnessed cyber-bullying, while others also include cases that children have only heard about or are aware of. This affects the interpretation of the findings from individual studies and the ability to draw more generalizable conclusions about cyber-bullying, its incidence, effects and protective factors.

■ Very few studies of cyber-bullying investigate the relationship between victims and perpetrators and the implications of a possible power imbalance; only two studies did so, finding that victims experience higher distress levels.[146] Hence, it is important to better understand the circumstances within which cyber-bullying occurs.

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140 (Lee et al., 2017)

141 (Yudes et al., 2018)

142 (Patterson et al., 2017b, 2017a)

143 (Patterson et al., 2017a)

144 (Razjouyan et al., 2018)

145 (González-Cabrera et al., 2018)

146 (Mitchell et al., 2016a; Mitchell et al., 2016b)

■ More longitudinal studies are needed to shed some light on causality and long-term outcomes. The majority of recent studies look at predictors, but there seems to be much less research on the potential effect of cyber-bullying and cyber-bystanding on children's well-being, for example.

■ Many studies omit important individual- and environmental-level covariates that have proven to be significantly related to online bullying and harassment experiences in previous research. These covariates include subjective well-being and social support. Integrating children's experiences of offline risks and protective factors with online risk experiences may be useful in developing more comprehensive models to understand cyber-bullying.

■ The studies reviewed do not always distinguish between cyber-bullying and cyber-bystanding. It is not always clear whether participants can indicate their adoption of multiple roles, for example, being a cyber-bully as well as a cyber-bystander.

7.4. Cyber-hate, discrimination and violent extremism

Cyber-hate is the use of digital technology to profess attitudes devaluing others because of their religion, race, ethnicity, sex or gender, sexual orientation, national origin or some other characteristic.[147] It is a distinct form of cyber-violence because it targets individuals based on their collective identity and belonging to a group rather than based on their unique individuality.

We found only two studies[148] that address cyber-hate, one comparing the United States and Finland, and another based only in the United States. We found none on violent extremism. Both studies use an online survey and mix children with young adults in their research. One is based on a larger survey, while the other includes quite specific groups (ethnic minority from lower socio-economic backgrounds or having a history of self-harm).

Key findings

■ Cyber-hate materials usually pertain to group stereotyping, blaming or advocating hate based on race, sexual orientation, religion, nationality or immigration status, sex or gender, and politics.

■ There is some indicative evidence that greater online exposure to hate material may vary based on differences in internet use, including the platforms used and the time spent online. It may also vary based on user characteristics, such as younger age, migrant background or country of residence, as well as some offline factors, such as lower levels of happiness, life satisfaction and trust in government.

■ The evidence gaps in this area are substantial and relate not only to prevalence, but also to risk and vulnerable groups, and most of all to protective factors.

The study based in the United States only used an online survey, with a sample of 1,034 internet users aged 15–36 years. The survey produced demographically balanced panel data.[149] The researchers found that the majority of their sample had seen or heard hate material online in the previous three months.

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147 (Costello et al., 2016: 312).

148 New publications that came out after the literature search was completed show large variations of cyber-hate exposure between countries (Machackova et al., 2020). Increases in witnessing online hate are positively related to being a perpetrator of online hate (Wachs et al., 2020). Girls tend to use strategies for coping with online hate more often than boys. Younger teenagers more often use technical strategies than older teenagers (Wachs et al., 2020).

149 (Costello et al., 2016)

In almost half of the cases, the material pertained to group stereotypes, followed by material blaming a group for the nation's problems or advocating hate towards a group, and material that called for violence or discrimination. Mostly, online hate pertained to race, sexual orientation, religion, nationality or immigration status, sex or gender, and politics.[150] The respondents were most likely to encounter hate material on Facebook, YouTube and Twitter, the three most commonly used platforms.

Other risk factors include time spent online, age, origin and ethnicity, and trust in government. Each additional hour spent online increases the likelihood of seeing or hearing hate material. But spending more than three hours a day online reduces this likelihood. This suggests both that those who view hate material online are likely to come upon it shortly after accessing the internet and that users who spend more time online tend to avoid hate material. Individuals who distrust government are more inclined to view websites disseminating hate material. The same is true for those from a white or Hispanic background and people with at least one parent born outside of the United States. Exposure to hate material decreases with age. The study found no relation between exposure to cyber-hate and risk-taking, closeness to friends and family offline, gender or geographical location.

The second study was a slightly younger online sample of 1,014 individuals in the United States and 555 individuals in Finland aged 15–30 years. It found that exposure to online hate was more frequent in the United States compared with Finland. This was explained by the greater ethnic diversity and focus on freedom of speech in the United States. The study found that people exposed to online hate were less satisfied with their lives and less happy in general. This is possibly a bidirectional relationship, according to the authors. "Exposure leads to less well-being; this can, in turn, lead to greater exposure," the study reports, "If this is the case, higher levels of exposure could be the result of a vicious cycle."[151]

Limitations and suggestions for further research

- The fact that we were able to identify only two cyber-hate studies suggests that more evidence is needed in this area, particularly on violent extremism. Understanding the consequences of mere exposure compared to active engagement (posting, liking) may be particularly important.

- Another substantial gap relates to the lack of evidence on actual harm to children and the long-term effects. Both of the studies discuss associations between different risk factors but can say very little about harm or causality, particularly in relation to more durable outcomes for children's well-being.

- While the publications discuss a range of background characteristics, the evidence on protective factors is particularly patchy. Future research should consider the potentially wide range of factors that could be examined in relation to children's access to cyber-hate and violent extremism content.

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150   (Costello et al., 2016: 315)

151   (Keipi et al., 2018: 11)

8. SEXUAL ACTIVITIES AND RISKS ONLINE

8.1. Viewing or exchanging sexual content

Children's online sexual activities are mainly researched in terms of the exchange of sexual material in relation to a range of activities, such as cyber-sex, exchanging sexualized content (sexting), chatting about sex, or seeking sexual partners online.[152] The recent literature reviewed here, however, is dominated by research on sexting.

8.1.1. Exchanging sexual content (sexting)

Sexting is defined as sending, receiving or exchanging self-produced sexualized content. This includes images, messages or videos sent or received through mobile phones, the internet or both.[153] Sexting can be a positive experience and a normal part of teenagers' exploration of sexuality and relationships. While it may be done among consenting children, it may still place them at risk. Sending or receiving sexual content can be non-consensual, including as a result of coercion, receiving unwanted sexual content through sexual bullying or harassment, or sharing someone else's content without the person's consent.[154]

We reviewed 21 studies on sexting. The overwhelming majority were conducted with children in European countries and the United States. Most of the studies are quantitative. They are predominantly cross-sectional, including large convenience samples of more than 500 people, and controlling only for demographic characteristics. Only five studies can be considered methodologically robust, with representative samples and adequate covariates or longitudinal design.

Key findings

■ The factors that predict a higher likelihood of sexting behaviour among children include gender (male), age (older), sexuality (LGBTQI) and socio-economic status (low).

■ Girls are more likely than boys to receive and be asked for sexts from strangers, to have negative sexting experiences, and to be vulnerable to coercive sexting victimization.

■ Most studies conceptualize sexting as deviant behaviour and do not acknowledge that it can be a positive experience for teenagers who want to explore their sexuality and relationships. Harm is often assumed, rather than assessed.

■ One of the main limitations of the literature on children's online sexual activities is the absence of relationship context in studying these interactions. Many studies do not ask children about their relationship with their sexting or cyber-sex partners, which precludes a nuanced understanding of these interactions. This is an important limitation, given the evidence on differential outcomes depending on the identity of children's sexting or cyber-sex partners.

■ Psychological problems, reduced online safety and privacy, online sexual solicitations by adults, and offline risks (such as sexual interactions with adults and dating violence) are all associated with sexting.

