Understanding children and young people as digital citizens

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DigiGen

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The impact of technological transformations on the Digital Generation
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Executive summary

The DigiGen project address the impact of technological transformations on the Digital Generation – of children's and young people's everyday lives focusing on the domains of home (family), their leisure time, education, and their civic participation. Our goal has been to uncover both the harmful and beneficial effects of digitalization on children and young people's skills and competence, wellbeing, involvement in bullying/harassment, level of trust and processes of democratization. This is achieved through uncovering in what ways children and young people use digital technology and with whom they interact, in what ways digital technology is meaningful to them and how digital technology may be seen as enabling or disabling their wants and needs. For this purpose, the project has developed a conceptual model to understand children's and young people's shaping of digital technology within and across the domains of their everyday lives, labelling these domains *the digital ecosystems.* The model considers the vulnerability and risks that the younger generation face but also the competence-building, skill-enhancing creativity brought forth by their own initiative and agency.

Through the active involvement of children and young people, the project has been designed to generate insights that have the potential to impact upon developing effective policies and practices across Europe. Furthermore, the inclusion of children and young people as co-researchers has allowed us to uncover what is meaningful to them when using digital technology and what is less meaningful.

Data and methods

This working paper builds on extensive qualitative data collected in 2020-2022 through individual interviews, focus group interviews and observation from 588 children and young people aged 5 to 18 in eight European countries, in addition to secondary analyses of existing databases on European children's and young people's well-being highlighted through their use of digital technology. Also, parents, teachers and other stakeholders have been interviewed. The analyses of qualitative data in this report have been prepared by scoping reviews of existing literature within each of the four domains. The scoping reviews have helped to highlight the continued focus in research on the multitude of risks such as internet addition, risky online behaviour, continued focus on screentime, the importance of parental mediation and a range of studies describing the individual and structural characteristics that represent and explain digital inequalities.

Main findings

The results of the research from DigiGen do show a continued lack of equal access (digital depravation), which can affect children's and young people's engagement and confidence in using digital technology. In our work on the **family,** we find that a lack of access can contribute to exacerbating inequalities as children and their parents may not be able to develop sufficient digital competences to be able to understand risks or to take measures to avoid them. The importance of parental mediation and the avoidance of overprotection should be explored further as an important contribution to understanding how this can contribute to reducing harm and increasing the benefits of digital technology.

For children and young people their **leisure time activities** are a fundamental element in their socialisation. Gaming and the use of social media are a significant part of the everyday lives of children and young people. For them playing together or connecting with friends via digital games such as Minecraft, Roblox or Fortnite allow for the development of crucial skills such as communication and collaboration, but also help maintain close friendships even during situations such as the COVID-19 pandemic. Likewise, these arenas are used for chats or videocall in order to do homework together or to share news and events. Acquiring one's first smartphone is considered by many a milestone and it allows the children more freedom. However, children owning their personal devices can also be used to infringe upon children's rights to privacy especially if it is used as a surveillance device.

For **education** challenges seem to revolve more around lack of teacher's competence as children and young people often feel their own digital skills surpass those of their teachers. Yet, digital inequalities within education exist, which can increase already existing vulnerabilities (both situational and innate). Both within and between the countries participating in this project there exist large gaps where some children and young people do not have the same access to digital devices. The ability of schools to develop sufficient digital skills means that this inequality in hardware and digital divides can lead to an inequality in outcomes. This in turn can lead to further social exclusion for some groups and where this social exclusion can lead to even further exclusion such as being left out of school functions or even ghosting of individuals by their classmates. Yet, within education the use of digital technology can help make learning more enjoyable and foster a sense of autonomy and support self-regulated learning. Furthermore, the blurry boundaries between home, leisure time and education brought on by digital technology have become clearer as a result of our data.

In terms of young people's **civic participation** digital technology allows them the ability to speak out for marginalised groups and to develop a sense of civic responsibility. Our research uncovered discourses surrounding social justice, a fight against racism and sexism as well as a concern for or lack of trust, in some cases, of political parties and to commercial platforms. What was clear is the link between speaking out, but also a concern for caution against surveillance, harassment, and general narrow-mindedness. Yet, in some cases some of the youth led activist groups are supported by tech savvy social media activists that are slightly older and who work as mentors in how to communicate their messages. What we do see in the older group of young people, age 16 and up, is that they find importance in their political or social justice activism, which is linked to, among other things, self-improvement, "being knowledgeable" and feeling included in something larger than themselves.

Policy recommendations

Following three years of research on the impact of digital transformations on children and youth, DigiGen has developed recommendations for policy and practice, acknowledging the need for proper governance distribution to support children in the digital era: through regulation, industry self-regulation, and civil society's awareness raising. This can be done by employing a more holistic approach to **digital access and competency**. The following recommendations are addressed to EU policy frameworks as seen through the 2030 Digital compass, the European way for the Digital Decade, i.e. the European Pillar of Social Rights Action Plan, the draft European Declaration on Digital rights and Principles for the Digital Decade, the Better Internet for Kids + strategy, the EU Digital Education Action Plan.

a. *Access*

Ensure that all children and young people have access to digital devices, connectivity, and to a digital environment that enables their active participation as digital citizens.

For EU and national legislators and policy makers:

- Mapping and reducing digital divides.
- Ensuring children's and young people's rights to participate in the digital environment are appropriately balanced with protection obligations.

For technology industries:

- Digital opportunities for all children, not just those who have access.
- Create digital spaces which allows children and young people to participate actively as digital citizens by design.

For civil society's awareness-raising:

- Integrating the voices of the Digital Generation.

b. *Competency*

Ensure that all children and young people are supported in developing digital competences (digital skills, media literacy and social competences).

For EU and national legislators and policy makers:

- Support children's and young people's development of digital competences (digital skills, media literacy and social competences) across their digital ecosystems.
- Recognise children's and young people's agency in developing their own and others' digital competences.

For technology industries:

- Develop innovative tools to support parents in digital technology mediation that support the development of social digital competences through operationalising co-creation, negotiation and co-activity.
- Offer opportunities to bridge the worlds of school and home, education and play to create positive and inclusive environments for children's and young people's development as digital citizens.

For civil society's awareness-raising:

- Foster enabling environments for the development of digital competences (digital skills, media literacy and social competences) across children's and young people's digital ecosystems.

List of abbreviations

ASD	Autism spectrum disorders
BIK	Better Internet for Kids strategy
BLM	Black Lives Matter
DoA	Description of Action
DSW	Digital storytelling workshop
DT	Digital technology
CAI	Computer-assisted instruction
CIL	Computer and information literacy
COVID-19	Coronavirus disease 2019
CT	Computational thinking
DGBL	Digital game-based learning
EC	European Commission
EIU	Excessive internet use
EST	Ecological systems theory
EU	European Union
EU-SILC	European Union statistics on income and living conditions
FOMO	Fear of missing out
HISEI	Highest international socioeconomic index of occupational status
IA	Internet addiction
ICILS	International study of computer and information literacy study
ICT	Information and communication technology
IGD	Internet gaming disorder
LD	Learning difficulties
LGBTQ+	Lesbian, gay, transgender, intersex, queer/questioning (evolving acronym)
NGO	Non-governmental organisation
NSC	National stakeholder committee
OLS	Overall life satisfaction
PCA	Principal content analysis
PISA	Programme for international student assessment
PVP	Problematic videogame playing
SES	Socioeconomic status
SLD	Specific learning difficulties
TIMSS	Trends in mathematics and science study
UN	United Nations
UK	United Kingdom
XR/Youth	(E)Xtinction Rebellion/Youth

Part I

Introduction, background, data and methodology

1. Introduction

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The topic **DT-TRANSFORMATIONS-07-2019: The impact of technological transformations on children and youth,** to which DigiGen has responded invited projects that address the impact of technological transformations on children and young people in relation to: **harmful** versus **beneficial effects of ICT use in their everyday lives across different systems**. In our work we identified a set of systems that are important in the lives of children and young people in order to capture the impact of technological transformations. The systems we have focused our research on include the family (home), leisure, education and the wider community (civic participation). Under each of these systems, we have taken a closer look at how ICT and digital technology in general have impacted on the everyday lives of children and young people. Moreover, we have assessed how children and young people are affected differently according to important characteristics related to socioeconomic background, gender, age group and culture. DigiGen's particular concern has been with both the harmful and beneficial effects of digitalisation on children and young people's **skills** and **competence, wellbeing, health, involvement in bullying/ harassment, level of trust** and **processes of democratisation**. Through the **active involvement** of **children** and **young people**, the project has been designed to generate insights that have the potential to impact upon developing effective policies and practices across Europe.

1.1. Main research question and the differing discourses on digital technology

DigiGen aims to increase our understanding of how and why some children and young people benefit from using digital technology while others are impacted negatively. It should be evident that answers to this question depend on our view of digital technology, meaning how we perceive, understand and talk about digital technology, especially with regards to the worries and hopes we may have for children and young people now and in the future. This perspective moves the question of the impact of technological transformations on the younger generations away from the technology itself and into the social and cultural sphere. Baym (2010, p. 23) has phrased this as: "When we are communicating about digital media, we are communicating about ourselves, as individuals, groups and societies." At the centre of these conversations are our values, norms and concerns for the interactions we have with other people – our interpersonal relationships, entangled with social and psychological issues of authenticity, privacy, well-being and personal growth.

Baym (2010) points out three different discourses surrounding the use of digital technology, directing the main arguments and outcomes of public and academic debate on this subject:

- Technological determinism.
- Social construction of technology.
- Social shaping of technology.

The three discourses exist in parallel, and while the first two are contrastive, there is a dialectic relationship between these and the third discourse in how they view an eventual causal relationship between digital technology and humans.

The discourse of technological determinism (Baym, 2010) depicts people being used by digital technology rather than people using it to achieve different ends. When this discourse is reflected in academic research, we typically see studies on screen time correlated with diverse negative outcomes, such as loneliness or health problems. However, in public debate, technological determinism may also point to positive outcomes, such as how access to digital content in the classroom may increase curiosity, level of information and therefore students' learning. A common argument in a different sphere concerns how technology may connect people and enable them to debate ideas and views, contributing to democratic deliberation – or, in stark

contrast, lock them inside digital echo chambers deafening oppositional arguments. All these fears, hopes and expectations are in their essence deterministic in what they assume that technology will do to us.

In contrast to technological determinism is **the discourse of social construction of technology** (Baym, 2010). The discourse of social construction inverts the relationship between technology and people, placing people's use and the social factors impacting on this usage before the technology itself. Here we see a wide range of social, economic, cultural and also industrial, manufactual and governmental factors affecting how technology is used by us and by our children. In the discourse of social construction, technology may actually be invented as a consequence of these factors, indicating social and economic change. Here Baym (2010) introduces a third discourse on technology, namely that of social shaping. She positions the discourse on social shaping of technology between technological determinism and social constructivism and sees the consequences of technology as dependent on a mix of the social capabilities that digital technologies create and the developing and often unexpected use that people make of the opportunities offered by the technology.

The discourse on social shaping of digital technology (Baym, 2010) further implies that change and development in use of the technology can be initiated by people, technology and institutions alike. As in the discourse of technological determinism, digital technology is both good and bad depending on its use. Baym (2010, p. 44) writes: "Machines can and do accelerate certain trends, magnify cultural weaknesses, and fortify certain cultures while eroding others." Baym (2010, p. 45) continues that in this perspective, we need to consider not only how societal structures and changes may spur the development of technologies but also the opportunities and constraints that the technologies represent to the social practices in people's everyday lives. Here the concept of domestication becomes relevant, denoting the stage when technologies move from being new and figuratively wild and untamed to being what Baym describes as deeply embedded in everyday practices without necessarily losing the complexity which the use of these technologies may entail. Overall, the discourse on social shaping combined with the concept of domestication of technology sees the human relationship with technology as emergent, not deterministic.

It is within this *emergent state,* characterised by social shaping of children's and young people's use of technology, that we find the work of the DigiGen project. With this project, we try to understand what the younger generation does with digital technology and how they react to being surrounded by this technology in everyday life, meaning within the family, for leisure time, in schools and as democratic citizens. When we also incorporate the social construction perspective in our analysis, we view the impact of technology on children and young people mainly through social and economic conditions in society and in the family background of individuals, enlarged or diminished by access, skills and competencies. Our ambition is to feed the results of this project back to families, schools and other practitioners by scaffolding their digital practices involving children and adolescents. We further present the results from DigiGen to policymakers and industry with an aim to influence legislative, ethical and manufactual aspects of digital technology, believing that institutional action can contribute to all children and young people being able to enjoy digital technology and reap the benefits that it may represent.

1.2. The DigiGen conceptual model and the project's empirical research questions

From the beginning of the project, the concept and overall approach of DigiGen have been presented in a theoretical framework taking its point of departure from ecological systems theory (EST). Originally formulated by Bronfenbrenner (1977), EST describes the different contexts surrounding the individual child. Hence, EST is regularly illustrated as in Figure 1.1, with concentric circles denoting the social contexts or spheres closer to or more distant from the individual child in the centre, such as family, friends and school (close), and political and cultural influences (distant). Bronfenbrenner (1977) labelled the sphere closest to the child the "microsystem" (where the child is present as an agent), followed by the "mesosystem" (the interplay between a child's different microsystems), then the "exosystem" (settings that influence the child, but the child does not directly participate) and finally the "macrosystem"

(broad cultural systems, societal views or ideologies with long-term consequences for the child). Later, Bronfenbrenner (1986a, 1986b) added the chronosystem to EST, indicating the dimension of time in the child's development. Events in the chronosystem may have different impacts in the ecosystems surrounding the child, that is, the parents' divorce may impact on the microsystem of the family, while the COVID-19 pandemic impacted on every system from micro to macro.
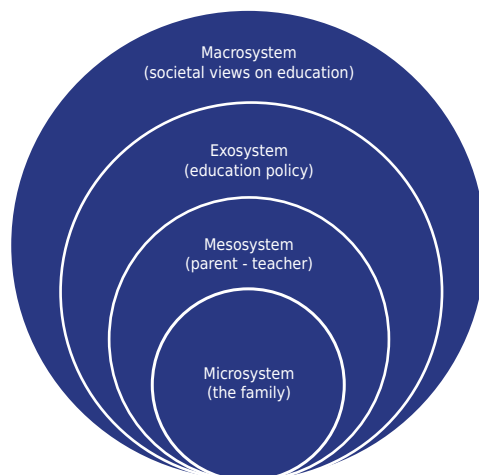
Figure 1.1: Basic illustration of nested model of ecological systems surrounding a child, originally proposed by Bronfenbrenner (1979). Captions describing examples of each system are from Neal & Neal (2013, p. 725)