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152 (Courtice and Shaughnessy, 2017)

153 (United Nations, 2019)

154 (Interagency Working Group on Sexual Exploitation of Children, 2016)

Gender, age, sexuality and socio-economic status are among the factors that predict sexting behaviour among children. Studies find that boys, non-heterosexual children, older teenagers and children from a lower socio-economic background are more likely to engage in sexting.[155] However, there is evidence that girls are more likely to be asked for sexts, to receive sexts from strangers[156] and to have more negative sexting experiences.[157] Girls are also more vulnerable to coercive sexting victimization[158] and to having their self-produced sexual content sent to other people without their consent.[159] Boys and older children aged 14–15 years are more likely to coerce a partner to send messages with sexual content than girls aged 11–12 years.[160]

Sexting practices are shaped by broader gender and cultural contexts. One study found that girls in the Netherlands (but not boys) who uploaded sexualized pictures of themselves on social media were more likely to engage in sexting than those who did not.[161] This is related to their sexual self-concept of being sexually mature and efficacious and is moderated by their level of extroversion and the volume of sexual media they consume.[162]

Qualitative research with children further highlights the gendered nature of the risk that comes with sexting. Boys are culturally perceived as entitled to take pleasure in viewing sexual (nude) images of girls as a way of fitting in with their peers.[163] On the other hand, the unauthorized distribution of nude images of girls has a more damaging impact on the girls' reputations, leading to them being stigmatized or "slut-shamed".[164] Children often place the responsibility for mitigating the risk from sexting on the person sending the sexts, especially when this is a girl.[165]

Predictors of sexting among children include having a romantic partner[166] and trusting the person they are sexting.[167] Sexting is also associated with having an extroverted, less agreeable and less conscientious personality type, as well as with higher levels of neuroticism, especially depression, impulsiveness and vulnerability to stress.[168] Two studies, conducted with representative samples in Australia and in 25 European countries, found that children who sext are more likely to have emotional problems,[169] as well as suicidal thoughts and behaviours,[170] even though framing sexting as a deviant and necessarily harmful behaviour was criticized by the researchers, who see sexting as a normal part of the teenage exploration of sexuality and relationships.[171]

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155 (Milton et al., 2019; Alonso and Romero, 2019; Morelli et al., 2016; van Oosten and Vandenbosch, 2017; Wolfe et al., 2016; Romo et al., 2017; Patchin and Hinduja, 2019; Gámez-Guadix et al., 2017)

156 (Buren and Lunde, 2018)

157 (Buren and Lunde, 2018; Stanley et al., 2018)

158 (Kernsmith et al., 2018)

159 (Stanley et al., 2018; Setty, 2018)

160 (Kernsmith et al., 2018)

161 (van Oosten and Vandenbosch, 2017: 45)

162 (Bobkowski et al., 2016)

163 (Setty, 2018)

164 (Ricciardelli and Adorjan, 2019: 569)

165 (Setty, 2018; Doornwaard et al., 2017)

166 (Milton et al., 2019)

167 (Speno and Aubrey, 2019)

168 (Alonso and Romero, 2019; Gámez-Guadix et al., 2017)

169 (Sevcikova, 2016)

170 (Milton et al., 2019)

171 For a positive view of sexting see: Albury (2017).

The Australian study examines a range of covariates, including time spent on the internet, cyber-bullying, perceived social support, digital literacy, and information and communications technology safety skills. There is some indicative evidence on possible longer-term negative effects from a longitudinal study with a convenience sample of about 600 children. It shows that sending sexts predicts a decrease in positive emotions one year later. This is without controlling for whether the initial sexting experience was positive or negative.[172]

Aspects of the digital context can also be related to sexting behaviour. A representative study in the United States[173] found that receiving sexts was positively linked to using a phone during school hours, and negatively associated with being on a family mobile phone plan and going to a school that supervises the use of phones. Some studies found a positive relationship between children's sexting and late-night internet use,[174] disclosure of personal information online, talking to people they first met online,[175] and regular viewing of online pornography.[176] In terms of online safety and privacy, children who sext are less likely to have preventive privacy behaviours. They are less careful with what they post online and more likely to give out personal information like their real name, home address and phone number.[177]

Children's engagement in sexting is also related to their experiences offline. Some studies show a connection to other risk-taking behaviours, both sexual and non-sexual. This means that some children live in a culture of higher risk-taking. Children who send sexts are more likely to engage in other risk-taking behaviours, such as increased alcohol consumption,[178] having more sexual experiences, having their first sexual interaction at a younger age, and having unsafe sex.[179] However, the relationship between sexual intercourse and sexting is only significant for younger boys (but not girls) aged 11–14 years and for adolescents aged 15–18 years.[180] The relationship context within which sexting occurs is important for some outcomes. A study in Belgium of 1,187 students aged 16–22 years shows that the positive relationship between sexting and lifetime substance use and heavy drinking is only significant among children who send sexts to people other than their romantic partners.[181]

Receiving and sending sexts is related to online sexual solicitations and having sexual interactions with adults, such as sending sexual content or meeting offline for sexual contact.[182] It is also related to cyber-bullying victimization and perpetration.[183] However, a longitudinal study of 624 students aged 12–19 years in Galicia, Spain, found that sending sexts predicted a decrease in victimization in general, such as being hit, insulted or threatened, but did not find a significant relationship with cyber-bullying victimization.[184] Moreover, there is a positive relationship between

172 (Alonso and Romero, 2019)

173 (Wolfe et al., 2016)

174 (Milton et al., 2019)

175 (Buren and Lunde, 2018)

176 (Stanley et al., 2018)

177 (Milton et al., 2019)

178 (Sevcikova, 2016)

179 (Van Ouytsel et al., 2016; Romo et al., 2017)

180 (Sevcikova, 2016)

181 (Van Ouytsel et al., 2016; Buren and Lunde, 2018)

182 (de Santisteban and Gámez-Guadix, 2018)

183 (Alonso and Romero, 2019; Machimbarrena et al., 2018; Milton et al., 2019; de Santisteban and Gámez-Guadix, 2018)

184 (Alonso and Romero, 2019)

the exchange of sexts and dating-violence perpetration and victimization,[185] as well as with experiencing interpersonal violence and abuse within children's intimate relationships. Examples of interpersonal violence include face-to-face, emotional, physical and sexual violence.[186]

8.1.2. Viewing sexual content online

Viewing sexual content online includes exposure to pictures or videos of sexually explicit material, such as nudity and people having sex, including pornography. Pornography for this review is specifically defined as sexually explicit media intended for sexual arousal. While most studies test children's intentional exposure to sexually explicit material online, a few also include a measure of accidental exposure.

Eighteen studies in our review looked at viewing sexual content online. The majority are from European countries. Studies mainly use large convenience samples, with only demographic control variables and cross-sectional designs.

Key findings

- Children view sexual content online to learn about sex but tend to see men's dominance and violent behaviours against women. Boys are more likely than girls to view such content.

- Children who are more interested in sex are also more likely to view sexual content online. They are also more likely to have experiences of risky sexual activities, such as casual sex, sexual sensation-seeking and exposure to unwanted sexual solicitation. This suggests multiple vulnerabilities and risk of harm for some children.

In the studies reviewed here, boys had greater exposure than girls to sexual content online, as is the case with other online sexual activities.[187] Children who view sexual content online tend to believe that they can learn something from it and are more likely to view online pornography. They are more likely to engage in other sex-related activities, such as casual sex or engaging in sexual sensation-seeking. They are also more prone to have instrumental attitudes towards sex, meaning that they perceive sex as a core instrument for sexual gratification, and to be exposed to unwanted sexual solicitation. They are more apt to meet face to face with someone they first got to know online.[188]

Several factors, both internet-related and not, mediate some of these relationships. For example, viewing sexual content online is related to sexual sensation-seeking, especially for those children who engage in online sexual activities more frequently, as well as those who think that internet pornography has more damaging effects on others than on themselves.[189] Viewing sexual content is related to sexting for children who have higher alcohol consumption.[190]

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185 (Morelli et al., 2016)

186 (Stanley et al., 2018)

187 (Chen et al., 2017; Ballester-Arnal et al., 2016)

188 (Vandenbosch and van Oosten, 2018; Stanley et al., 2018; Chen et al., 2017; Chang et al., 2016a; Marret and Choo, 2018)

189 (Chen et al., 2017)

190 (Morelli et al., 2017) (Vandenbosch and van Oosten, 2018)

A study in Australia that explored the content children are exposed to when watching sexual content online revealed that significantly more children see men's pleasure, men's dominance and men's violent behaviours against women than vice versa.[191] It also found that girls are more likely than boys to recognize violence against women in pornography.[192] These findings are concerning, given the evidence that children use pornography to learn about sex.[193] Still, the findings explain the associations, among boys, between viewing pornography and having sexually aggressive behaviour and holding negative gender attitudes.[194]

There is much less evidence on protective factors and outcomes in relation to viewing sexual content online. Support from parents or friends, but not teachers, seems to provide a buffer against the negative effect of sexually aggressive behaviour, associated with viewing online pornography.[195] There is no evidence that parental use of internet filtering successfully protects children from encountering sexual content online.[196] There are also significant gaps in terms of outcomes. One study found no direct relationship between viewing online pornography and its impact on mental health outcomes, once the consequences of general internet use are taken into account. These consequences include sleep loss and withdrawal when the internet is inaccessible.[197]

Limitations and suggestions for further research

■ Children's engagement with digitally mediated sexual activities, such as sexting or viewing sexual content online, need to be studied in the context of children's intimacy, partner relationships, and desire to learn about sex. These practices must be understood within the cultures of teenage sociality that both encourage and regulate the exchange of sexual material.