Even though EST has been widely used to illustrate and describe the different contexts of a child's life and development, Neal & Neal (2013) point out that the idea of *contexts being nested within each other* does not sufficiently describe the relationship and interplay between these contexts in children's everyday lives. This interplay is represented by the social interaction that takes place between actors both within and between the different contexts or ecological systems. Instead, Neal & Neal (2013, p. 723) propose seeing the ecological systems surrounding a child as *networked,* "where each system is defined in terms of the social relationships surrounding a focal individual, and where systems at different levels relate to one another in an overlapping but non-nested way."
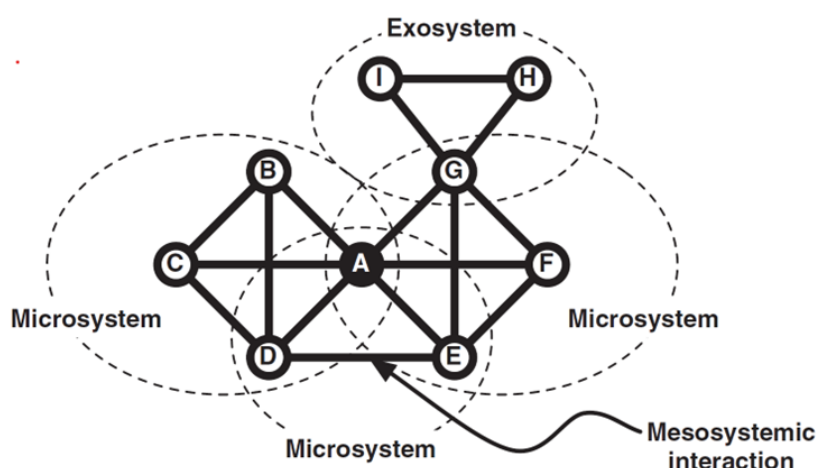
Figure 1.2: Original display of a networked EST model presented by Neil & Neil (2013, p. 728). Permission from the authors has been obtained

Neal & Neal (2013) then reformulate Bronfenbrenner's (1979) original model of EST starting from the position that the contexts of a child's life consist of ecological environments in an overlapping arrangement. This networked organisation of EST is illustrated in Figure 1.2, where

the capital letter A in the middle represents an individual child. Capital letters B–G in Figure 1.2 represent individuals being in direct contact with the child within three different microsystems (i.e. the family, a leisure activity and the school). When these people connect across different microsystems, mesosystems of social interaction emerge. In contrast to the traditional nested view of ecosystems, this gives a new display of parallel microsystems partially overlapping in mesosystems. Connections between the microsystem and exosystem levels appear when, for instance, a school principal (capital letter G in figure 1.2), from the child's microsystem of the school, interacts with the exosystem of the municipal school board, here represented by individual professionals labelled with the capital letters I and H in figure 1.2. Neal & Neal's (2013) main point is that each ecosystem, from micro- to exo-, is populated by people *doing something* by communicating, creating a network of social interaction. People being in direct or indirect contact with each other across the contexts surrounding the child serve to connect different ecological environments, so that the relationship between these environments is defined by the patterns of their interactions. Neal & Neal (2013) continue Bronfenbrenner's original division of ecological systems from micro to macro. Like Bronfenbrenner, they do not see the macrosystem as built from interactions or social settings, as in the micro-, meso- and exosystems, but refer to the macrosystem as "forces, that shape the patterns of social interactions that define settings [from micro to exosystem level]" (Neal & Neal, 2013 p. 729).

Towards a conceptual model for DigiGen

Neal and Neal's (2013) development of Bronfenbrenner's (1979) original model of EST has inspired the conceptual model for the DigiGen project, where we add a fourth microsystem to Neal and Neal's (2013) networked model, namely that of a digital space for civic participation. The DigiGen conceptual model is displayed in Figure 1.3.
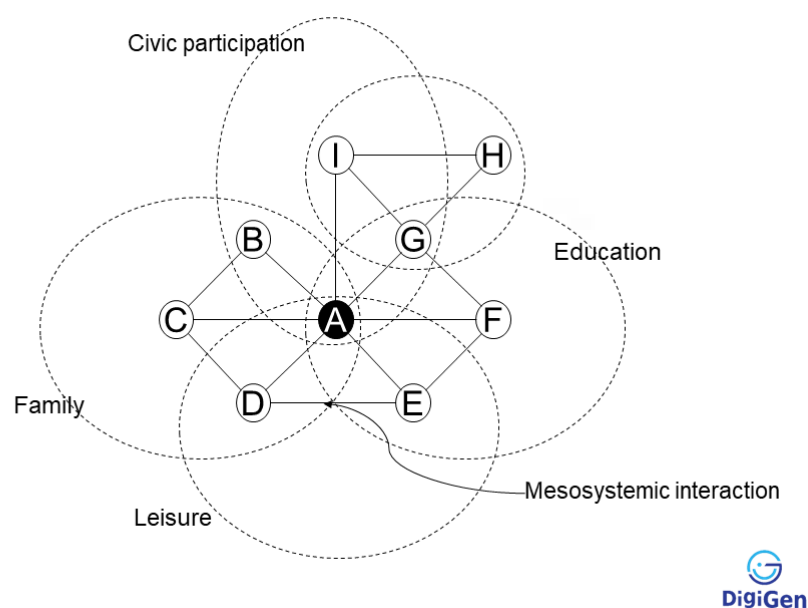
Figure 1.3: Conceptual model for DigiGen displaying four microsystems where children's and young people's use of digital technology takes place, inspired from Neal and Neal's (2013) networked representation of EST

In Figure 1.3, the child indicated by the capital letter A thus belongs to four overlapping microsystems, suggested in the DigiGen project as the family, the school, leisure and also a space where children and young people may use digital technologies for civic participation. As in Neal and Neal's original model (2013), the microsystems are populated with people, indicated here with capital letters B–I. Within the microsystems, the people are in direct contact with the child in the middle using digital technology for that interaction. Some of the people surrounding the child are also connected to each other across the different microsystems, forming a mesosystemic interaction.

If we zoom in on the microsystems, and on the social relationships that characterise them, this networked version of EST allows us to concentrate not only on *where children use* digital technology and *why* they use it but also with whom they interact and how the social relationships that they form, maintain or even disrupt using these technologies shape their daily lives.

What do we gain from viewing children's and young people's daily activities from a networked EST perspective (Neal & Neal, 2013), rather than the nested perspective (Bronfenbrenner, 1977; 1979)? The short answer is that for DigiGen, the networked perspective on EST places people and their interactions at the forefront while maintaining and differentiating between our domains for the use of digital technology in everyday life and keeping the interrelationship of these domains open to examination. When we let these four domains – "Family", "Leisure", "Education" and "Civic participation" – represent different microsystems incorporating the individual child or young person, this sharpens our focus on the social interactions within and across these microsystems and is consistent with the social shaping perspective on technology proposed by Baym (2010).

When looking specifically at the *network* as a feature for working with the EST model, Neal & Neal (2013, p. 735) argue in the following way: "[it] clarifies how ecological systems are related to one another, highlighting that they are not nested, but instead overlap in complex ways." In our view, this breaks down the perceived barriers between the different ecological systems in Bronfenbrenner's (1979) original nested model of EST. Based on the empirical research in DigiGen, this overlap between different domains, or microsystems, of a child's everyday life is necessary to understand the social shaping of technology that takes place both within and between these microsystems. Like Flewitt & Clark (2020), DigiGen sees the boundaries between the everyday domains or settings where a child participates and exercises their agency as porous. This porosity is enhanced by digital technology, and in many instances, it is mediated by such technology in that through participating in digital spaces the child may be present in several microsystems simultaneously.

Bronfenbrenner (1977; 1979) originally proposed the nested EST model for conducting experiments comparing and controlling for different factors in the child's surroundings. From the beginning, one ambition for the DigiGen project has been to present an explanatory model, focussing the project's main research question. According to the project proposal, the model would build on the compilation, synthesis and analysis of the project's data to identify at-risk groups and propose solutions for children's and young people's online resilience. The model would further provide a useful basis for policymakers, civil society organisations and the technology industry, as well as other goods and service providers, to consider risk, resilience and enhancement factors in family life, leisure, education and civic participation.

Viewed from the end of the project, the term *conceptual model* has revealed itself to be more precise than the proposal's original reference to the model as "explanatory". Tondeur et al. (2021) describe the general conceptual model as situated in practical considerations to represent a social phenomenon or process, where the model is expected to bridge theory and practical application. More importantly, Tondeur et al. (2021) distinguish between *scientific models* and *conceptual models* in a way that clarifies what kind of "explanatory power" is attributed to each category (see Table 1.1).

In Table 1.1, five main quality criteria for scientific models originally formulated by Kuhn are contrasted to conceptual models by Tondeur et al. (2021). Thomas Kuhn Bronfenbrenner's original nested model of EST aspires to the scientific model described in this table. The main reasons for presenting the DigiGen "explanatory" model as a *conceptual* model are found in Table 1.1's description of scope (generalisability) and fruitfulness of the latter, where the practical relevance for stakeholders, innovations and further joint efforts of research and practice are of primary interest to our project.

According to Tondeur et al. (2021, p. 2189), conceptual models "can [thus] draw on a bricolage of scientific, social science and professional practice epistemologies and often aim to connect theory and professional practice." This is exactly what we will do in this report, using our development of the networked model of EST (Figure 1.3) as the starting point for a conceptual model for DigiGen. In the following, we address Tondeur et al.'s (2021) five criteria in detail, focussing on Neal and Neal's (2013) original networked model of EST as displayed in Figure 1.2 and then developed for DigiGen in Figure 1.3.

Table 1.1: Comparison between scientific models and conceptual models (Tondeur et al., 2021, p. 2190)

Quality criteria	Scientific models	Conceptual models
Accuracy	Empirically validated	Empirically, practically validated with known limitations clarified
Consistency	Flawless chain of reasoning	Logically related to theories, epistemology and other conceptual models
Scope	Highest possible generalisability	Generalisable when considering goal orientation, process orientation and context sensitivity
Simplicity	Highest possible reduction of complexity	Graphic representation, inspiring parsimony, learnability and usability
Fruitfulness	Explain new phenomena or relationships, inspiration for new approaches to research	Practical relevance, address stakeholders, helps analyse practical situations, inspire practical innovations, enables dialogue and joint efforts of research and practice

Accuracy

For the first criterion of accuracy to be met, the conceptual model for DigiGen must be supported by empirical or practical results. In this context, the empirical model explains a large part of the variance in the data: "A good model of [educational] technology integration should be able to be applied in context before validation, provided known limitations are explicit and transparent", Tondeur et al. (2021, p. 2190). This means that while empirical validation is important for both scientific and conceptual models, the validation in the conceptual model has to fit into practical contexts to fulfil the quality criterion of accuracy. As already shown in Table 1.1, Tondeur et al. (2021) point out that the decisive conditions are that the limitations of the conceptual model have to be clarified. The criterion of accuracy applies to the networked version of the EST model because it is possible to elaborate the model further, as Neal and Neal (2013, p. 733) have already stated in their paper: "A complete discussion and formal validation of network analytic operationalizations of the setting construct would go beyond the scope of the article, but we briefly consider some possibilities that may be useful in the future translation of our theoretical reformulation of EST into a measurement methodology." Even if the original nested version of the EST model (Bronfenbrenner, 1977; 1979) was widely recognised, it seems that "[…] the precise relationships of systems to one another remain elusive" (Neal & Neal, 2013, p. 723). Previous limitations of the model have been extended, as Neal and Neal (2013, p. 723) point out: "Although many applications of EST focus primarily on the microsystem, it is not for researchers' lack of interest in higher order systems but rather for the daunting ambiguity of these systems. The networked model provides more theoretically consistent definitions that clearly specify not only what each system of composed of but also how each system is related to the others."

Consistency

The second criterion, consistency, provides a logical chain of reasoning, also in combination with epistemology and other proven theories. For scientific models, the criterion of consistency is about a flawless chain of reasoning. When it comes to conceptual models, consistency means that the model must be logically relatable to other theories, epistemology and other conceptual models. Therefore, the concept must be clear and focus on the important factors. In addition, the validity must be demonstrable not only for researchers but also for practitioners (Tondeur et al., 2021, p. 2190). Because the concept of EST is often used to focus on social settings (Neal & Neal, 2013, p. 722), it also fits the DigiGen model because in the DigiGen project there

are publications that explore the view of the younger generation on the educational system (Eickelmann et al., 2021). The EST model is theoretically consistent with other models, as Neal and Neal (2013, p. 723) have already stated in their article: "To build this argument, we begin by reviewing the traditional conceptualisation of ecological systems as nested systems and highlight more recent modifications to the theory." This means that the criterion of consistency for conceptual models applies to the DigiGen conceptual model.

Scope

The third criterion of scope is met if the theory is applicable to a wide range of phenomena with a high degree of generalisability. This is already true of Bronfenbrenner's (1977; 1979) original EST model, as Neal and Neal show using data from Google Scholar: "Indeed, Google Scholar reveals that the Ecology of Human Development (Bronfenbrenner, 1979), …, has been cited nearly 15 000 times as of September 2012" (Neal & Neal, 2013, p. 722). Regarding the conceptual model, goal orientation, process orientation and context sensitivity must also be taken into account (Tondeur et al., 2021, p. 2191). A good model is also characterised by the fact that it combines theory and practice and can be specifically adapted to application contexts (Tondeur et al., 2021, p. 2192). Specific contexts can, according to Tondeur et al. (2021, p. 2192), be "[…] specific/multiple aggregation levels of the educational system, grade or educational levels, the involvement of specific stakeholders, contextual conditions, or the dynamic processes and mechanisms for technology integration." Neal and Neal (2013, p. 722) point to a range of research where the EST model is applicable, such as academic outcomes, developmental risk, adolescent activity engagement and family influences on adolescent development. This is also in line with the DigiGen model, as there are already studies on the developments of different countries, children and pupils or families in connection with digitalisation, that is, different phenomena on different levels (Eickelmann et al., 2021; Kapella & Sisask, 2021; Lorenz & Kapella, 2020).

Simplicity

The fourth criterion of simplicity of a theory reduces the complexity of an otherwise confusing interplay of objects and their properties. The aim should be to make the model neither too complex nor too facile and uninteresting for users, which is why Tondeur et al. (2021, p. 2193) suggest that the model should be represented visually to make it easier to communicate and more applicable in practice. The criterion of simplicity applies to the conceptual model in the DigiGen project (see Figure 1.3), as the model has only four central components (microsystems) and a clear network structure, which are comparatively easy to understand once it is clear that A represents the individual starting point in the model (e.g. the child). Even the ability for visualisation is provided, as shown in Figure 1.2 (original model by Neal & Neal, 2013, p. 728). Easy communicability and applicability in practice are thus also ensured.