■ Future research needs to reflect more closely how children perceive online sexual activities and to remain open to the possibility that for some, such activities are beneficial. Studying online sexual activities as deviant and harmful behaviours does not correspond with the experiences of all children.

■ Another limitation at present relates to the different ways in which studies operationalize sexting, with some studies looking only at sending sexts or only at receiving sexts. This creates a partial picture of the predictors and outcomes of different types of sexting. For example, it is not clear why some children are more likely to receive than send sexts.

■ An area that needs further exploration is the motivations and outcomes of different types of sexting, especially the sharing of sexts of others without their consent.

■ With regard to the evidence on viewing sexual content, future studies should link the content that children see online to outcomes. Currently, issues of content and outcomes are studied

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191 (Davis et al., 2018)

192 (Davis et al., 2018)

193 (Lykens et al., 2019; Doornwaard et al., 2017)

194 (Shin and Lee, 2017)

195 (Shin and Lee, 2017)

196 (Przybylski and Nash, 2018)

197 (Hokby et al., 2016)

separately. Studies should also distinguish between accidental and intentional viewing of sexual content online, and the different kinds of sexual content that children may be exposed to. Finally, more evidence is needed on the impact of viewing sexual content online on children's well-being in general.

■ Overall, there is a lack of clarity regarding the protective role of social support from family and friends in relation to patterns of children's online sexual activities and their outcomes. Studies have not found that family support reduces the likelihood of children sending a sext to strangers, nor that parents' use of internet filtering decreases children's exposure to sexual content online. Nonetheless, there is evidence that parental and friend support can act as a buffer against the negative effects of viewing online pornography, including against sexually aggressive behaviour. Parental discussions with children about online privacy settings also reduce the risk of sexting. This calls for a closer investigation into the impact of different forms of social support on children's online sexual activities.

8.2. Sexual exploitation and abuse online

We define online sexual exploitation and abuse as including all acts of child sexual abuse, child prostitution, production or dissemination of child sexual abuse materials, child corruption (the intentional causing, for sexual purposes, of a child, to witness sexual abuse or sexual activities) and solicitation of children for sexual purposes.[198] These acts can take place virtually but can be preceded or accompanied by or can develop into exploitation offline.

We identified 22 studies on online sexual exploitation and abuse.[199] They generally focus on prevalence, predictors, and risk and protective factors. The majority of studies were conducted in European countries, with a smaller number in the United States and in countries of East and Southeast Asia. Most often, these studies include older teenagers. Children under 12 years of age are generally missing from the evidence base. Some studies conflate children with young adults. The studies vary in the extent to which they operate within the parameters of our definition of online sexual exploitation and abuse.

Our search yielded no studies on children exploited in/for prostitution, child sexual abuse materials or child corruption. There are variations in relation to who the perpetrator is and how the child regards the interaction. For example, some studies specify that the perpetrator is an adult. Others also include peers or strangers, without asking about age. Some research asks children about only unwanted sexual experiences, while other studies leave this open. This makes it challenging at times to identify the precise definition used in the research and to establish comparability of findings.

Key findings

■ Online sexual exploitation and abuse are linked to a combination of factors related to three areas, namely the digital context (online activities and skills), child-related factors (gender, age, well-being, offline risks) and the social context (factors related to family, peers and community).

■ Children who are more vulnerable offline, perhaps because they are exposed to violence and have less protection and support, are also more vulnerable online.

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198 (Council of Europe, 2012)

199 For a review of the evidence on child sexual exploitation and abuse see also Radford et al. (2015) and UNICEF (2020).

- Online victimization can create real risks for the offline victimization of children. Being asked to do something sexual online is a strong predictor of children meeting in person, for sexual purposes, an adult they first got to know online.

In assessing the risk factors, the studies mainly focus on three areas. The first is the digital context, which covers children's online activities and, occasionally, skills. The second area deals with child-related factors, such as gender and age, well-being and offline behaviour, for example, sensation-seeking, risk-taking and experiences of violence. The third is the social context, which covers factors related to family, peers and community. An overall conclusion, supported by all 22 studies, is that online sexual exploitation and abuse are linked to a combination of factors across all three areas, but that children who are more vulnerable offline, perhaps because they are exposed to violence and have less protection and support, are also more vulnerable online.

Children who are at a higher risk of victimization tend to be female, older teenagers, LGBTQI children and children from ethnic minority backgrounds. They are also more likely to have experienced other forms of online and offline violence, to lack social support and to engage in risky online behaviour, such as posting personal information or pictures online and chatting to strangers. Factors not significantly related to online sexual exploitation and abuse include children's self-esteem, the number of people on their contact lists, and the use of and length of time spent on social networking sites.[200] We explore this further in relation to specific types of online sexual exploitation and abuse.

There is a range of protective factors identified in this literature in relation to online sexual exploitation and abuse, including enabling parental mediation, help-seeking and the ability to recognize violence in personal relationships. For a better understanding of the incidence and impact of child sexual exploitation and abuse, we need to acknowledge the interconnection of children's existing vulnerabilities, both online and offline, and the presence of protective factors, at both the individual and social level. Below, we examine the evidence on online sexual solicitation, sextortion and cyber-dating violence.

8.2.1. Sexual solicitation online

Sexual solicitation, also referred to as 'grooming', denotes the process of establishing a relationship with a child either in person or through the use of information and communication technologies to facilitate online or offline sexual contact.[201] Online sexual solicitation refers to requests to a child to share personal sexual information or engage in sexual activities or sexual talk through digital technologies.

This topic yielded the most evidence of all topics in the area of online sexual exploitation and abuse, a total of 15 publications. Most of the research is quantitative, using school-based survey methods and (cluster or stratified) random sampling. In four cases, convenience sampling was used. One study used an online panel.[202] Most of the research is cross-sectional, except for one longitudinal study in Taiwan Province of China.[203] However, even when the studies use large samples overall, drilling down to sexual solicitation victims produces small samples.

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200 (DeMarco et al., 2017; de Santisteban and Gámez-Guadix, 2018)

201 (United Nations, 2019)

202 (Sklenarova et al., 2018)

203 (Chang et al., 2016a)

Only one of the studies in our sample is qualitative, in that it uses focus groups.[204] One study includes young adults but was retained as it is retrospective and covers the pre-adulthood period.[205] Geographically, the research covers Asia (India, Japan, Malaysia, the Republic of Korea, Taiwan Province of China and Thailand), Europe (Cyprus, Germany, Ireland, Italy, the Netherlands, Spain and the United Kingdom) and the United States.

Key findings

- Girls and older teenagers are more likely to be victims of online sexual solicitation, according to most studies (but there are exceptions).

- Being subjected to online sexual solicitation is associated with online risk behaviours, including exposure to online pornography, posting personal information or pictures online, having unknown people as friends on social media, voluntary sexting, video chatting with strangers, time spent online on weekdays (but not on weekends), and high levels of gaming.

- There is a connection between being vulnerable offline and online. Online sexual solicitation is correlated with offline exposure to violence, neglect, physical punishment, psychological victimization, parental conflict, sexual harassment and sexual solicitation.

- Perpetrators are a mixture of strangers and people known to the child. Perpetrators of online sexual solicitation are less likely to be known to the child than perpetrators of face-to-face sexual abuse.

- Social support can act as a protective factor. Children who lack such social resources face a double disadvantage: they are more likely to experience online sexual solicitation and less likely to seek help.

The publications indicated that 12 to 17 per cent of those surveyed had been subjected to sexual solicitations by an adult, and 13 to 28 per cent had received unwanted sexual solicitations, regardless of the age of the perpetrator. The differences are likely to be related to both methodological approaches and country specificities. The majority of the studies in the review found that girls experience online sexual solicitation (unwanted or not specified) more often than boys, including in Ireland, Italy, Spain, Sweden and the United Kingdom.[206] But in some contexts, such as Taiwan Province of China, boys are more likely than girls to experience online sexual solicitation.[207] In Malaysia, both genders are equally likely to be subjected to online sexual solicitation,[208] and boys are sometimes found to be more likely than girls to be perpetrators of unwanted sexual solicitation.[209]

A few studies explore how sexual solicitation experiences vary by children's age. There is some evidence from two studies in Spain[210] which suggests that age is an important factor. This research found that children aged 15–17 years were significantly more likely to receive requests to engage in sexual activities or in sexual talk, or to give out personal sexual information than their younger peers

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204 (Groenestein et al., 2018)

205 (DeMarco et al., 2017)

206 (Montiel et al., 2016: 226; Machimbarrena et al., 2018; Zetterström Dahlqvist and Gillander Gådin, 2018; de Santisteban and Gámez-Guadix, 2018; DeMarco et al., 2017)

207 (Chang et al., 2016a)

208 (Marret and Choo, 2017)

209 (Marret and Choo, 2017)

210 (Montiel et al., 2016; de Santisteban and Gámez-Guadix, 2018)

aged 12–13 years. Age and gender were also found to be important factors by a German study with children aged 14–17 years, which looked at their online sexual interactions with adults and peers. These interactions included having a sexual conversation, exchanging pictures, and cyber-sex.[211] The study found that half (51 per cent) of children had engaged in some type of online sexual activity. While this activity mostly involved peers, about one in five children in this study had had a sexual interaction with an adult. Of the children who engage in online sexual activities, about one in five have experiences of being solicited for sexual purposes. Overall, only 6 per cent of their sexual interactions with peers and 10 per cent of such interactions with adults are perceived as negative. This study found that the children experiencing online sexual solicitation were more likely to be girls, older teenagers, gay or bisexual, not living with both parents, of a foreign nationality and lacking in social support.[212]

The majority of studies do not ask children about their relationship with the person soliciting them. It can be concluded from recent evidence that the perpetrators are a mixture of strangers and people known to the child. A study conducted in Cyprus with 1,852 children and young adults aged 15–25 years found that in cases of online sexual solicitation the perpetrator was less likely to be known to the individual than in cases of face-to-face sexual abuse.[213] A Spanish study with a younger sample of 2,731 children aged 12–15 years showed that in two thirds of online solicitation cases, children first met their perpetrator online.[214]

That same study found that two thirds of the children who engaged in sexual interactions with adults reported the use of some form of persuasion strategy by their perpetrator.[215] The study tested three persuasion techniques used by adults in the sexual solicitation of children: deception, meaning to pretend to be someone else; bribery, defined as offering money or gifts; and the formation of a non-sexual emotional relationship.[216] It found that online sexual solicitations, such as requests by an adult for a child to send sexual pictures or videos or to engage in cyber-sex, were associated with the use of deception and bribery. Sexual interactions, for example, where children agree to send an adult sexual pictures or videos of themselves or to meet an adult offline to have sexual contact, are related to the formation of a non-sexual emotional relationship.[217] This means that children may be groomed to develop feelings of closeness and intimacy with the adult perpetrator, which can then lead directly to sexual interaction and abuse, without the mediation of sexual solicitation.

A study in Malaysia of 3,349 children aged 12–17 years[218] shows that slightly more than half of the children who were in contact with an unknown person online were invited to a face-to-face meeting and that 59 per cent of these children went to this meeting. Nearly one third of the children reported that the person they met was an adult who posed as a minor. More than half of the children who met people they first got to know online went to the meeting alone and had met more than six people (separately). Boys are more likely to meet people face to face, as are children who go online in internet cafés, view pornography online and disclose personal information on the internet. Not being explicitly

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211 (Sklenarova et al., 2018)

212 (Sklenarova et al., 2018)

213 (Karayianni et al., 2017)

214 (Gámez-Guadix et al., 2018)

215 (Gámez-Guadix et al., 2018)

216 (Gámez-Guadix et al., 2018)

217 (Gámez-Guadix et al., 2018)

218 (Marret and Choo, 2018)

forbidden by parents to meet strangers or to use certain websites and chat rooms also increases the likelihood of meeting people offline. Of the 1,005 children who said they had met a person they first got to know online, 5.5 per cent reported that they had been assaulted, either sexually or physically. More than half of these children experienced multiple types of assaults. Forced sexual intercourse was reported by 18 respondents in the study (13 males, 5 females).[219]

Several studies explore the role of children's online activities in relation to the experience of online sexual solicitation. A longitudinal study in Taiwan Province of China shows that higher levels of online gaming, exposure to online pornography, posting personal information or pictures online, and chatting to strangers via a webcam are associated with a higher likelihood of exposure to an unwanted sexual solicitation.[220] Sexual solicitation is also significantly associated with having unknown people on a list of social networking friends, voluntary sexting, instant messaging or using video chat, and time spent online on weekdays (but not on weekends).[221] Comparing children who are only solicited for sexual purposes with those who are also involved in a sexual interaction with an adult — meaning that they sent sexual photos or videos of themselves or met face to face with an adult they previously met online — the latter are more likely than the former to have played online games, to have used chat and to have met new people online.[222] Other risk factors include perpetration of online harassment and aggression.[223] Being asked to do something sexual online is a strong predictor of a child meeting in person, for sexual purposes, an adult they first got to know online.[224]

There is a connection between being vulnerable offline and online. Children who are exposed offline to sexual harassment, solicitation, bullying (among boys) and parental conflict are also more likely to be victims of online sexual solicitation. Both physical sexual abuse and online sexual solicitation are significantly correlated with exposure to violence, neglect, physical punishment and psychological victimization. However, children experiencing both types of sexual abuse do not experience higher odds of these outcomes than those experiencing only one of them.[225] A study of 1,852 children and young people aged 15–25 years living in Cyprus found that those from urban areas and those whose father's educational level was lower were more likely to report online sexual solicitation and physical abuse.[226] The vicious cycle continues, as children who have experienced online solicitation are then more likely to experience sexual violence and abuse offline.[227]

There is very little research on the effects of sexual solicitation on children. Depressive symptoms are significantly positively associated with online sexual solicitation, according to studies with children in Spain and Taiwan Province of China,[228] but this association was found only among girls in Sweden.[229]

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219 (Marret and Choo, 2018)

220 (Chang et al., 2016a)

221 (de Santisteban and Gámez-Guadix, 2018)

222 (de Santisteban and Gámez-Guadix, 2018)

223 (Marret and Choo, 2017; Zetterström Dahlqvist and Gillander Gådin, 2018; DeMarco et al., 2017)

224 (DeMarco et al., 2017)

225 (Karayianni et al., 2017)

226 (Karayianni et al., 2017)

227 (Nagamatsu et al., 2018)

228 (de Santisteban and Gámez-Guadix, 2018; Chang et al., 2016a)

229 (Zetterström Dahlqvist and Gillander Gådin, 2018)

Low levels of help-seeking (reporting experiences of illicit solicitation to friends, parents or a helpline) are associated with higher rates of online sexual solicitation.[230] Children who have stronger social support from parents and friends[231] are more likely to show protective behaviour and seek help after experiencing online sexual solicitation. Children who have been involved in risky behaviour offline, such as intoxication, illicit drug use, absenteeism from school, or having problems with teachers, are also more likely to seek help after experiencing online sexual solicitation.[232] This suggests that children can also develop protective strategies and resilience. Parenting plays a key role in protecting children. A recent cross-sectional study conducted across six countries shows that instructive parental mediation is negatively related to being a victim of online sexual solicitation among children aged 12–17 years, while restrictive mediation predicts higher levels of victimization.[233]

8.2.2. Sextortion

Sexual extortion, sometimes referred to as 'sextortion' is the threatened dissemination of images of a sexual nature without consent, usually to exact revenge or procure benefits such as additional images, sexual acts or money.[234]

Our database search for the period yielded only one study on sextortion among a nationally representative sample of children, conducted by Patchin and Hinduja (2018).[235] The study of children aged 12–17 years in the United States used single-item, dichotomous questions for measuring victimization and offending. The findings from this study may only be relevant for children in the United States and should not be generalized to other countries.