Fruitfulness

The fifth and final criterion of fruitfulness means that the model has practical relevance in addressing stakeholders, in that the model helps analyse practical situations, inspires practical innovations, and enables dialogue and joint efforts of research and practice. Such innovations are relevant for research as well and can create opportunities for collaborations between researchers and stakeholders and improve the dialogue between them. The criterion of fruitfulness is fully met in the networked EST model, as new phenomena can be identified. In DigiGen, this includes the interplay of family life, leisure, education and civic participation. The networked model offers the possibility of using the precise tools of social network analysis to move EST from a theory to a method, as Neal and Neal (2013, p. 733) noted, which is why the practical application of the model can be taken for granted.

In sum, the networked version of the EST model, as presented by Neal and Neal (2013) and applied for DigiGen with an additional fourth microsystem, is a good conceptual model to represent the complexity of the activities and interactive relationships formed by the younger generation using digital technology. In particular, the main reasons for presenting the DigiGen "explanatory model" as a conceptual model, which are related in the descriptions of the scope (generalisability) and fruitfulness, are purposefully presented.

Development of the DigiGen conceptual model (i): Digital inequality

In assessing the possible outcomes of activities involving digital technologies and taking place within the different microsystems involving the individual and agentic child, digital inequalities have to be considered. The topic DT-TRANSFORMATIONS-07-2019: *The impact of technological transformations on children and youth* is concerned more specifically with how the use and impact of digital technology among children and young people may be influenced by different living conditions, creating, among other things, an educational divide between young people. The inequalities that exist within societies can lead to a digital divide, including both an access divide and an imbalance of digital use, which threatens the vision of a democratic space where everyone has an equal opportunity for participation. Consequently, excluded groups will be at risk of not reaping the benefits of digital technology to the same extent as more privileged groups (Helsper, 2021: van Dijk, 2020; Helsper et al., 2020; Blank & Lutz, 2018; Van Deursen & Helsper, 2015). Our understanding of digital inequality is influenced by van Dijk's (2020) widely used differentiation of digital divide types (motivational, material, skills, and usage). In this, we are concerned with each of these types of divides: the first-level divide of access, the second-level divide of digital skills and the third-level divide of motivation and usage. Our aim in DigiGen has in part been to contribute to a broader discussion around digital inequalities. This is even more important given the experiences faced across the globe as a result of the COVID-19 pandemic, which saw many of us moving our lives and education online. The exceptional circumstances brought about by the pandemic have highlighted pre-existing digital inequalities and, in some cases, even resulted in an increase in the digital divide.

More specifically, digital inequalities and social inequalities are rendering certain subgroups significantly more vulnerable. This is supported by research on digital literacy which has associated vulnerabilities with socioeconomic and demographic backgrounds. This research shows that those with lower levels of digital skills can subsequently have lower engagement, resulting in fewer benefits from the use of digital technology (Helsper, 2021; Paus-Hasebrink et al., 2014; Helsper & Eynon, 2013). While access is a crucial first step in reducing the digital divide (van Dijk, 2020; Ayllón et al., 2021), Helsper (2021) reminds us that "access alone is not sufficient to tackle inequalities in opportunities in digital societies" (p. 71). Thus, in addition to access, there is a need to develop digital literacy and skills in order to unlock the potential that exists and to reduce the inequalities in outcomes (Helsper, 2021). More importantly, a lack of skills can be linked to valuable engagement and in some cases even confidence and interest in using digital technology (Ayllón et al., forthcoming; Helsper, 2021).

Inequalities in the access and use of digital technology and, moreover, the benefits obtained through engagement with digital technology are essential to understanding socioeconomic and socio-cultural well-being in contemporary societies. As some people systematically have more opportunities and are more capable of achieving positive outcomes from the increasing digitisation of society (Helsper, 2021; van Dijk, 2020), it is important to ask which policies and interventions will be more successful in overcoming unjust inequities. To answer the question about how we might prevent inequities from expanding in increasingly digital societies, it is crucial not only to understand how digital and social inequalities are linked but also to understand these aspects individually by examining the networks and communities where children and young people live their everyday lives.

Development of the DigiGen conceptual model (ii): Vulnerability, resilience and agency

To further understand how digital divides may affect children and young people within the microsystems of EST differently, we use a framework on vulnerability and autonomy developed by Lotz (2016).[1] Here, *vulnerability* is seen as intrinsic to the human condition, an enduring aspect of being human. Lotz is in line with the understanding of vulnerabilities as a universal,

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[1]   The text under the sub-heading "Development of the DigiGen conceptual model: Vulnerability, resilience and agency" has already been published in Seland et al. (2022) Conditions contributing to positive and negative outcomes of children's ICT use: Protocol for a scoping review. Societies 2022, 12(5), 125. https://doi.org/103390/soc12050125

inevitable and enduring aspect of the human condition (Fineman, 2008; Mackenzie et al., 2014; Goodin, 1985). Regardless of age or socioeconomic background, this vulnerability is inextricably linked to every human being's dependence on others and the affective social human nature. This means that children and young people constitute a vulnerable group in themselves, as do adults and the elderly, although in different ways. The vulnerability of children and young people is characterised by the life phase of growing up and finding one's own place in the world, where overcoming challenges depends on support from others. At the same time, young people's need to free themselves from parents makes this need for support difficult.

In addition to the *intrinsic or inherent vulnerability* of being human and belonging to a vulnerable age group, Lotz (2016) identifies two additional sources of vulnerability that may or may not occur in combination with the state of intrinsic vulnerability described above. First, *situational vulnerability* represents the context-specific, temporary or enduring situations that may arise from personal, social, economic or environmental conditions in one's life. Here we find typical characteristics of social exclusion and social inequality: interrelated and often self-reinforcing factors that can disadvantage an individual experiencing unemployment, discrimination, low income, poor housing or family breakdown (Social Exclusion Unit, 2004).

The third source of vulnerability described by Lotz (2016) is *pathogenic vulnerability.* This source should be understood as compounding existing vulnerabilities (see above) and may arise from other, unmanaged or poorly managed critical situations "where it undermines agency or exacerbates the sense of powerlessness engendered by vulnerability in general" (Lotz, 2016, p. 47). Here we again find risks or threats to well-being and health, exemplified in children and young people's use of ICT as cyberbullying, internet addiction, relational problems and personal security and safety issues, which may co-exist with and amplify situational and inherent vulnerability.

According to Lotz (2016), vulnerability has often been conceptualised as the opposite of autonomy. *Autonomy* should here be understood as "a suite of rational, affective, deliberative, and self-interpretative skills and competences that enable a person to make choices and act in line with their reflectively endorsed beliefs, values, goals, wants, and self-identity" (Lotz, 2016, p. 53). However, as humans will always be embedded in social relations and conditions, vulnerability is a constant state and can thus not be totally eliminated. Lotz' (2016) point is therefore that vulnerability and autonomy may coexist in a person. This means that a person can rise above situational and pathogenic vulnerability by acquiring internal agential competences, supported by the right kinds of social relationships and institutions, thus gaining access to a decent range and quality of options, resources and opportunities. Like vulnerability, autonomy is here understood to be socially and inter-subjectively constituted, and not an individualistic trait. In contrast to vulnerability, we recognise autonomy in the ideas of personal well-being and growth, such as friendship, learning, acquisition of skills and knowledge, societal participation and personal development, which may follow children's and young people's use of ICT. These autonomy-generating experiences might not only reduce the effects of situational and pathogenic vulnerability but also increase individual resilience towards the vulnerability inherent in being human and part of the human world (i.e. intrinsic vulnerability).

The conceptual model and DigiGen's empirical research questions

Through the presentation of research results in this report, the evidence from the project will be added to the DigiGen conceptual model (see Figure 1.3) in layers (Chapters 2 and 4-8). This evidence is generated from the project's empirical research questions, which are presented in Table 1.2.

Table 1.2: The empirical research questions in DigiGen with relevance to the projects' identification of four microsystems representing children's and young people's use of digital technology in everyday life

DigiGen empirical research questions (1-5)	Relevance to the DigiGen conceptual model	Presented in this report's chapter
1. How diverse is the European Union in terms of usage of digital technology among children and young people and to what extent does access to digital technology depend on age, gender and socioeconomic background?	All microsystems 1-4	Chapter 2
2. How are the everyday lives of European families shaped by technological transformations?	Microsystem 1: Family	Chapters 4+8
3. How are everyday practices linked to leisure time transformed through usage of digital technology and how can social interactions and social skills acquisition be enhanced?	Microsystem 2: Leisure	Chapters 5+8
4. How do young children regard their education in terms of preparing them for adult life in the digital age?	Microsystem 3: Education	Chapters 6+8
5. What are the socioeconomic, gendered, and political culture-related factors affecting the digital political engagement of young people?	Microsystem 4: Civic participation	Chapters 7+8

In addition to the five empirical research questions listed in Table 1.2, a final question (no. 6) in DigiGen connects the data analysis and this report's main objective by asking:

> Which are the policies that combat the systematic inequalities in the opportunities, capacities and desires of young people to reap the benefits of digitalisation?

This question links the four microsystems of the DigiGen conceptual model (Family, Leisure, Education and Civic participation) to the exosystem level of EST (Bronfenbrenner, 1977; Neal & Neal, 2013). At the exosystem level, we find political, cultural and other societal institutions affecting the child's development both directly and indirectly by shaping the patterns of social interaction that goes on in the other spheres or ecological systems closer to the child.

1.3. Exosystem level: Introduction to EU Policy Frameworks

Seen from the exosystem level of the DigiGen conceptual model on children's and young people's use of digital technology, DigiGen arrives at an important political time for both EU digital and social policy and more specifically for child rights in the digital environment. In 2021, the European Commission presented their plans for "Europe's Digital Decade" outlining the priorities for Europe's technological transformation.[2] The policy programme for the Digital Decade is orientated by a Digital Compass which focuses on four main priorities: 1) skills, 2) government, 3) infrastructures and 4) business. These priorities will be grounded in a set of European Digital Rights and Principles. The European Commission presented the draft digital principles in January 2022.[3]

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2   Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions 2030 Digital Compass: the European way for the Digital Decade.

3   Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions Establishing a European Declaration on Digital rights and principles for the Digital Decade.

It is important that DigiGen policy recommendations help guide EU policy makers in implementing the digital principles. There are several of key relevance to DigiGen research: solidarity and inclusion, participation, and safety and security.

- **Solidarity and inclusion** refer to ensuring that all people in Europe should be able to reap the rewards of technological transformation. This includes ensuring access to digital devices and the internet and developing digital education and skills.
- **Participation** links to the project's research on civic participation, where this principle seeks to develop an online environment which supports digital citizenship.
- **Safety and security** are where the digital principles speak directly to children's rights in the digital environment, that is that children and young people should be protected and empowered online – notably, the commitment to "providing opportunities to all children to acquire the necessary skills and competences to navigate the online environment actively, safely and make informed choices when online".[4]

PEOPLE AT THE CENTRE
Digital technologies should **protect people's rights, support democracy, and ensure that all digital players act responsibly and safely.** The EU promotes these values across the world.

SOLIDARITY AND INCLUSION
Technology should **unite, not divide, people.** Everyone should have access to the internet, to digital skills, to digital public services, and to fair working conditions.

FREEDOM OF CHOICE
People should benefit from a **fair online environment, be safe from illegal and harmful content,** and be empowered when they interact with new and evolving technologies like artificial intelligence.

SAFETY AND SECURITY
The digital environment should be **safe and secure.** All users, from childhood to old age, should be empowered and protected.

SUSTAINABILITY
Digital devices should support **sustainability** and the **green transition.** People need to know about the environmental impact and energy consumption of their devices.

PARTICIPATION
Citizens should be able to **engage in the democratic process** at all levels, and have **control over their own data.**

Figure 1.4: Proposed Digital Rights and Principles (European Commission, 2022)

Better Internet for Kids Strategy (BIK+)

In May 2022, the European Commission released the updated Better Internet for Kids Strategy (BIK+). BIK+ sets the political agenda for children's rights in the digital age centred on three pillars: **safe digital experiences**, **digital empowerment** and **active participation**. The Strategy acknowledges the various inequalities that affect children's interaction (or lack thereof) with digital technologies. DigiGen also applies a lens of inequalities to understand why some children seem to benefit from ICT use whilst others do not. One area that DigiGen has contributed to is assessing the extent of the digital divide across Europe (Ayllón et al., 2021a, 2021b). The Strategy includes our findings here as a basis for tackling such inequalities.

DigiGen research can contribute to pillar 2 'digital empowerment' by reinforcing that children's digital competence is key to their overall well-being and the exercise of their rights in the digital environment. The Commission recognises that digital empowerment is conditional on access to digital devices and the internet. Initiatives to support families facing poverty and social exclusion are a key base in this regard. The Commission clarifies that children in Europe are exposed to digital technologies from a young age and should be supported accordingly. This is an area where DigiGen research focusing on young children can inform the implementation of the Strategy.

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4   Draft European Declaration on Digital Rights and Principles page 6.

Pillar 3 'active participation' highlights the benefits of cross-generational knowledge sharing in supporting the whole family to navigate digitalisation. DigiGen has recognised the value of empowering the digital generation in passing knowledge on to older generations and creating family rules and practices together. Data presented in this report show that children's realities and experiences are often different to what adults presume. Listening to the voices of the digital generation through DigiGen data is a useful way to ensure that the implementation of the BIK+ strategy is most effective.

Figure 1.5: Better Internet for Kids + (BIK+) Strategy (European Commission, 2022)

EU Child Rights Strategy

The UN Committee on the Rights of the Child's General Comment 25 affirms children's right to access to and competency with digital technologies in all settings.[5] The EU reflects this sentiment in the EU Child Rights Strategy (2022) in Chapter 5 on the "Digital and information society: An EU where children can safely navigate the digital environment, and harness the opportunities".[6] The Strategy reflects to a certain extent DigiGen's findings that the digital world offers children, even very young children, many opportunities to exercise their rights. DigiGen can offer greater support to this aim in acknowledging the positive effects digital technologies can have in health and well-being. The Strategy reflects the general discourse which puts stress on potential screentime concerns along with the idea that children are spending less time on other activities which are perceived as better for their well-being. In this report, DigiGen insights provide a more nuanced perspective, challenging these aspects.

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5   UN Committee on the Rights of the Child General Comment 25 on Children's Rights in relation to the Digital Environment (2021).
6   EU Child Rights Strategy (2021) [chapter 5].

European Pillar of Social Rights Action Plan

The European Pillar of Social Rights Action Plan lays the path for the implementation of social rights across Europe through 20 key principles.[7] The interaction between social rights and digitalisation is of the utmost relevance for DigiGen's approach, which explores the various inequalities at play within children's digital ecosystems. Many of the 20 principles cut across the DigiGen landscape, but attention will be paid here to two key principles. **Principle 11** aims to support children experiencing or at risk of poverty.[8] Disadvantaged children across Europe are less likely to be able to reap the rewards of digitalisation and may have greater vulnerability to risks. **Principle 20** states that everyone has the right to essential services, including digital communications (digital devices and access to the internet).[9] Together these principles relate to the EU Child Guarantee, a key initiative which includes efforts to ensure that children from disadvantaged backgrounds have access to the digital world.[10] Member States are recommended to describe steps to ensuring such access through national action plans, with progress on these plans periodically monitored by the European Commission.