Key findings

■ Sextortion usually occurs within existing relationships (romantic or friendship) and much less by among people unknown to each other. Children involved in offending are also more likely to be victims of sextortion.

■ The data on sextortion are mostly inconclusive, with large variation between studies. According to the studies in our sample, boys are more likely to be involved in sextortion than girls, both as victims and perpetrators, but are less likely to tell anyone about it.[236] Victims are more likely to be non-heterosexual. There are no differences based on age and race.

The study indicates that 5 per cent of children aged 12–17 years had reported ever being victims of sextortion. Three per cent had reported being offenders. There is a connection between offending and victimization. Those involved in one role are more likely to also be involved in the other, similar to online bullying. Unlike other forms of sexual exploitation, where girls tend to be the victims, sextortion victims are more likely to be boys and to be non-heterosexual. Boys are also more likely than girls to target others. The study found no difference in sextortion experiences by race and no consistent

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230 (Marret and Choo, 2017; Zetterström Dahlqvist and Gillander Gådin, 2018; DeMarco et al., 2017)

231 (DeMarco et al., 2017)

232 (DeMarco et al., 2017)

233 (Wachs et al., 2020)

234 (United Nations, 2019; Patchin and Hinduja, 2018)

235 (Patchin and Hinduja, 2018)

236 Some studies find that girls are more likely to be sextortion victims. See, for example: https://www.missingkids.org/theissues/sextortion. Such differences may be due to reporting, measurement or local differences.

difference concerning age, except that 15-year-olds are generally more likely to be involved compared with children of other ages.

The victims of sextortion experience a range of harms, such as being stalked or harassed (10 per cent of boys and 24 per cent of girls), being contacted repeatedly online or over the phone (43 per cent of boys and 41 per cent of girls) or having a fake profile created in their name (11 per cent of boys and 9 per cent of girls). In about one in four cases, the sextortion results in the sharing of the image with someone else without permission.

According to the study by Patchin and Hinduja (2018), boys are significantly less likely to tell someone, including a parent, the police or their school, about a sextortion incident. Only 35 per cent report it, compared with 47 per cent of girls. When boys do tell someone, they most often turn to a friend (45 per cent), compared with 39 per cent of girls. Girls most often turn to their parent (42 per cent), compared with 29 per cent of boys. Very few sextortion victims report the incident to the site or app on which it occurred (5 per cent of boys and 7 per cent of girls).

8.2.3. Intimate partner violence online

Intimate partner violence online is broadly defined as abusive behaviour, such as harassment, control or stalking, within a sexual relationship or by a dating partner, facilitated by technology.[237]

Five studies and one meta-review in our sample address cyber-dating violence. The research is based in Europe (Belgium, Bulgaria, Cyprus, England [in the United Kingdom], Italy, Norway and Spain) and the United States. It employs school-based surveys, mostly with convenience sampling methods. One study employs a purposive sample stratified by community risk factors, such as poverty, unemployment, minority populations, rental housing, female-headed households and community violence, with a random selection of schools and participants.[238]

Key findings

■ Girls are more likely to be victims of intimate partner violence, as are children transitioning to adolescence, those in a heterosexual relationship, those who have a wider age gap with their partner and those who have experienced bullying victimization or perpetration.

■ Adverse childhood experiences, such as exposure to violence, abuse and other trauma, and risk-taking, such as alcohol binge drinking for boys and early and unsafe sex for girls, are risk-predicting factors.

■ Girls are more negatively affected by the experience of intimate partner violence than boys and are more likely to be monitored or pressured by their partner.

■ Parental involvement, such as monitoring and emotional bonding, can be a protective factor in relation to intimate partner violence online. But there is no association with family and peer support, community engagement among children or school connectedness.

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237 (Smith-Darden et al., 2017; Van Ouytsel et al., 2016; Backe et al., 2018)

238 (Smith-Darden et al., 2017)

The evidence suggests that girls are more likely to be the victims of intimate partner violence, as are those who are younger than their partner, those in a heterosexual relationship and those who have experience of bullying victimization or perpetration.[239] Girls are more likely to be sent too many messages that make them feel uncomfortable, to be pressured to share passwords or respond quickly to calls or texts, or to have their messages, whereabouts and activities monitored by their partner.[240] A wider age gap between the partners and being the victim of such electronic intrusion are associated with a higher likelihood of perpetration. Girls are also more negatively affected by the experience than boys.[241]

Gender plays an important role in relation to predictive risk factors. A study with children and young people in Belgium aged 16–22 years who had been victims of cyber-dating abuse found that male victims were significantly more likely to have engaged in alcohol binge drinking, while girls were more likely to have been sexually active at a younger age and to have had unprotected sex.[242] Another study, which tested the relationship between family, school- and community-level factors and various forms of cyber-dating aggression among children in the United States, found that gender (male) predicts coercive sexting but not cyber-stalking or online harassment.[243]

Perpetration of intimate partner and cyber-dating violence is, overall, more common among children transitioning to adolescence and those from black and other minority ethnic backgrounds, according to a United States-based study. As with online sexual solicitation, offline vulnerability and parenting are significant factors predicting victimization and protection. Adverse childhood experiences, such as exposure to violence, abuse and other trauma, significantly predict higher rates of cyber-dating aggression perpetration.[244] Parental involvement in the form of parental monitoring and emotional bonding is significantly associated with a lower likelihood of perpetration of all forms of cyber-dating aggression. Perceived safety of the community predicts lower levels of cyber-stalking only.[245] There is no association between intimate partner or cyber-dating violence and family and peer support, community engagement among children or school connectedness.[246]

Limitations and suggestions for further research

■ As with most of the other aspects of children's internet use, more evidence is needed on the long-term outcomes for children of experiencing online sexual exploitation and abuse. For example, more evidence is required on recovery time and on children's capacity to form healthy attachments to trustworthy others in both the immediate aftermath and later in life.

■ We need to understand the offline context of children's lives to identify risk and protective factors for online sexual exploitation and abuse and how to support children's ability to cope. What role do cultural taboos and poverty or inequality play in facilitating sexual exploitation and abuse online or offline?

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239 (Backe et al., 2018; Hellevik and Øverlien, 2016; Reed et al., 2016)

240 (Reed et al., 2016)

241 (Hellevik and Øverlien, 2016)

242 (Van Ouytsel et al., 2016)

243 (Smith-Darden et al., 2017)

244 (Smith-Darden et al., 2017)

245 (Smith-Darden et al., 2017)

246 (Smith-Darden et al., 2017)

■ If we are to understand online sexual exploitation and abuse, we need more evidence to explain the pathways between children's online and offline vulnerability, their exposure to online sexual solicitation and their response to it. This would entail developing a model mapping the digital ecology, perpetrators' behaviours, children's digital skills and online activities, and children's background and living environment (home, school, community) with the occurrence of sexual solicitations and sexual abuse. There are inconsistencies and variations in how researchers define, measure and explain online sexual exploitation and abuse. This creates challenges for identifying a clear model of vulnerability and protection. In most studies, the relationship between children and the perpetrators is unclear. Further gaps relate to the online platforms where such interactions happen and how they unfold.

■ There is more focus in the literature on associations between online sexual exploitation of children and other risk factors and much less on the experiences of harm and the long-term impact on children's well-being and outcomes.

■ There needs to be an exploration of the nature of online platforms, applications, services and networks to understand how these may facilitate or protect against child sexual exploitation.