EU Digital Education Action Plan

The EU Digital Education Action Plan (2021–2027) sets the agenda for bringing today's education in line with the digital age.[11] The Action Plan contains two strategic priorities: developing a high-performing digital education ecosystem and enhancing digital skills and competences for the digital age. Developing the ecosystem requires efforts at the infrastructure, person and content levels. Enhancing digital skills and competences involves ensuring digital literacy fit for this digital age, ensuring that basic digital education includes algorithmic and artificial intelligence awareness. Initiatives on these two priorities aim to fill gaps and disparity across Member States in digital education.

Bringing the political agenda of 'Europe's Digital Decade' together with the above policy frameworks gives DigiGen a strong foundation to cement its policy recommendations.

1.4. Macrosystem level: Introduction to a children's rights perspective

Digital technologies are vital to children and young people's current lives and to their future. This was plainly revealed by all evaluations of the COVID-19 pandemic crisis but was known even before this. Without meaningful access to digital technologies, children's civil, political, cultural, economic and social rights are endangered. During crisis periods (pandemics, wars), we witness that lacking access to the internet/digital technologies or lacking the skills to use such technologies can result in failing or dropping out of school, or isolation, though children's development and mental health, progress in educational attainment and social life depended on these things.

In the digital world, the ability of children and young people to exercise their rights often depends on factors beyond the reach of the children and their parents – their access to digital technology and their connectivity – but also on social deprivation, minority or refugee status (Organisation for Economic Co-operation and Development, 2001). Thus, children and young people are often limited in their use of digital technology due to the social inequalities they face, which may leave them without adequate access to ICT despite the explosion of new technologies and internet resources (see Ayllón et al., 2021). Other times, parents and educators might control and limit access for children and young people, eventually leading to reduced digital skills (Livingstone et al., 2017). Yet, children and young people themselves might be motivated to learn through the use of digital technology, leading to the need for support and scaffolding. Recent research suggests that for children and young people, the use of digital technology

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7   European Pillar of Social Rights Action Plan (2021).
8   European Pillar of Social Rights Action Plan (2021) Principle 11.
9   European Pillar of Social Rights Action Plan (2021) Principle 20.
10   EU Child Guarantee (2021).
11   EU Digital Education Action Plan (2021).

is important for their overall well-being (Dienlin & Niklas, 2020) but that there is a need for guidance and guardianship to ensure healthy and safe use. Often their parents or teachers lack sufficient competence and are not fully equipped to support these children and young people so that they thrive in the digital environment (Gudmundsdottir & Hatlevik, 2018). Furthermore, many children and young people may be more knowledgeable than adults when it comes to the practical use of digital technology, meaning that the caregivers responsible for children also need guidance (Lu, 2022).

In our contemporary era, when children's rights have been formally legislated by all states of the United Nations (except for the formal recognition of the United States), children's rights in the digital environment have been laid down by the UN Children's Rights Commission in General Comment 25 (2021). Its objective is to give guidance on relevant legislative, policy and other measures to ensure the compliance of states with promoting, respecting, protecting and fulfilling all children's rights in the digital environment. The main principles of General Comment 25 are:

- Nondiscrimination
- The best interest of the child
- Children's rights to life, survival, protection, and development
- Children's right to participation.

Non-discrimination in the digital environment means to overcome digital exclusion, free and safe access for children in dedicated public locations, affordable access, and programmes that promote the knowledgeable use of digital technologies in educational settings, communities and homes. The Committee calls upon State parties to take proactive measures to prevent discrimination, mentioning minority, asylum-seeking, refugee and migrant children, children in the category LGBTQ+, victims and survivors of trafficking or sexual exploitation, those in alternative care, and those deprived of liberty or in any other vulnerable situations.

Another principle mentioned by General comment 25 is *the best interest of the child*: in all actions regarding the provision, regulation, design, management and use of the digital environment, the best interests of every child should be a primary consideration. During all of the planning of the research, the data collection and the analysis, DigiGen researchers have acted to keep children's best interest in the focus, exploring drivers of successful and secure use of digital technology in all areas, for the well-being of the child. The focus has been on respecting the ethics of research with children, how children and adults can cooperate and how adults can mediate children's use of digital technology with minimal risks and in secure circumstances, in the child's interest. Looking at ways parents and children manage to negotiate and respect rules, though creating resources to access safe applications, enforced the recommendations of the General Comment for fostering the capacities of caregivers and children to benefit from digital technologies as a tremendous opportunity to learn and to be creative, in conditions of safety.

According to the children's *right to life, and development*, General Comment 25 state that parties should identify and address the emerging risks of children relating to content, contact, conduct and contract in the digital world. It refers to violent and sexual content, cyberaggression, harassment, gambling, exploitation and abuse, and promotion of or incitement to suicide or life-threatening activities, including by criminals or armed groups designated as terrorist or violent extremist. States should pay specific attention to the effects of technology on cognitive and emotional development. Training and advice on the appropriate use of digital devices should be given to parents, caregivers and educators. Lack of access to the digital environment or lack of digital knowledge and competencies might limit or hamper development and well-being (including social integration and health).

Another principle is *the right of children to have their voices heard and participate*. It refers to the rights of children to seek, receive and impart information and to have their views given due weight. During all of the DigiGen research, the focus has been on respecting the ethics of research with children while engaging them in presenting their opinions. Access to digital technology represents an opportunity for children to express their views. The use of digital technologies can help to realise children's participation at the local, national and international levels (Livingstone et al. 2017). The commitment of DigiGen researchers to understanding children's views led to the development of creative methods for children's participation in focus groups and in situational role plays; students acting as co-researchers and interviewing each

other about school, gaming and civic participation; and the design of a toolkit for improving communication between them and adults on the topic of digital technology (Kapella & Sisask, 2021).

As a result of using all these qualitative active methods for engaging children and young people in research, the accumulated data reinforces what many researchers and child rights activists have already flagged: that children generally are the experts of their digital worlds and are aware of many of its dangers. This does not mean that they do not need further digital education; on the contrary, they have often expressed their awareness of needing more digital education.

1.5. The path from research-based explanations to policy recommendations

While DigiGen's research agenda is to explain under what conditions harmful versus beneficial effects of the use of digital technology occur, the overall impact agenda is to use the knowledge from the project, in collaboration with policy and practice stakeholders, to develop effective social, educational, health and online safety policies and practices, and market regulations.

Proposing policy recommendations implies making value judgements. In DigiGen we present the recommendations by integrating a children's rights perspective, representing normative cultural influences or ideologies with long-ranging impact on children's and young people's lives. Moreover, the recommendations following the project's findings build on the belief that reducing inequalities and providing beneficial use of digital technologies is a collective responsibility between government, industry and society. Here, DigiGen will consider a balance between three areas of action: **government regulation**, **industry self-regulation** and **civil society awareness-raising**. This is further presented and elaborated in Chapter 9, and only briefly introduced here.

Regulations

Regulation is one of three key areas of action identified by DigiGen with the intention of setting a regulatory and legislative framework which allows for the optimalisation of children and young people's digital experiences. Regulation thereof may cover pre-conditions for basic access to the digital environment e.g., through social policy and then support when access is met e.g., through educational policy. For example, although school communities can be influenced by civil society and industry initiatives, public educational policy (curricula, budgets, management) is a main force influencing how they can respond to the digital transition. Governments have obligations under international law to realise commitments to human rights treaties such as the UN Convention on the Rights of the Child. This gives state regulation a particular role in coordinating the establishing minimum regulatory standards including for industry practice through market regulation.

Industry self-regulation

One of the overall goals of DigiGen is to contribute to better market regulation. An important aspect of market regulation is industry self-regulation, which is therefore the second area of action that DigiGen will take into account.

Industry self-regulation may complement government policies or may serve as a way for regulators to identify good practices and use these to adopt formal regulation afterwards, serving as a legal backstop to ensure that what was first voluntarily adopted becomes a legal requirement. Moreover, industry's response to emerging issues can sometimes be a shorter process than the creation of official regulation.

Industry self-regulation may be effective in certain situations where it offers a competitive advantage or improved consumer confidence. However, the challenge of self-regulation can be that there are few or no consequences in the event that self-regulation is breached. The implementation of self-regulation is often monitored by the industry actors themselves, which may result in questionable assessments.

Another challenge is the diversity of relevant industry actors, such as internet providers, software developers, hardware developers, online platforms, etc. Therefore, recommendations regarding industry self-regulation from DigiGen will encompass

- recommendations dealing with market guidelines for industries working in the field of digital technology and children, where the recommendations can be presented as an opportunity to attract consumers/users as well as being deployed where there is pressure from regulators to implement strict regulations if problems and risks are not addressed appropriately;
- recommendations dealing with policy at transnational level, moving beyond the European Union, where it may be more complicated to achieve effective official regulation.

Awareness-raising

Awareness-raising outlines civil society's role in supporting children and young people in the digital environment. Civil society are often most aware of the everyday realities of their communities' needs and best placed to support from the grassroots up. There is also a role for civil society to respond to gaps left by regulation and industry self-regulation, but this must not be unduly burdensome. Awareness-raising in this sense refers to supporting civil society actors in identifying conditions under which children and young people may experience beneficial or harmful effects of ICT use.

1.6. Outline of this report

This report is divided into three parts. Part I consists of an introduction (this chapter) followed by one chapter focusing on digital inequality based on a secondary analysis of data from existing databases on children's and young people's digital access, engagement and well-being across Europe. Part I concludes with a chapter on data and methodology in the DigiGen project.

Part II of this report presents scoping reviews for the four domains or microsystems in DigiGen – that is, Family, Leisure, Education and Civic Participation – followed by summaries of the empirical research conducted in these domains in the project.

In Part III of this report, we present first a synthesis of findings from our research within the microsystems that substantiate the knowledge on how and why some children and young people benefit from using digital technology while others are impacted negatively (our main research question), applied based on the DigiGen conceptual model. The final chapter of this report links our main research findings to recommendations for future EU policy, concluding the report's aim to present policies that combat systematic inequalities in the opportunities, capacities and desires of young people to reap the benefits of digitalisation.

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2. Background: Secondary analyses of existing databases

This chapter presents the background for the qualitative data presented and analysed in this report's Chapters 4–8 through quantitative analyses conducted in the first phase of DigiGen to answer the following research question: *How diverse is the European Union in terms of usage of digital technology among children and young people, and to what extent does access to digital technology depend on age, gender and socioeconomic background?* The following chapter thus adds to the state-of-the art on children's and young people's use of digital technologies in all the microsystems investigated in this project – Family, Leisure, Education and Civic participation – with special attention to digital inequalities and the inequalities in well-being that can be associated with the use of digital technologies.

The chapter is divided into three parts: 1) Digitally deprived children in Europe, 2) Digitally disengaged and digitally unconfident children in Europe and 3) ICT and children's subjective well-being.

2.1. Digitally deprived children in Europe

Authors: Sara Ayllón, Halla B. Holmarsdottir and Samuel Lado

Introduction

The outbreak of the COVID-19 pandemic has completely changed the need for internet connection and technological devices among the whole population, but especially among school-aged children. Nowadays, having a computer connected to the internet makes the difference between being able to keep up with their education and falling badly behind. DigiGen research provides a detailed account of who the digitally deprived children in Europe are, where they live and what socioeconomic characteristics they share.

Data

We use data from the European Union Statistics on Income and Living Conditions (EU-SILC) in its cross-sectional form. The information relating to digital deprivation is contained in two main variables: HS090 and PD080. The first collects, at the household level, the answers to the question 'Does your household have a computer?'. Household respondents can answer 'yes' or 'no'. If the answer is negative, the question continues as follows: 'If you do not have a computer: (a) Would you like to have one but cannot afford it or, (b) Do you not have one for other reasons, for example you do not want or need it?'. The second collects, at the individual level, the answers to the question 'Do you have an internet connection for personal use when needed?'. In this case, all adult members in the household can answer 'yes' or 'no'. And, again, if the answer is negative, they are asked whether it is because of unaffordability or for some other reasons.

A child is defined as digitally deprived if s/he lives in a household that cannot afford to have a computer and/or lives with adults that cannot afford an internet connection. Importantly, and to our knowledge, this is the only data set that records such enforced lack.

Results and discussion

We find that 5.4% of school-aged children in Europe are digitally deprived – the differences across countries being substantial. Figure 2.1 shows the percentage of children who live in a household that cannot afford to have a computer and/or cohabit with adults who cannot afford to have an internet connection. The choropleth map shows two country clusters with a certain

North–South divide. On the one hand, in Northern and Continental Europe, as well as in the Baltic countries and the United Kingdom, the percentages of digitally deprived children are very low. On the other hand, the prevalence of the phenomenon is much higher in the Mediterranean countries, and particularly in Eastern Europe.
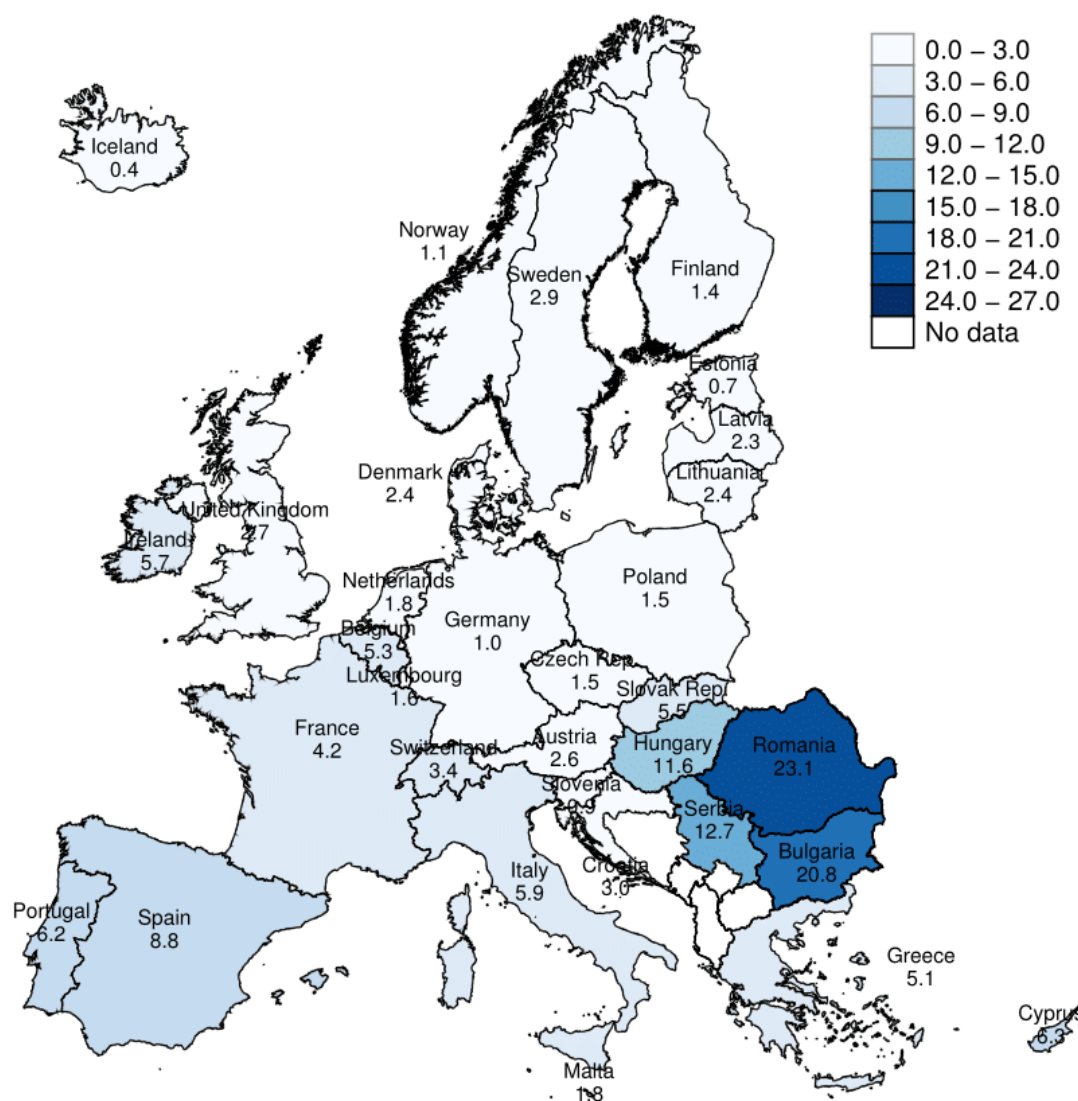
Figure 2.1: Percentage of digitally deprived school-aged children (6-16), Europe, 2019

Once we have identified who the digitally deprived children in Europe are and where they live, we next explore the socioeconomic and demographic characteristics that digitally deprived children in Europe share. In order to do so, we consider six vulnerable groups: (i) living in a lone parent household; (ii) living in a poor household; (iii) living in severe material deprivation; (iv) from immigrant origin; (v) living with low educated parents and (vi) living in a large family. Our systematic exploration of the demographic and socioeconomic characteristics associated with digital deprivation is based on logistic regressions.

We find that digital deprivation particularly affects children with severe material deprivation, who cohabit with low educated parents and are in poverty. However, the heterogeneity of characteristics that describe a digitally deprived child is large across country clusters. For example, having parents of non-European immigrant origin reduces the likelihood of digital deprivation in Eastern Europe and the Baltic area, while it increases the probability in all other contexts – see Figures 2.2 and 2.3.
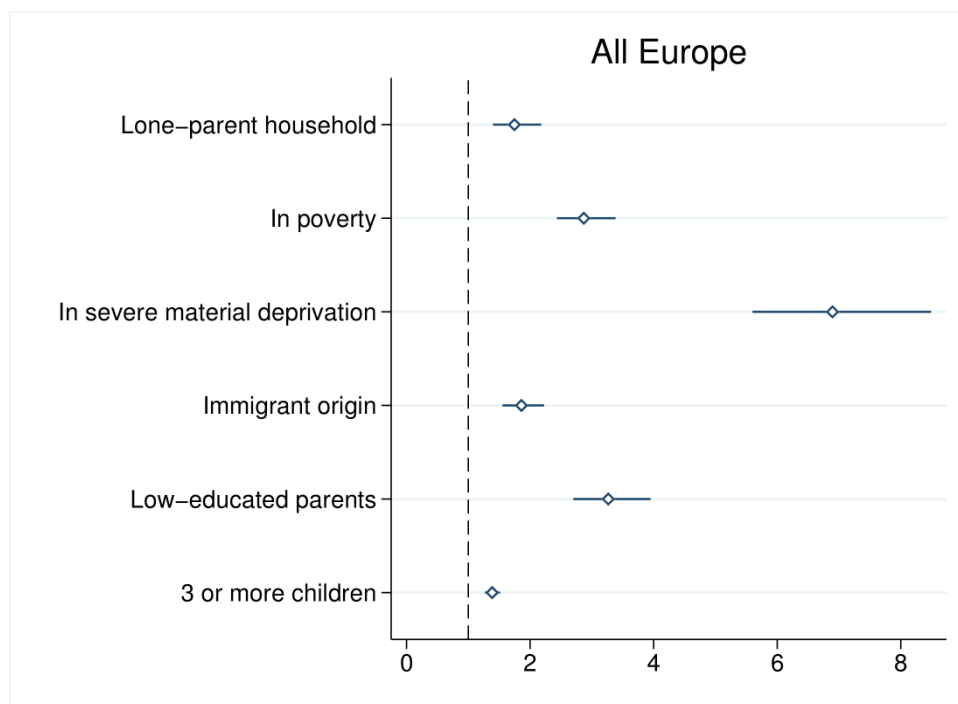
Figure 2.2: Logistic regressions (odds-ratios) for the probability of being digitally deprived, by socioeconomic characteristics in school-aged children (6–16 years), Europe, 2015–2019. Note: The horizontal line indicates confidence intervals at 95%
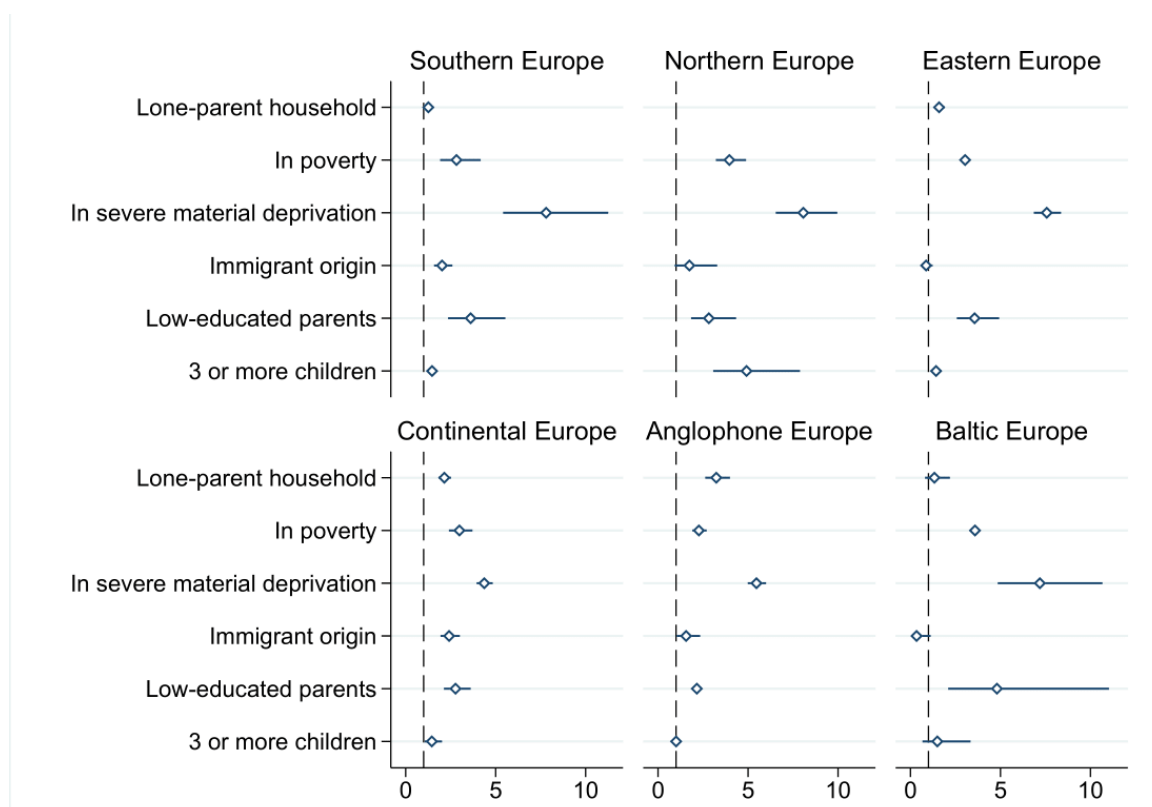
Figure 2.3: Logistic regressions (odds-ratios) for the probability of being digitally deprived, by socioeconomic characteristics in school-aged children (6–16 years), European country clusters, 2015–2019. Note: The horizontal line indicates confidence intervals at 95%. The result for lone-parent households in Northern Europe is not shown given that it has a very large confidence interval

2.2. Digitally disengaged and digitally unconfident children in Europe

Authors: Sara Ayllón, Samuel Lado and Maria Symeonaki

Introduction

Moving beyond access, students of today are still not equally equipped for their technology-rich future: various kinds of digital divides still prevail in society and affect the young generation. In the current situation, having interest and strong confidence in the use of digital devices is a prerequisite for children to be able to continue with their educational development. Taking new measures to prevent the deepening of the digital gap is therefore crucial to alleviating the significant existing differences in digital competence and knowledge of the use of ICT and preventing further marginalisation.

Data

We use data from the 2015 and 2018 waves of the OECD's Programme for International Student Assessment (PISA). In particular, we draw the data from the 2018 'ICT familiarity questionnaire' which asks children about digital media and devices and their attitudes towards them. We only consider children that have access to digital technologies either at home or at school.

We measure students' interest in ICT by using the answers to the following six questions: 1) "I forget about time when I'm using digital devices"; 2) "The internet is a great resource for obtaining the information I am interested in (e.g. news, sports, dictionary)"; 3) "It is very useful to have social networks on the internet"; 4) "I am really excited discovering new digital devices or applications"; 5) "I really feel bad if no internet connection is possible"; and, 6) "I like using digital devices". All the questions have four possible answers – "strongly disagree", "disagree", "agree" and "strongly agree" – which we grade from 1 to 4. From the six questions, we proxy each student's interest in ICT through a Likert-type scale which sums up the respective values of the defining items. Then we define a child as "digitally disengaged" if they have a score of interest towards ICT below or equal to 12 points.

We measure students' confidence towards ICT in a similar fashion by using the answers to the following group of questions: 1) "I feel comfortable using digital devices that I am less familiar with"; 2) "If my friends and relatives want to buy new digital devices or applications, I can give them advice"; 3) "I feel comfortable using my digital devices at home", 4) "When I come across problems with digital devices, I think I can solve them"; 5) "If my friends and relatives have a problem with digital devices, I can help them". Again, answers go from complete disagreement to full agreement, and we define a child as "digitally unconfident" if s/he has a score below or equal to 10 points.

Results and discussion

In Europe, 5.7% of children are digitally disengaged. However, such percentages differ between European countries. Whereas in Belgium (3.5%), France (4.8%), Germany (3.9%) and Spain (5.2%), the percentages of digitally disengaged children are low, in Eastern Europe digital disengagement is relatively high: 17.3% in Bulgaria and 15.2% in Albania – see Figures 2.4 and 2.5.