9. MENTAL HEALTH AND WELL-BEING

The studies we reviewed typically offer a narrow measure of children's psychological well-being. A more comprehensive model is needed. A promising solution can be offered by the work of Ryff, an American academic and psychologist, which is among the most popular conceptualizations of psychological well-being.[247] Her model of well-being incorporates measures of six dimensions: self-acceptance, positive relations with others, personal growth, purpose in life, environmental mastery, and autonomy. This model has been successfully applied by The Children's Society in its international survey of children's well-being (Children's Worlds), which in wave 3 involves child participants aged 8–12 years from 40 countries around the world.[248] This research makes connections between well-being and children's lives and daily activities, their time use and their own perceptions and evaluations of their well-being. Ryff's model can be supplemented by measures of depression, self-harm and life satisfaction. It is worth noting that well-being may be positioned as an outcome or as an input, for example, as a measure of child vulnerability.

We identified 34 studies on digital technology and its relation to mental health and well-being, most of which are based in Europe (Belgium, Estonia, Hungary, Italy, Lithuania, the Netherlands, Northern Ireland [United Kingdom], Norway, Spain, Sweden, and Wales [United Kingdom]) and North America (Canada and the United States). A smaller number of studies address the context in parts of Asia and the Middle East (China, the Islamic Republic of Iran, Israel, the Republic of Korea, Taiwan Province of China and Thailand). The research is predominantly survey-based, with only one qualitative study[249] and one meta-analysis.[250] The majority of quantitative studies are cross-sectional and face methodological issues such as small or convenience samples. There are several longitudinal studies[251] in the review but some of them are limited in their findings by sampling issues.

Key findings

- Long-term outcomes related to children's well-being, mental health or resilience are rarely explored. The evidence on how factors related to digital device and internet use may intersect with offline factors and predict child well-being requires development.

- The evidence on the impact of children's internet use on mental health and well-being is mixed and inconclusive. Some studies show a positive association between internet use and negative outcomes, such as anxiety, depression, suicidal thoughts and panic disorder, while others show a negative association, and some studies show no relationship at all.

- In most cases, there is only evidence about an association, not causality. A child who uses the internet excessively and experiences poor mental health may be using digital technologies as a way of coping with pre-existing issues.

- The internet can have a positive effect on mental health and well-being. Children who receive mental health support online or who can talk about their problems with friends online have reduced depression levels.

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247 (Ryff, 1989)

248 For more details, see: Children's Worlds, www.isciweb.org/

249 (Jacob et al., 2017)

250 (Fedele et al., 2017)

251 (Heffer et al., 2019; Hokby et al., 2016; Pabian and Vandebosch, 2016; Pace et al., 2019; Ra et al., 2018; Shimoga et al., 2019; van der Schuur et al., 2019; Vannucci and McCauley Ohannessian, 2019)

■ What matters for children's mental health is less the time spent using the internet and social media and more how children use their time online and the consequences of that use.

A recent UNICEF review on the impact of digital technology use on children's mental health and well-being found that the evidence to date is largely inconclusive. It concludes that children's use of digital technology is more often assessed in terms of the time spent online rather than by measuring such factors as the type of online activities children engage in, or the context of internet use.[252] This evidence review found similarly mixed results. While some studies show a positive association between internet use and mental health problems, others find a negative association[253] or no association at all. For example, findings from cross-sectional and longitudinal studies conducted in China, the Islamic Republic of Iran, the Republic of Korea and the United States show a significant association between increased digital, social media or internet use and higher levels of anxiety, depressive symptoms, suicidal ideation, panic disorder and attention deficit hyperactivity disorder (ADHD).[254] This association is stronger among children who do not live with either of their parents.[255]

In contrast, three longitudinal studies from Canada, European countries and the United States found no a significant direct impact of the time children spend using digital technologies, such as social media, the internet and texting, on their mental health in terms of depression and anxiety.[256] Another study found that moderate social media use was associated with the highest levels of mental well-being, compared with either too much or too little social media use.[257]

It is plausible that these conflicting results stem from the different ways in which digital media use is measured. Comparing longitudinal studies, it seems that those that find no relationship with mental health measure use in terms of hours spent online per day or per week. Studies that do find an association measure the number of times per day or per week that children use certain digital platforms or do specific activities such as sending messages or using social media.

Several studies show that what matters for children's mental health is not merely the time spent using the internet and social media, but rather how children use this time, what they experience online and the consequences of that use. More specifically, it is the negative perceived impact of high levels of internet use or social media stress on sleep loss and withdrawal (negative mood when the internet is inaccessible) that indirectly mediates the adverse effect on mental health over time.[258] Another study found that children who report frequent, daily use across all social media platforms suffer worse mental health problems compared with low social media use subgroups.[259]

The possible causal relationship between intense internet use and decreased mental health and well-being is rarely studied. Hence, it is often difficult to say whether excessive use of digital technologies is

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252 (Kardefelt-Winther, 2017)

253 (Liu et al., 2016; Lee et al., 2016)

254 (Khodarahimi and Fathi, 2017; Zhang et al., 2019; Kim, 2017; Ra et al., 2018; Vannucci and McCauley Ohannessian, 2019; Lim et al., 2017)

255 (Lee et al., 2016)

256 (George et al., 2018; Heffer et al., 2019; Hokby et al., 2016)

257 (Shimoga et al., 2019)

258 (Hokby et al., 2016; van der Schuur et al., 2019)

259 (Vannucci and McCauley Ohannessian, 2019)

the cause or consequence of poor mental health. In fact, one study found evidence of reverse causation, where greater depressive symptoms predicted more frequent social media use, although only among girls.[260] Most studies do not show significant gender differences in these associations.

A study in the United States of 5,593 students aged 12–17 years examined digital self-harm, defined as the "anonymous online posting, sending, or otherwise sharing of hurtful content about oneself". The authors found that it was significantly correlated with experiences of depressive symptoms.[261] A qualitative study with children with a previous history of self-harm revealed that the internet can act as a catalyst for children's self-harm behaviours, normalizing them through their participation in online communities where others share self-harm practices and techniques, and through easy access to images that invoke a physical reaction and inspire behavioural enactment.[262]

Digital self-harm is also associated with other experiences of violence and risk, both offline and online, such as school bullying and cyber-bullying, drug use, and participation in various forms of adolescent deviance, such as attacking someone or stealing. These results tie in with the evidence of the positive association between cyber-bullying victimization and online sexual solicitation among children and suicidal thoughts, depression and anxiety.[263]

Another group of studies demonstrates the positive impact of internet use on mental health and well-being. Higher levels of children's well-being are positively associated with receiving mental health support online and with speaking to friends online regarding personal problems.[264] Similarly, decreased levels of depression are associated with freely revealing negative emotions online.[265] Social media use can be a positive coping mechanism for socially rejected children because they tend to use it to share their personal difficulties.[266] A positive effect on mental health is also observed when internet use is perceived to make life more meaningful, improve school grades or enhance performance.[267] Thus, besides time spent online, it is important to understand the ways in which children use the internet and social media, what they are exposed to while online and the mediating perceived consequences of that use, to have a better idea of the impact on their mental health.

An overwhelming majority of the studies we reviewed do not measure outcomes at all. Instead, they describe the incidence of certain behaviours but leave their consequences unexplored.[268] Among the studies that do examine outcomes, most outcomes measured in online risk research are immediate and topic-relevant. Long-term outcomes, such as well-being, mental health or resilience, are rarely explored. For instance, in studies of cyber-bystanding, one outcome measured is that of expressed empathy with the victim following an intervention. But the long-term consequences of being a cyber-

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260 (Heffer et al., 2019)

261 (Patchin and Hinduja, 2017)

262 (Jacob et al., 2017)

263 (Fisher et al., 2016; Hinduja and Patchin, 2019; Kim et al., 2018; Nikolaou, 2017; Chang et al., 2016a; de Santisteban and Gámez-Guadix, 2018)

264 (Best et al., 2016)

265 (Xie et al., 2018)

266 (Ophir, 2017)

267 (Hokby et al., 2016)

268 (Delgado and Escortel, 2018; Razjouyan et al., 2018)

bystander are not examined.[269] In studies of online sexual solicitation, a short-term outcome measured may be help-seeking from friends or family, while longer-term outcomes that may be related to well-being and mental health are not explored.[270]

Efforts to tackle long-term consequences present a methodological challenge for cross-sectional studies. Measures of well-being may be positioned as an outcome or as an input, such as a measure of child vulnerability. Studies that acknowledge this problem tend to posit a bidirectional or transactional process, whereby more vulnerable young people may become drawn into online risk and, in turn, find themselves more likely to experience harm, or they simply observe correlations. For instance, one study[271] found a correlation between sexting and negative mental health and well-being, such as suicidal thoughts and behaviours, and body image concerns.