Figures 2.4 and 2.5 show that regarding children's confidence towards digital technologies, at the European level, 8% of children lack digital confidence. Again, a certain West–East divide is found. In Bulgaria, 16.8% of children state that they do not feel comfortable when using digital devices. The same is found in Albania, where 14% of children are digitally unconfident. Therefore, this phenomenon is extended in Eastern Europe, while in Continental and Northern Europe, except for Finland (11.1%), Austria (12.2%) and Iceland (12.7%), the percentages of digitally unconfident children are relatively low.
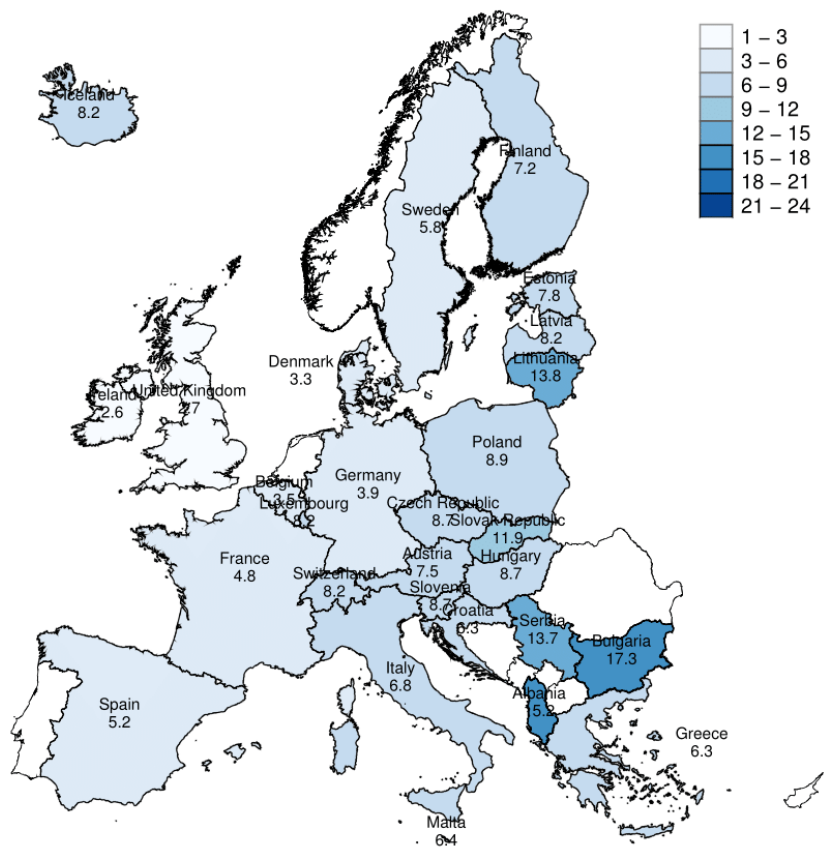
Figure 2.4: Percentages of digitally disengaged children, Europe, 2018
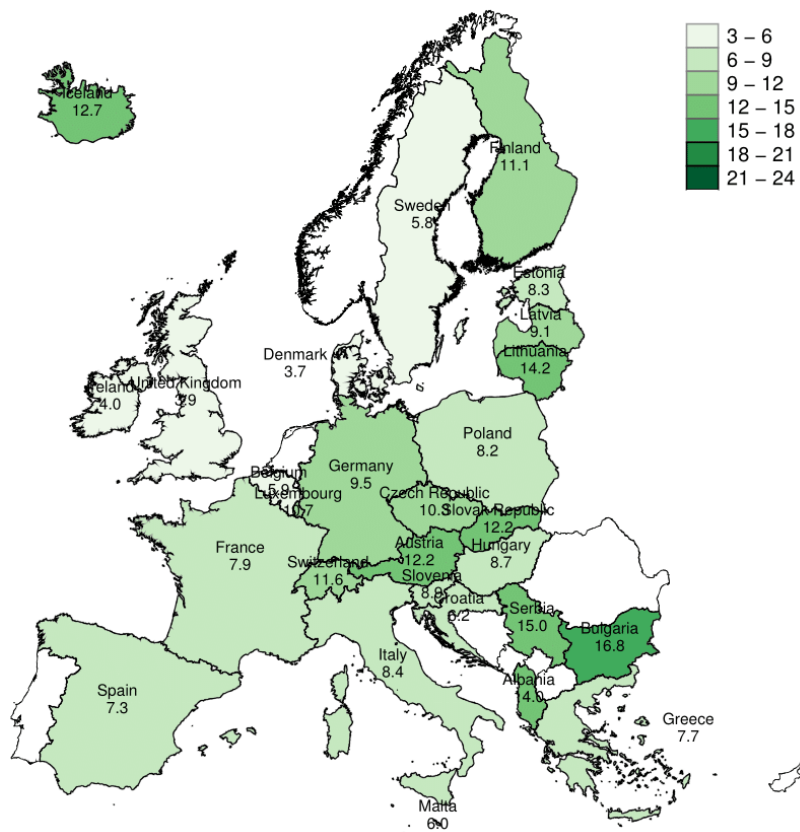
Figure 2.5: Percentages of digitally unconfident children, Europe, 2018
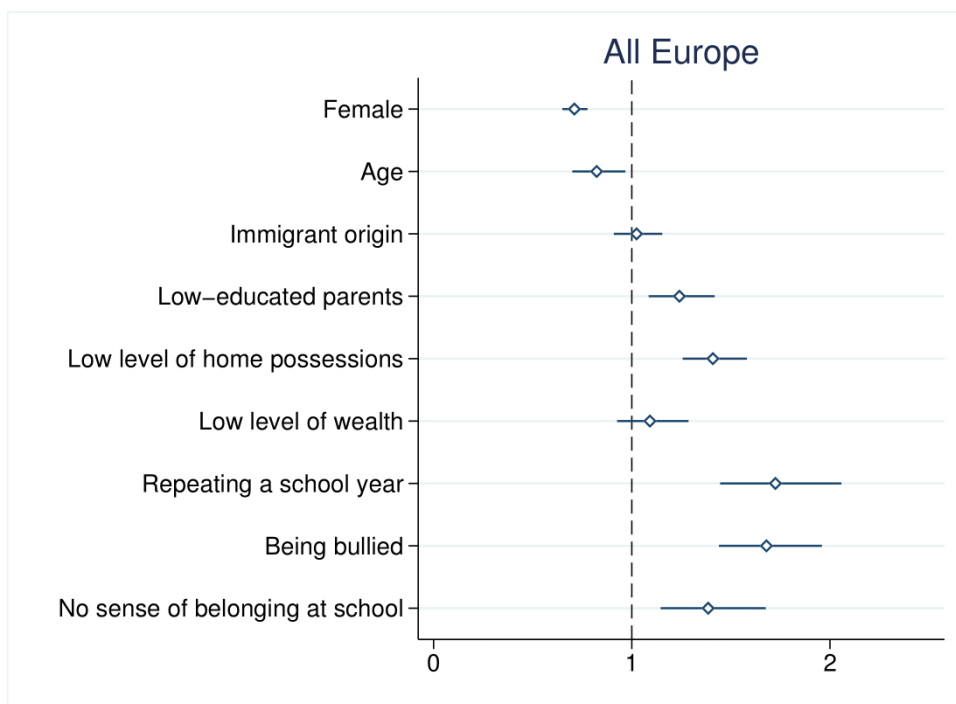
Figure 2.6: Probability of being digitally disengaged, by socioeconomic, demographic and subjective characteristics, Europe, 2018. Note: The horizontal line indicates 95% confidence intervals. Results are weighted
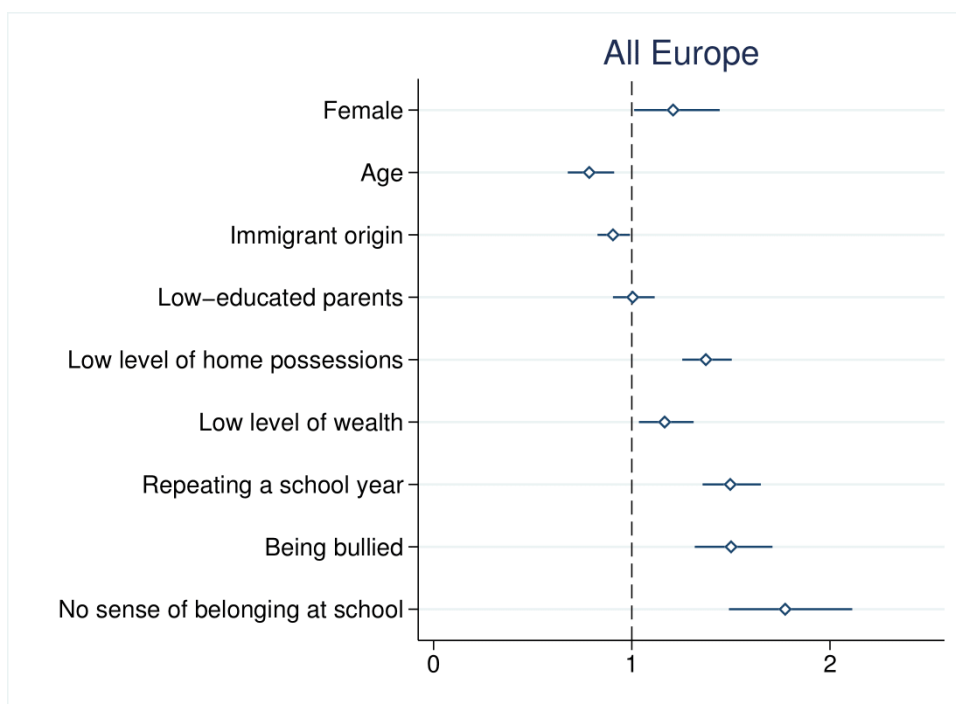
Figure 2.7: Probability of being digitally unconfident, by socioeconomic, demographic and subjective characteristics, Europe, 2018. Note: The horizontal lines indicate 95% confidence intervals. Results are weighted

Once we have learned about where digitally disengaged and unconfident children live, we aim to find out which socioeconomic and demographic characteristics define a digitally disengaged and a digitally unconfident child. For that purpose, we run a series of logistic regressions in which we consider seven vulnerable groups: (i) children of immigrant origin; (ii) those who cohabit with low-educated parents; (iii) those whose families have a low level of wealth; (iv) those whose families have a low level of home possessions; (v) those who need to repeat a course; (vi) those who have been bullied; and (vii) those who do not feel a sense of belonging to their school.

We find that most of the risk factors considered are positively linked to digital disengagement. However, the relevance of the associations varies by country cluster and, in general, such associations are weak, preventing us from very strong conclusions at the country cluster level. In all country groups, the characteristics most associated with digital disengagement are grade repetition and a low level of home possessions – see Figure 2.6.

Finally, and regarding children's ICT confidence, Figure 2.7 shows that, again, grade repetition and a low number of home possessions are the most linked factors to the phenomena. Also, subjective feelings of little bonding with the school, being bullied and having a low level of wealth increase the probability of lack of digital confidence. As for low-educated parents, we do not find a statistically significant relationship.

2.3. ICT and children's subjective well-being

Authors: Sara Ayllón, Pablo Brugarolas and Samuel Lado

Introduction

In recent decades, technology has been gaining importance worldwide. Children and young people are today growing up in a strongly connected world, surrounded by digital devices. However, not all children benefit equally from online experiences. Research evidence shows that, in Europe, on average, 20% of 9–10-year-old children had negative experiences online in 2019, such as cyberbullying; 8–17% of 9–16-year-old children encountered online harmful content; and from 7.9% of children in Iceland to 22.8% in Spain are at risk of experiencing internet addiction (Lorenz & Kapella, 2020; Šmahel et al., 2020; Tsitsika et al., 2014).

In this research, we use the Children's Worlds database (see below) to investigate how the use of ICT affects children's subjective well-being in Europe and whether the use of ICT crowds out other activities, which may have an impact on how satisfied children are with their own lives.

Data

We use the Children's Worlds database. This is an international survey designed to study children's well-being, covering 35 countries/federal regions across four continents in three waves (2011–12, 2013–14 and 2016–19). The survey questionnaire asks 8-, 10- and 12-year-old children about their daily lives and activities, their use of time, their agreement with several statements and events, their sociodemographic and economic characteristics and, most importantly for the DigiGen project, their opinion about their own well-being and use of ICT. Our sample includes 10- and 12-year-old children living in the European Union and the United Kingdom participating in the third wave – that is, 32,179 children.

In terms of subjective well-being, the questionnaire includes one single question regarding overall life satisfaction (OLS): "How satisfied are you with your life as a whole?", where children can answer from "0" (not at all satisfied) to "10" (totally satisfied).

Regarding ICT usage, we compute an index that summarises the use of new technologies. We obtain this index by applying a principal component analysis (PCA) technique. In our application, we take the four variables referring to the use of new technologies (how often the child plays electronic games, how often s/he uses social media, whether s/he owns a mobile phone and whether s/he has access to the internet) and apply principal components.

Results and discussion

The results are the outcome of a series of linear regressions where standardised overall satisfaction with life is regressed against the index of ICT use and then on each new technology. We find that higher frequencies of playing electronic games, using social media and having internet access and/or a mobile phone are positively associated with overall subjective well-being.

Regarding potential crowd-out effects, we regress different activities, such as time spent relaxing with family members or seeing the child's friends, on the ICT use index. We do not find evidence that children who use ICT more intensively spend less time on other activities. For both time spent relaxing, talking or having fun with their families and seeing their friends, we find a significantly positive association: the more intense the use of new technologies, the more time children spend with their family or seeing friends. A similar (yet weaker) pattern is observed for time spent playing sports or doing exercise. For the time spent doing homework, there seems to be no difference across the different levels of electronic game use. Estimated coefficients for time spent helping around the house are negative and small yet inconsistent – see Table 2.1.

Table 2.1: ICT use and crowd-out effects

	(1) Relaxing, etc. with family	(2) See your friends	(3) Doing homework	(4) Helping around the house	(5) Playing sports / doing exercise
ICT use index					
Low ICT use	0.149	0.127	0.057	-0.037	0.184
	(0.145)	(0.125)	(0.100)	(0.128)	(0.122)
Medium ICT use	0.331**	0.267**	0.117	-0.012	0.194
	(0.134)	(0.121)	(0.096)	(0.130)	(0.121)
High ICT use	0.462***	0.398***	0.149	0.003	0.290**
	(0.137)	(0.121)	(0.095)	(0.129)	(0.121)
Very high ICT use	0.712***	0.638***	0.160	-0.001	0.476***
	(0.137)	(0.121)	(0.097)	(0.130)	(0.124)
Constant	2.147***	0.953***	2.474***	2.374***	1.172***
	(0.226)	(0.254)	(0.174)	(0.230)	(0.214)
Observations	21,704	19,597	21,718	21,909	21,742

Notes: Standard errors in parentheses, clustered at the school level. All specifications include country and questionnaire fixed effects and controls. * p < 0.10, ** p < 0.05, *** p < 0.01.

Finally, we explore how using different new technologies influences children's satisfaction with their free time and the way their time is used. We observe that using new technologies is positively associated with being satisfied with how much free time one has: children who on average use new technologies more often are more satisfied with the use of their free time.

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Tsitsika A., Janikian, M., Schoenmakers, T.M., Tzavela, E.C., Olafsson, K., Wójcik, S., Macarie, G. F.; Tzavara, C.; The EU NET ADB Consortium & Richardson, C. (2014) Internet addictive behavior in adolescence: A cross-sectional study in seven European countries, *Cyberpsychology, Behavior, and Social Networking* 17(8): 528–535.

3. Data and method

This report combines two different tasks in the DigiGen project, namely Task 7.1 Summarising results for policy use and Task 7.2 Scoping review, synthesis and linking to EU frameworks. In this chapter, the description of the design of the scoping review[12] precedes the overview of the data and methods used for empirical analysis in the project; the chapter concludes with a summary of how the consortium has worked to generate, revise and present evidence-based policy recommendations under the supervision of the project's impact sub-committee.

3.1. Design of scoping review

The scoping review is one of the multi-faceted family of techniques for systematically searching and assessing literature within a given research field (Grant & Booth, 2009). The idea common to these methodological approaches is to present the research front in a systematic, transparent and replicable manner, although the specific aims of the different review techniques may be more varied. It follows from this incremental development that definitions of different literature search techniques are not exact, and empirical use of such techniques demonstrates overlap. Since Grant and Booth (2009) wrote their overview of 14 different literature search approaches, the scoping review has been described by several authors, some of them offering step-by-step frameworks. Still, vagueness in the frameworks may occur, making the scoping review a comprehensive but not standardised technique for conducting and reporting a systematic literature search.

The following framework for conducting a scoping review is derived from Colquhoun et al. (2014) and Peters et al. (2015):

1. Identification of keywords

2. Use identified keywords across all databases

3. Study selection

4. Extracting and charting results

5. Synthesis

Review question

Starting from the framework of vulnerability and agency described with reference to Lotz (2016) and focussing on the four microsystems in the digital ecosystems model described in Chapter 1, we conducted our scoping review based on the following question:

> What are the conditions contributing to children and young people being either negatively or positively impacted by ICT use in the family, during leisure time, in education or as democratic citizens?

Step 1: Identification of keywords

For the initial identification of keywords, researchers are advised to conduct a limited search of relevant databases and extract words from title and abstract (Colquhoun et al., 2014; Peters et al., 2015). However, in this scoping review, we started by extracting relevant keywords first

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from literature reviews by Ayllón et al. (2020) and Lorenz and Kapella (2020) and inserting these keywords into a template. We subsequently asked researchers in the project teams to review and expand on the list of keywords for each of the four digital microsystems that we have derived from ecological systems theory (please see Chapter 1 in this report). The results of this process were comprehensive lists of keywords, both those common to the four different microsystems and those that are specific to particular domains.

Table 3.1: Identification of keywords across four microsystems of children's and young people's use of digital technology

	All micro-systems	Family	Leisure	Education	Civic part.
Target group	child/ children; young (people); youth; adolescent; teenager	kids	--	pupil; student	student
ICT usage	ICT; digital; online; internet	screen time; social or new media; sharenting	screen time; social or new media; screen device	computer; BYOD*	web; social or new media
Context	--	family; home; parent	--	primary/ secondary and elementary/ secondary education or school; teaching; classroom; instruction; pedagogy; didactics; practice; hybrid or remote/ distance learning; formal or informal learning	citizenship; civic; democracy; politics
Vulnerability (situational)	age; gender; boy; girl; sociodemographic; socioeconomic; migrant; immigrant; ethnic minority; unemployment; (high or low) income; inequality; single parent; co-parenting; culture; risk; vulnerability; marginalised; disability; disadvantage; special (needs or education); LGBT+; (rainbow or patchwork) family; foster parent; homeless; heterosexual; homosexual; urban; rural				
Autonomy	--	--	entertainment; communication; negotiation; connecting; play; socialisation; creation; collaboration; content sharing	competence; skill; literacy; activity; homework; collaboration; learning; achievement	engagement; efficacy; activity; protest; debate; volunteer

*) BYOD = Bring Your Own Device.

As a rule of thumb, scoping reviews should have expansive inclusion criteria (Munn et al., 2018). Still, characteristics like age group should be detailed (Peters et al., 2015). This has relevance from the initial phase of setting up the database search for the scoping review, where the idea is to *broaden* the search (Coquhoun et al., 2014; Peters et al., 2015).

From applying the template across all four digital ecosystems, a selection of keywords was made based on trial-and-error in a preliminary test-search in the following EBSCO host databases: Academic Search Ultimate, Education Source, ERIC and SocINDEX. The keywords presented in Table 3.1 were our initial inclusion criteria for the scoping review.

Step 2: Use identified keywords across all databases

The second step of any literature review is to use all identified keywords across all databases. In this scoping review, the search was conducted by using four separate search strings, targeted to each of the four domains or microsystems in Table 3.1. The search was then conducted on the following databases with a time span from 2011 to 2021:

EBSCOhost:

- Academic Search Ultimate
- Education Source
- ERIC
- SocINDEX

Web of Science Core Collection:

- Science Citation Index Expanded (SCI-EXPANDED)
- Social Sciences Citation Index (SSCI)
- Arts & Humanities Citation Index (A&HCI)
- Emerging Sources Citation (ESCI) (only 2015-present)

ProQuest:

- Applied Social Sciences Index & Abstracts (ASSIA)

Table 3.2: Example of search strings: "Family" and "Civic Participation" with Boolean operators

	Family	**Civic participation**
Title	(home* or parent* or famil*) AND (ICT* or digital* or online* or internet* or (screen) W1 time or (social or new) W1 media or sharent*)	(citizen* or civic* or democra* or politic*) AND (ICT* or digital* or internet* or online* or web* or (social or new) W1 media)
Abstract	(child* or kid* or young* or youth* or adolesc* or teen*) AND (age* or gender* or boy* or girl* or sociodem* or socioec* or migrant* or immigrant* or ethnic* or minority* or unemploy* or (high or low) W1 income or inequal* or single W1 parent or co-parent* or cultur* or risk* or vulnerab* or marginalise* or disab* or disadvant* or special W1 (needs or education) or LGBT* or (rainbow or patchwork) W1 family or foster W1 parent or homeless* or heterosex* or homosex* or urban* or rural*)	(child* or young* or youth* or adolesc* or teen* or student*) AND (particip* or engage* or efficacy* or active* or protest* or debate* or volun*) AND (age* or gender* or boy* or girl* or sociodem* or socioec* or migrant* or immigrant* or ethnic* or minority* or unemploy* or (high or low) W1 income or inequal* or single W1 parent or co-parent* or cultur* or risk* or vulnerab* or marginalise* or disab* or disadvant* or special W1 (needs or education) or LGBT* or (rainbow or patchwork) W1 family or foster W1 parent or homeless* or heterosex* or homosex* or urban* or rural*)

For the database search for the microsystem "Family", the first search conducted in this scoping review, we also searched the bases PsyhINFO and Social Care Online (SCIE). These databases are specifically recommended for studies on social work. However, the results from these databases yielded numerous duplicates, adding to the results from our searches in the EBSCOhost and Web of Science databases, and therefore no additional searches in these databases were added for the other microsystems.

For the microsystem "Education", an additional database search was set up in Science Direct, recommended by the project team responsible for this domain in DigiGen. However, Science Direct demands less complex search strings (fewer Boolean operators) than do the EBSCOhost, Web of Science and ASSIA databases, making the results less refined.

Step 3: Study selection

Selecting studies from the search results begins with a screening process. The reliability of this process will be strengthened by using two reviewers (Peters et al., 2015). In this scoping review, we facilitated study selection reliability using two reviewers and the web-based review tool Rayyan (www.rayyan.ai). This application, to be downloaded to a personal computer or hand-held device, makes it possible for two (or more) reviewers to assess and categorise results individually and in blind mode before viewing the categorisations made by the other(s). This procedure reveals in a tidy and structured manner where the reviewers agree on whether to include or exclude the article in question and where further discussion or even a third reviewer is necessary to reach agreement.

In Rayyan, the two reviewers read the title, abstract and keywords of each result from the literature search. They used the inclusion/exclusion criteria (see Table 3.3) to categorise the result as "include" or "exclude" (or also "maybe", to be discussed with the collaborator at a later point). This process has a distinct iterative aspect to it, as it involves post-hoc inclusion/exclusion criteria based on the specificities of the review question combined with new familiarity from reading about the studies (Colquhoun et al., 2014). The reviewers met at beginning, at mid-point and at the final stage of the screening process and refined the search criteria when needed.

Table 3.3: Inclusion/exclusion criteria for all microsystems, screening stage.

	All microsystems	Family	Leisure	Education	Civic participation
Inclusion	Children and young people	Age: 0-10	Age: 10-15	Age: 7-16	Age: 16 and above including university- and college students
	Primary geographical area: Europe Secondary geographical area: OECD countries				
	Studies must be in English				
	Grey literature will be included from database search only				
Exclusion	--	Studies on therapists and social workers only, studies on parents only	--	Studies on teachers only or teacher students only	--
	Studies on online tools, interventions or programs to help parents deal with situations concerning their children or family, and papers reporting on the testing of digital research instruments for research, like protocols and surveys.				

Step 4: Extracting and charting results

The review team for each domain then charted the studies resulting from the screening process using a spreadsheet in Excel. For this purpose, only a cursory reading of studies in full text was required. The spreadsheet gave an overview of the research and was used for records on the characteristics of included studies with key information relevant to the review question. Colquhoun et al. (2014) recommend that this data chart is first piloted on 5–10 studies. The data chart can be updated with additional categories at any time during the review process, if needed.

The following characteristics were recorded for each study included in the screening phase of this scoping review, in one spreadsheet for each microsystem:

1. Author

2. Year

3. Journal

4. Country

5. Research question

6. Population

7. Sample size

8. Methodology

9. Duration

10. ICT device or platform

11. Representations of situational vulnerability (background variables denoting inequality, for example, age, gender, socioeconomic status, ethnic minority status, parents' marital status, disability, having an LGBTQ+ identity, living in foster care, being adopted or homeless, living in urban versus rural areas)

12. Representations of pathogenic vulnerability and/or autonomy (outcome variables denoting threats to or evidence/experience of well-being, health, safety, security, learning, social inclusion or -exclusion)

13. Key findings

Based on the charting of screened studies, the review teams from the four different domains assessed and selected studies to be read in full text and reported on in the final synthesis. Also in this stage, studies ended up being excluded, following the iterative rationale of the scoping review (Colquhoun et al., 2014). In this stage, we:

- Included studies that build on data from or on children and young people.
- Included literature reviews.
- Excluded correlational studies on screen time and/or parental mediation, except when these studies also address situational and/or pathogenic vulnerability.
- Excluded studies that address obesity, sedentary time/physical activity, eyesight or muscular functions in correlation with ICT use except where these studies also incorporate variables covering situational vulnerability.

Colquhoun et al. (2014) and Peters et al. (2015) state that this phase should include a hand search of reference lists for additional literature. However, the completeness of the search will have to be balanced against and determined by time/scope constraints (Grant & Booth, 2009), meaning that comprehensiveness and breadth must be kept in accordance with time

and personnel resources (Colquhoun et al., 2014). The time and personnel resources of this scoping review demand that only literature turning up in the initial database search/screening process was assessed for inclusion, and no hand search of reference lists of included studies was conducted.

Step 5: Synthesis

To review is defined by Grant & Booth (2009, p. 92) as "To view, inspect, or examine a second time or again". The report from the scoping review should therefore include a narrative or descriptive summary of the results that align to a) the objective and b) the question of the review (Peters et al., 2015). This equals what Colquhoun et al. (2014) call a qualitative content analysis approach to the studies included. These researchers also propose to use analytical framework/s to show overview and breadth of results, structured as thematic analyses with tables and charts where necessary. The discussion should begin with the overall conclusion based on the scoping review results, then be in-depth with relevance to the review question and objective. Discussion should contain limitations of the review, as well as references to the context of current literature, practices and policy. The conclusion of a scoping review should address implications for future research.

The final reporting from a scoping review includes accounting for the number of studies that are a) *identified* and b) *included* through the screening process. It is common to illustrate this process by using a flow chart (Peters et al., 2015), adapted to this scoping review in Figure 3.1.
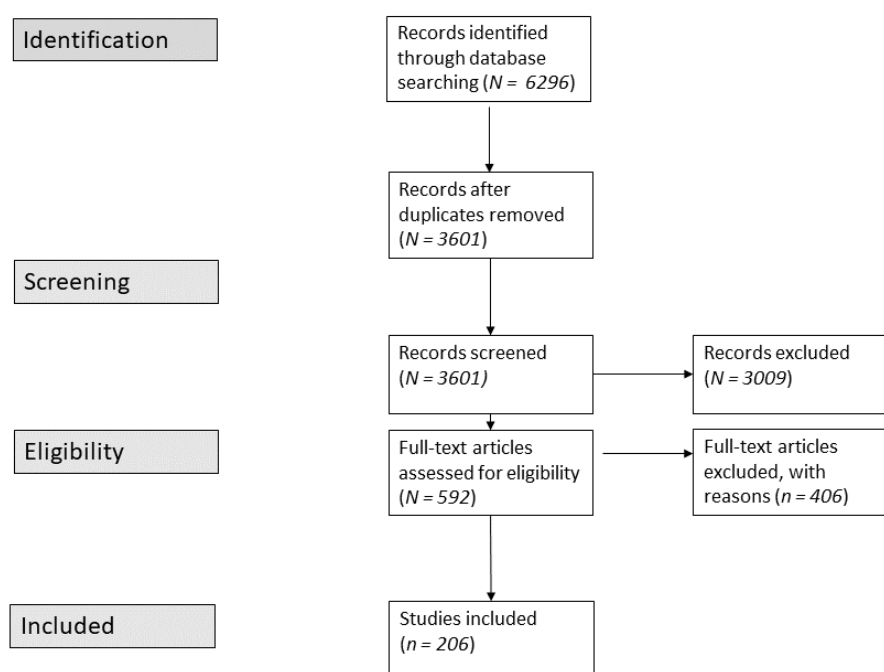
Figure 3.1: Flow chart for reporting results of scoping review (derived from Peters et al., 2015, p. 144). *N* equals the sum of results from four separate search strings adhering to the four microsystems of children's and young people's ICT use: Family; Leisure; Education and Civic participation

Figure 3.1 shows that for the four microsystems of children's and young people's use of digital technology, the search strings based on the identified keywords (described as step 1 in the design) yielded a total of 6296 studies across all the databases (step 2). After removal of duplicates, 3601 studies were screened for inclusion (step 3), which led to the exclusion of a majority of this number. Then the remaining studies, 592 in all, were charted for eligibility using detailed categories in an Excel spreadsheet (step 4), where also the majority of the remaining studies were excluded. This led to a final number of 206 studies to form the basis of this scoping review, to be reported on in the following chapters (step 5).

3.2. Data and methods for empirical research

For this report, a template was used for displaying and commenting on the data, sample and methodology within each domain/microsystem. In the following, we include the tables and comments for each domain.

Family

Table 3.4: Overview of data and methods in the microsystem "Family"

Approach	Domain "family"							
	Age group: 5-6 Years		Age group: 8-10 Years		Age group: Adults		Total	
	N of methodological unit	N of participants	N of methodological unit	N of participants	N of methodological unit	N of participants	Units	Participants
Focus groups	21	79	21	97	-	-	42	176
Family interviews	20	29	22	30	42	65	42	124

Family: description of research sample

The sample shown in Table 3.4 consists of children aged between 5 and 10 years and their families, with country case studies in Austria, Estonia, Norway and Romania. A total of 42 focus group interviews were conducted with a total of 176 children, complemented by 42 family interviews where a total of 124 people participated (65 parents, 59 children).

The overall sample of families reflects the diversity of families in terms of cultural, economic and educational background and of family and living forms. We reached out to different family forms, such as nuclear families with one, two and three and more children living with both of their biological parents, single-parent families, multi-household families, intergenerational households (e.g. grandparents living in the same household), families in a patchwork constellation and families after a divorce or separation. Also, in regard to the socioeconomic, educational and cultural background, our sample reflects some diversity: we included families of the ethnic group of Roma, families with diverse educational and socioeconomic backgrounds. Families were placed in urban, suburban or rural areas of the participating countries, and families either owned a house or apartment or rented an apartment.

In the recruitment strategy, the participating countries had to make sure to reach out to different regions (urban, rural) in their countries and obtain contrasting families in terms of educational background of parents and socioeconomic status. Since Romania is one of the project partners, it was also possible to focus on a specific ethnic group, Roma children and families. Because of the COVID-19 pandemic, recruiting strategy in some participating countries was limited since recruiting via kindergarten and school was not possible. Consequently, for those countries where institutional access was denied, the personal networks of researchers were utilised for recruiting potential participants, enabling subsequent snowball sampling. This implied that the contacts to children were mostly facilitated by parents. A well-known problem of snowball sampling is a tendency for homogeneous samples. Nevertheless, as our substantive results show, we were able to reach a diverse sample of families regarding their digital technology practices as well as regarding their regional and sociodemographic backgrounds.

Family: description of methods

The empirical research results from the domain "Family" are based on a multi-methodological approach: focus groups with children, individual interviews with children and young people and other family members, and video observations of young people have mainly been applied. In our methodological approach, we could see that our multiple-perspective interview research proved to be very valuable in triangulating perspectives for a more nuanced understanding of shared knowledge and family practices. Furthermore, comparing the different perspectives within one family allows for new insights. Triangulating here means comparing, relating and integrating perspectives – not validating them. This allows for a more comprehensive understanding of family dynamics and practices. Another triangulation exercise was the integration of different disciplinary perspectives amongst researchers.

Leisure

Table 3.5: Overview of data and methods in the microsystem "Leisure"

Approach	Domain "leisure"	
	Age group: 10-15 Years	
	N of methodological unit	N of participants
Focus groups	-	-
Interviews	85	85
Game observation	8	22
App	273	50

Leisure: description of research sample

Research in the microsystem "Leisure" was initially planned to incorporate diversity in the sample, taking into account sociodemographic variables that can imply forms of inequality. For this reason, the recruitment process was essentially to be based on purposeful sampling procedures, and it would involve the following basic social and institutional 'pools':

- Schools, primary and lower-high from two-three different districts
- Sports clubs, study centres, youth centres, etc., operating in the areas were to be informed about the research to help researchers get in touch with possible participants
- Parents' associations were to be contacted and used as a pool for potential recruiters.