Strikingly, we found few studies exploring the consequences of online sexual solicitation on victims' well-being. The literature clearly assumes that these are adverse, but the evidence (and the measures needed) are underdeveloped; the Disrupting Harm project will address this gap. In the research on sexting, there is little examination of outcomes, which is also problematic, though here the outcomes are less certain since sexting can be either a voluntary or a coerced behaviour.

Limitations and suggestions for further research

■ One substantial gap in the literature relates to the lack of a comprehensive approach to studying the relationship between internet use and well-being and how offline factors may influence outcomes. Cross-national research on children's well-being in relation to the offline domain demonstrates the importance of a wide range of child-related factors. These include age, gender, home context, family relationships, peer relationships, school context, teacher relationships, neighbourhood quality,[272] health and safety, and risk behaviours, such as obesity, substance abuse, violence, and sexual risk-taking.[273] Country-level factors, such as gross domestic product and income inequality, are not strong predictors of child well-being.[274] We found no studies examining how factors related to digital device and internet use may intersect with offline factors and predict child well-being. This highlights the need for further research.

■ With few exceptions, most studies focus on the impact on mental health of time spent using the internet, without considering the nature or context of the different activities that children engage in online. When testing the impact of time spent online, researchers rarely include variables related to the perceived quality of online experiences or issues to do with online victimization, such as cyber-bullying.

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269 (Knauf et al., 2018)

270 (DeMarco et al., 2017)

271 (Milton et al., 2019)

272 (Newland et al., 2019)

273 (UNICEF Office of Research – Innocenti, 2007)

274 (Newland et al., 2019)

10. THE FUTURE RESEARCH AGENDA

■ Robust, high-quality and comparable research is still necessary. In many areas, our knowledge remains tentative. The large majority of studies we found are based on small or non-representative samples, involve correlational analyses of cross-sectional data and control for a limited number of background variables. While such studies offer some insights, their limitations make it difficult to establish whether the effects observed are due to digital technology use or other factors from the child's wider life environment.

■ We need a better representation of the diversity of children's circumstances. At present, most research examines the experiences of older children and those from the global North. Evidence on the pre-teenage years and from global South countries is sparse. Filling these gaps will enhance our understanding of the pathways to harm and vulnerability, and the protective factors that help to build resilience.

■ We still need to learn more about the positive effects of children's internet use. Only one fifth (79 out of 359) of the studies we reviewed explore opportunities and benefits of internet use. In contrast, children's encounters with certain online risks – particularly excessive internet use, cyber-bullying, gambling and problematic gaming – feature heavily in the research literature.

■ Many studies examine the effects of the time children spend using the internet, without including variables related to the perceived quality or context of online experiences or experiences related to online victimization, for example, cyber-bullying. This is a serious limitation, which constrains our understanding of which activities are more relevant to positive child outcomes. Even more so as recent research demonstrates that subjective measures of time spent online can be highly unreliable.

■ There are significant cross-country differences in children's exposure to opportunities and risks. We need to draw on conceptually and theoretically sound models of children's internet use to develop a better understanding of what factors are significantly associated with positive and negative experiences, and how much these matter for different groups of children. To do so, we also need more consistent definitions and measures of those factors to enable comparative research.

■ More evidence is needed on the outcomes of children's internet use. While studies may link children's online experiences to predictive factors in their life circumstances, they rarely follow up on the consequences of children's internet use over time, to document either benefits or harms. The evidence is particularly scarce in relation to long-term outcomes such as well-being, mental health and resilience, which require longitudinal research. To develop the longitudinal evidence base in this field, we need more long-term investment funding for and research commitment to the study of children's outcomes, implementing efficient ways to account for the rapid changes in the digital environment.

■ We still lack an understanding of how the different research themes covered in this report are linked, for example, children's online risks and opportunities and the factors that influence both. Although Global Kids Online and other projects have proposed models to explore these relations, and generated hypotheses about how these shape children's well-being in an increasingly digital world, few recently published studies have tested these models.[275]

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275 We have begun this process in our recent 11-country comparative report comparing Global Kids Online findings for cross-national similarities and differences, see: http://globalkidsonline.net/synthesis-report-2019/

- We need a better understanding of children's digital ecology. There needs to be some exploration of the nature of digital devices, online platforms, applications, services and networks to understand how these may facilitate or protect against online risk and harm.

- More evidence is needed to explain the pathways between children's online and offline vulnerability, exposure to both offline and online risks, and children's responses to risk. Investigating these pathways would entail developing a model of mechanisms mapping the digital ecology, perpetrators' behaviours, children's digital skills and online activities, and children's backgrounds and living environment (home, school, community) with the occurrence of different types of risk and harm online. This should be done using a combination of analyses of personal, country-level and digital ecology factors that can foster or prevent children's exposure to risk.

- There is an urgent need for child-centred research methods to complement the recent evidence.[276] We still do not understand anywhere near enough about how children see these issues. We need research on cultures of childhood, as they are experienced by children themselves. For example, we need research on forms of sexual exploration online that may be tolerated or even encouraged because they have positive impacts on children's evolving identities. There is a need for researchers to conduct more studies that allow children to talk about online experiences in their own words.[277]

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276 For more on child-centered research see Third et al. (2017, 2020).

277 For further suggestions, see Stoilova et al. (2020).

APPENDIX: METHODOLOGY AND SEARCH PROTOCOL

1. Databases and search terms

Web of Science and Scopus were chosen as the two databases that yielded the largest number of high-quality results and allowed additional filtering for relevance (e.g., by discipline), based on our previous evidence review work.[278]

■ Web of Science Core Collection – provides access to articles covering all aspects of science, the social sciences and the humanities from more than 20,000 journals, plus around 1.4 billion references. The journal selection process is publisher-neutral and applied consistently to all journals from 3,300 publishing partners. Existing titles are reviewed to maintain quality levels.

■ Scopus – indexes content from 24,600 active titles and 5,000 publishers. This is rigorously vetted and selected by an independent review board. It includes peer-reviewed literature from scientific journals, books and conference proceedings in the fields of science, technology, medicine, the social sciences, and the arts and humanities.

■ We supplemented these databases with additional resources (n=5) suggested via a consultation with experts.

Search terms

Each search included a combination of title, abstract and keywords, blending several groups of keywords:

Search 1
■ Group 1, **child** terms: child* OR youth OR teen* OR adolescen* OR minor OR kid OR girl OR boy OR pupil[279] (in title)

■ Group 2, **technology** terms: digital* OR mobile* OR internet OR online OR social media (in title)

■ Group 3a, **method** terms: survey OR questionnaire OR review (in title, abstract or keywords)

■ **Web of Science categories** (by number of studies): psychiatry (69), psychology multidisciplinary (68), education educational research (42), psychology experimental (40), health care sciences services (37), communication (33), paediatrics (32), medical informatics (31), psychology developmental (28), family studies (26), social work (26), psychology clinical (24), psychology social (21), social sciences interdisciplinary (21), multidisciplinary sciences (15), criminology penology (12), psychology educational (6), nursing (5), psychology applied (5), computer science information systems (4), sociology (4), behavioural sciences (3), education special (2), humanities multidisciplinary (2), computer science interdisciplinary applications (1), development studies (1), education scientific disciplines (1), psychology (1), social issues (1)

■ **Scopus subject areas** (by number of studies): medicine (321), social sciences (209), psychology (195), computer science (83), arts and humanities (53), nursing (27), multidisciplinary (2)

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278 (Livingstone and Stoilova, 2019; Livingstone et al., 2017; Stoilova et al., 2019)

279 Initially we included "student" but this resulted in a very high number of irrelevant studies on adult students.

Search 2

- Group 1, **child** terms: child* OR youth OR teen* OR adolescen* OR minor OR kid OR girl OR boy OR pupil (in title, abstract or keywords)

- Group 2, **technology** terms: digital* OR mobile* OR internet OR online OR "social media" (in title, abstract or keywords)

- Group 3b, **method** terms: survey OR questionnaire OR review OR "case study" OR "focus group" OR interview* OR observation (in title, abstract or keywords)

- Group 4, **violence** terms: harm* OR abus* OR exploit* OR bully* OR viol* OR harass* OR groom* OR solicit* OR *extortion OR assault* OR hurt* OR humiliat* OR victim* OR agress* OR coerc* OR blackmail* OR intimidat* OR manipul* OR prostitut* OR porn* OR traffick* OR sexting (in title, abstract or keywords)[280]

- **Web of Science categories** (by number of studies): psychology multidisciplinary (120), family studies (115), psychiatry (111), psychology clinical (104), criminology penology (96), social work (79), social sciences interdisciplinary (72), psychology social (60), psychology developmental (50), education educational research (46), psychology experimental (45), paediatrics (44), communication (43), health care sciences services (42), psychology applied (28), nursing (27), medical informatics (22), multidisciplinary sciences (20), sociology (19), psychology educational (18), psychology (14), women's studies (11), computer science information systems (9), social issues (7), behavioural sciences (6), anthropology (4), film radio television (4), social sciences biomedical (4), computer science artificial intelligence (3), computer science interdisciplinary applications (3), Asian studies (2), ethnic studies (2), telecommunications (2), cultural studies (1), educational scientific disciplines (1), education special (1), humanities multidisciplinary (1), urban studies (1)

- **Scopus disciplines**: medicine, social sciences, psychology, nursing, computer science, arts and humanities, multidisciplinary

The above search protocol was determined following the testing of different options. For example, it would have been preferable to search the title, abstract and keywords for group 1 and 2 words in search 1 but this produced 15,550 search results in Web of Science only, which was unmanageable in a rapid evidence review. This search also produced a high number of irrelevant results. Hence, search 1 was reduced to group 1 and 2 words in the title only, which worked better.

2. Results and screening

Search 1 produced a total of 1,001 results (n=397 in Web of Science and n=604 in Scopus). Search 2 produced 1,084 results (n=810 in Web of Science and n=274 in Scopus). These were pooled, yielding 2,085 combined search results. Five more studies were added based on expert suggestions. After removing the duplicates, there were 1,587 unique search results, which were screened.

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280 The online violence terms were generated from relevant reports. For example, UNICEF (2017), ECPAT International (2016), Quayle (2016).

Screening

■ *Phase 1*: The results (n=1,582) were screened based on title and abstract, and the results not meeting the inclusion criteria were removed (n=1,136).

■ *Phase 2*: The full text as screened for the remaining texts (n=446), applying the same criteria for relevance and a new requirement for methodological rigour, and removing all studies that do not meet the criteria (n=63). Results for which the full text was unavailable were also removed (n=24), creating a final sample for analysis (n=359).
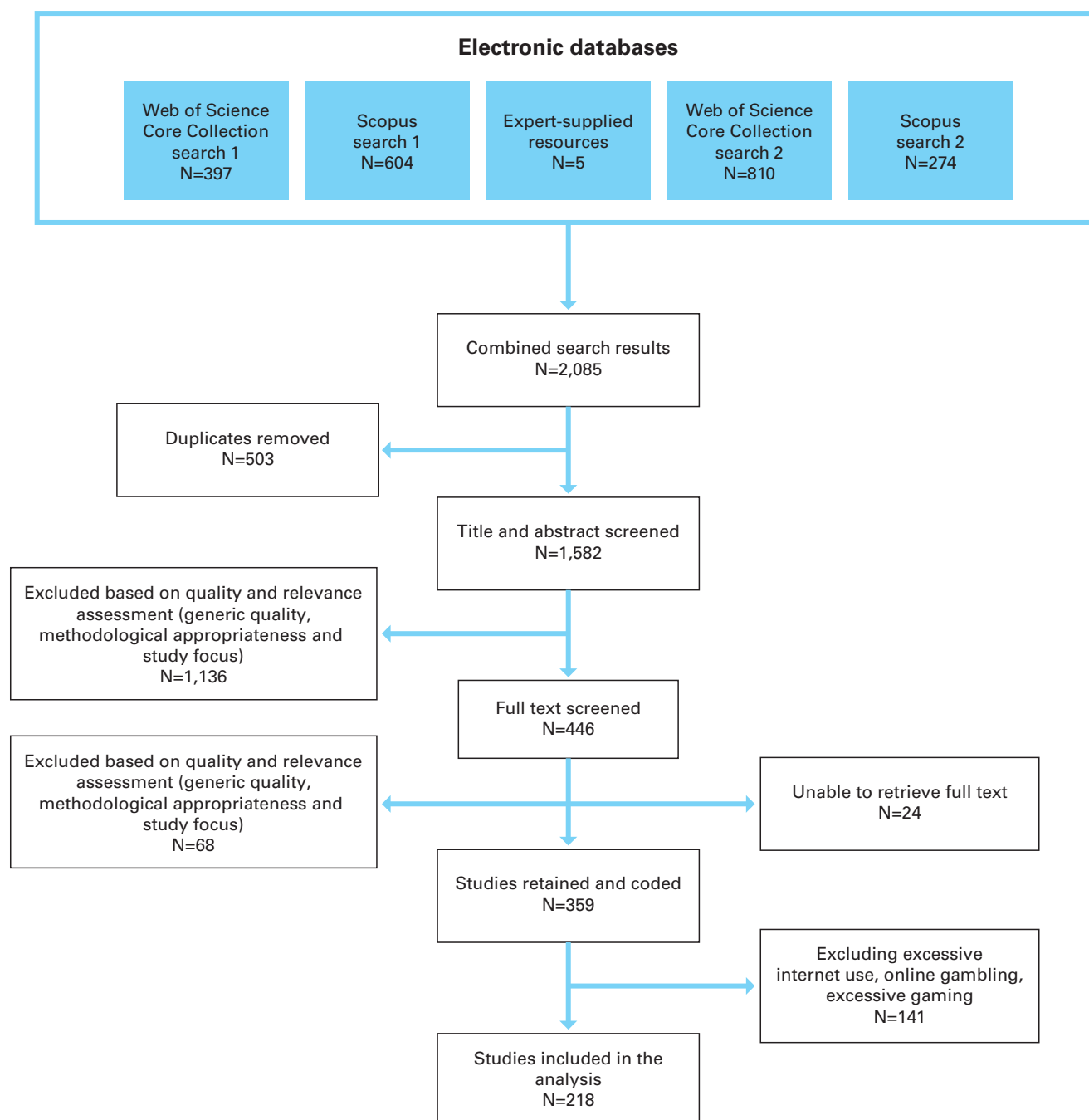
In relation to the particular focus on harm, most of the studies were based on research with adults (either victims or perpetrators) or case files, rather than research with children. Several studies also analysed online interactions between children and perpetrators. These were also excluded.

Exclusions

The exclusions made during the screening mostly related to:

■ App/software/online content development: studies discussing the development or effectiveness of online content/apps (depression prevention, obesity, illness recovery, substance use, smoking, drinking) or marketing research (e.g., customer satisfaction).

■ Technology-related words producing irrelevant results: mostly these were online research methods (online interviews, surveys, focus groups, forums, online panel studies) used to study non-internet-related issues and occasionally cases where 'mobile' is not related to technology (e.g., 'mobile pastoralists').

■ Child-related words producing irrelevant results: the exclusions here relate to some results focusing on young adults or university students, as well as practitioners working with children (youth workers, medical practitioners, teachers); adult children; or adult perpetrators of online violence against children.

Figure A.1.: Search protocol and outcomes

Electronic databases

| Web of Science Core Collection search 1 N=397 | Scopus search 1 N=604 | Expert-supplied resources N=5 | Web of Science Core Collection search 2 N=810 | Scopus search 2 N=274 |

Combined search results
N=2,085

Duplicates removed
N=503

Title and abstract screened
N=1,582

Excluded based on quality and relevance assessment (generic quality, methodological appropriateness and study focus)
N=1,136

Full text screened
N=446

Excluded based on quality and relevance assessment (generic quality, methodological appropriateness and study focus)
N=68

Unable to retrieve full text
N=24

Studies retained and coded
N=359

Excluding excessive internet use, online gambling, excessive gaming
N=141

Studies included in the analysis
N=218

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