However, the COVID-19 situation altered the process completely. Restrictive measures imposed in all participating countries and the reluctance of parents and children towards physical contact made the initial research design and recruitment strategy impossible to follow. Difficulties and even no access to 'areas of interest', such as schools, sports clubs and youth centres, because of the pandemic restrictions led all research teams to include in our strategies techniques of convenience sampling as well. This had an impact on the composition of the sample, since this was inevitably relatively homogeneous. Even if gender distribution among the respondents was balanced, there were few cases of respondents with migrant background, except in the United Kingdom. The distinction between urban and rural area of residence was also more nuanced in the case of Romania than in the other countries.

The interviewees were recruited through different sampling strategies. In order to achieve the aim to recruit children and young people of diverse social backgrounds, different groups and organisations were contacted, including gaming groups and high school or vocational training

institutions, along with individual parents. Participants were thus recruited through different techniques of purposeful sampling, that is, a combination of typical case sampling, stratified purposeful sampling and snowball sampling. In total, 85 interviews were conducted: 20 in Austria and in the United Kingdom, 19 in Greece, 13 in Norway and 13 in Romania.

It was also difficult to recruit co-researchers through interviews. Although several interviewees had consented, the communication usually faded out in the process or participants tended to withdraw because diaries seemed to require too much involvement from the respondents and, in the end, it was not really felt to be a participatory process. We also followed the complicated procedure due to precaution/ethics measures that required first children/parents to email researchers for access code/personal ID and then download the application. In total, 50 children and youths aged between 9 and 17 participated as co-researchers from Austria, Norway and the UK. A total of 29 co-researchers were recruited in the UK, 13 in Norway and 8 in Austria. The sample includes data from a total of 23 girls and 27 boys.

Leisure: description of methods

Research in the microsystem of "Leisure" had a two-fold ambition: on the one hand, to combine different methodological tools within a multi-modal approach; on the other hand, to render children and young people active participants in the research process. In order to do so, several methodological tools were used, such as interviews, communication diaries, video game observation and secondary analysis of statistical data.

Due to the COVID-19 restrictions, almost all interviews were conducted online through video conference platforms, which made the work of the researchers more difficult. Apart from the difficulties in organising the interviews, in most cases without any face-to-face contact with parents and/or children, during the interviews children tended to give short (yes or no) answers, particularly the youngest ones. It might have been that questions were sometimes straightforward and did not encourage developed answers, but it also had to do with the means of communication, which does not provide much room for flexibility.

Significant problems appeared also in implementing research with digital diaries. Apart from practical problems – that is, for some children it was difficult for them to find the app because of complicated spelling and the fact that there are two apps with similar names – researchers faced severe difficulties in motivating children to participate, even when their parents supported the project, trying to remind them daily to fill in the app. In addition, there was no direct way of communicating with participants through the app, for example about possible troubles getting started, need for assistance, etc.

In the limited cases of acceptance, co-researchers were asked to spend a few minutes every day for a period of about 10 days on their reports. Daily reports included brief survey questions and the opportunity to upload images or screenshots containing examples of their digital activities.

Finally, problems appeared during the game observation research (Minecraft). Recruiting from interviewees did not really work since Minecraft does not seem to be a videogame so popular for adolescents; not all children interviewed play Minecraft and those who do play were not necessarily willing to participate in the ethnographic study. Parents also were not very willing to get involved in the research, while children seemed disorientated regarding their digital presence and actions. Most importantly, the pandemic triggered an unprecedented push for almost all people toward digital services in domains like public sector services, education, consumerism (e-shops), and leisure and cultural activities. The result was and still is an overwhelming feeling of 'digital obligations', which resulted in a feeling of 'digital fatigue' or 'digital burnout'.

As this description shows, the involvement of children and young people as co-researchers proved to be more challenging than expected. For them as digital natives, the app used seems not to be "naturally" interesting, and even with incentives and pressure from the parents, children did not use it. (From the Minecraft sessions, children said that a game has to be fun and exciting, and, if it is a learning game, it should not be too obvious, otherwise nobody wants to play it.)

It seems that rendering children co-researchers requires more participatory methods that involve them from the stage of research design and the formulation of research questions. Despite the efforts, the goodwill and the open-mindedness of the researchers, a certain intergenerational gap between perceptions of the 'digital' exists. Therefore, a more nuanced perspective of what could or should be done to alleviate potential harmful effects of ICT predominance in children's and young people's leisure time should be adopted, by taking into account children's perspectives.

Education

Table 3.6: Overview of data and methods in the microsystem "Education"

Approach	Domain "education"									
	Students: 9-16 Years		Teacher candidates		Teachers		National stakeholders		Total	
	N of method-ological unit	N of partici-pants	N of method-ological unit	N of partici-pants	N of method-ological unit	N of partici-pants	N of method-ological unit	N of partici-pants	Units	Partici-pants
Pilot study COVID-19 add-on	26	26	-	-	-	-	4	4	30	30
Task 5.1: Qualitative data	86	43	-	-	37	37	14	14	137	94
Task 5.2: Video workshop	37	50	-	21	-	-	-	-	37	71

Education: description of research sample

In the microsystem "Education" there are five participating countries: Estonia, Germany, Greece, Norway and Romania. The research samples therefore stem from all five countries. In addition to the participant group of (1) children and young people, participant groups of (2) teacher candidates, (3) teachers and (4) national stakeholders are included.

A key point of the microsystem "Education" is the consideration of the formal transition of children and young people to a new formal education phase. As this transition differs in the five participating countries, there are different age groups in the national samples. While the youngest children in Germany are 9–10 years old, the young people in Estonia are 15–16.

In the sampling, attention was paid to ensuring that the samples were as heterogeneous as possible. A convenience and snowball sampling approach was used to sample the (1) children and young people, whereby those with varying background characteristics (gender, socioeconomic status, culture) have been recruited. The sample of (2) teacher candidates included primarily college or university students. The participants should have had the chance to gain experience related to the use of digital technology in education (second to fifth year of teacher education). In addition, teacher candidates should differ in terms of gender and subject area. In addition, a diversity in type of school/school track in those countries where teacher training is also differentiated according to different school types (e.g. different school tracks after primary school in Germany) was respected. Attention was also paid to the fact that participants were from two different universities/institutions for teacher training (max. three) and from different regions. When sampling the (3) teachers, no direct link between teachers and children and young people interviewed was intended. In addition, the participating teachers should have had the chance to gain experience related to the use of digital technology in education (at least two years of experience in teaching). Also, teachers should differ in terms of gender and subject area. To maximise diversity, no subjects were excluded. In the sampling of (4) national

stakeholders, attention was paid to ensuring diversity in their perspectives due to their work fields and experience.

In the pilot COVID-19 study (please see below), interviews were conducted with a total of 26 children and young people who were in a class after the transition to a new formal education phase. In addition, group discussions were held with four national stakeholders.

The qualitative interview study was conducted with 43 children and young people before and after transition to a new formal education phase, 17 teachers teaching in a class before transition, 18 teachers teaching in a class after transition, 2 teachers teaching at both stages (before and after transition) and 14 national stakeholders.

In the video workshop, a total of 28 children and young people before transition, 22 children and young people after transition and 21 teacher candidates took part.

Education: description of methods

In the microsystem "Education", a multi-methodological approach with different research techniques is applied. In general, the focus is on children and young people, considering different individual backgrounds and characteristics. The work package consists of three parts: (1) a pilot study, (2) a qualitative interview study and (3) a video workshop. Due to the unforeseen COVID-19 pandemic, a pilot study was also conducted as an add-on.

Prior to the main survey, an (1) exploratory pilot study COVID-19 Add-On was conducted to assess the impact of the COVID-19 pandemic on digital technology in education in which country-specific circumstances were considered. The exploratory study served two main purposes:

- Feeding into the preparation for data collection and further developing the interview guideline for children and young people for the main survey and beyond, to involve children and young people and their perspectives in the development of the survey instruments.
- Gaining insights into children's and young people's experiences of the impact of the pandemic on education in different countries to disseminate their voices.

The data collection of the COVID-19 pilot study took place in autumn/winter 2020/2021 (for further information, see published DigiGen working paper: Eickelmann et al., 2021).

In the (2) qualitative interview study, a design with transition and development stage focus has been used. The interviews were conducted with three participant groups: children and young people, teachers and national stakeholders. Two different timings (two sub-studies) of data collection with children and young people occurred – before and after the transition to a new formal educational phase happened. This data collection took place in late summer and autumn 2021 (for further information, see published DigiGen working paper: Eickelmann et al., 2022).

The method of (3) the video workshop is based on a collaborative ethnography approach, including children and young people as co-researchers and subject-matter experts, co-producing insider knowledge. Teacher candidates were involved, as they will be the teachers of tomorrow, to foster their awareness of issues children and young people face in terms of technological transformations in education. Children and young people after transition and teacher candidates focusing on both before and after transition level developed interview guidelines in the first part of the video workshop. In the second part, these children and young people and teacher candidates interviewed (other) children and young people using the interview guidelines developed. The interviews were video recorded. A total of 12 interview guidelines and 37 videos were produced. The data collection was in autumn/winter 2021 (for further information see published DigiGen working paper: Casamassima et al., 2022).

Civic participation

Table 3.7: Overview of data and methods in the microsystem "Civic participation"

Approach	Domain "civic participation"	
	Age group: 15-18 (focus groups); 16-18+ (interviews)	
	N of methodological unit	N of Participants/documents
Netnography/interviews	3	65
Focus group interviews during digital storytelling workshops	3	12
Policy document analysis	3	44

Civic participation: description of research sample

For the DigiGen project, we led a study on ICT and civic participation in Estonia, Greece and the United Kingdom focusing on adolescents 16–18 years of age but also inclusive of older ages where that was contextually relevant using netnography (online content analysis, online interviews), digital story telling workshops and digital citizenship policy analysis documents.

Recruitment of participants involved the snowballing technique for the online interviews in netnography and subsequently also for recruiting the digital storytelling adolescents to co-research and co-produce the digital stories about what challenged and inspired their civil participation.

Civic participation: description of methods

This data collection translated into three major comparative qualitative phases. In the first, we produced netnographic research (online observation, content and 65 interviews in total) conducted between September 2020 and April 2021 in Estonia, Greece and the United Kingdom, comparing the reasons and the means by which youth engaged in online civic participation, focusing on online movements mobilising for racial, social and environmental justice (see Karatzogianni et al., 2021). In the second phase, focus group discussions were organised as digital storytelling workshops with young people involved in the production of online political discourse, with the aim of identifying how they are affected by the online environment of their choice and key strands in youth ideological online production. Within the workshops, a digital tool (PowerPoint) was used for the co-production of relevant material (photos, screenshots of relevant online content) to communicate the motivations, causes and means that young people find appropriate and meaningful for what they perceive as civic participation (as digital citizens) (see Karatzogianni et al., 2022a). In the third phase, we critically assessed digital citizenship in educational systems and in national digital citizenship documents (multimedia included) in the United Kingdom, Greece and Estonia, focusing on the inclusion and promotion of digital citizenship (see Karatzogianni et al., 20022b).

Netnography (Kozinets, 2009) as a technique involves adapting ethnographic techniques to digital environments, focusing on political discourse and practice in digital networks used by young people, as well as in more youth-specific blogs, websites of youth organisations and social media networks, with particular emphasis on how socioeconomic, gender-related and political culture-related factors influence ICT use by young people. In conducting the netnography, DigiGen researchers used critical multimodal discourse analysis to understand and analyse narratives and images, including videos, with emphasis on the role of young people in producing online content for political purposes. We also collected original data through qualitative interviews

with participants involved in the production of online political discourse (65 interviews in total). The third phase was organised as digital storytelling workshops (DSWs) with young people involved in the production of online political discourse, focusing on how they are affected by the online environment of choice. During the workshops, PowerPoint was used as a tool for the co-production of relevant material that communicated the motivations, the causes and the means that young people find appropriate and meaningful in their civic participation.

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Part II

Scoping reviews and summary of research results in four project domains (microsystems): Family, Leisure, Education, and Civic participation

4. Use of digital technology in the family

4.1. Scoping review: Family

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Introduction

In this paper, we report on a scoping review to answer the following review question: *What are the main conditions contributing to children and young people being either negatively or positively impacted by the use of digital technology in the family?*

This review broadly encompasses how children and young people are vulnerable to digital technology. The review originates from DigiGen Work Package 3 and focuses on children's use of information and communication technology (ICT) within the family and its impact on family communication and daily life. The scoping review also aims to uncover how vulnerability is conceptualised and understood in the research literature by focusing on diverse aspects of the family. Furthermore, it aims to understand the conditions under which harmful versus beneficial effects occur as they relate to ever-increasing ICT use among children and young people. The method for this scoping review is described in this report's Chapter 3.

In this scoping review, we reviewed a total of 252 studies that focused on the broad term of vulnerability as it relates to digital technology and family. The selected articles focused on aspects that either increase or decrease vulnerability with regard to digital technology. From this sample, further analysis was based on the following inclusion criteria:

- Studies written in English
- Studies from Europe and the OECD area
- Studies focusing on the target group 0–18 in combination with family
- Studies that cover differences in background and differences in outcome
- Studies published between 2011 and 2021

This inclusion process led to a final corpus of 100 studies published in the period 2012–2021, which formed the focus of this literature review. European studies are mainly included in the review, focusing broadly on the impact of ICT in family settings. However, due to their focus on the youngest adolescents and children, those below the age of 12, in combination with differences in background and outcome, we have included one study from Chile, two from the United States, two from China, one from India and five from Australia.

Table 4.1: Final corpus of 100 studies reviewed for "use of digital technology in the family"

Presented methodology	Quantitative research	Qualitative research	Mixed methods	Review articles
N	70	14	6	10

A total of 59 of the quantitative studies were surveys or questionnaires targeting adolescents from the age of 12–18 and/or their parents, and five of them were longitudinal studies. One of the surveys was distributed to children younger than 12 years. The rest of the quantitative studies were tests or multivariate analyses. Within the qualitative category, all the studies were in-depth or focus group interviews. The interviews targeted adolescents from 12–18 years and/or their parents, except for one study where the researchers also talked to children

younger than 12 years. This first scanning of the methodological approach indicated that few studies examined positive and negative influences through listening to children under 12, so the insights regarding the youngest children of the family were collected through answers from their parents.

Based on our scoping review, we can sum up the relevant resilience-enhancing factors contributing to the well-being of children and young people and their vulnerability as follows:

   1) Parental mediation and care

   2) Extensive internet use

   3) Social networking as a social lubricant

   4) Age and gender

   5) Risky online behaviour

   6) Gaps in existing research

The scoping review focuses on (daily) practices in the family and connections to the family that establish and shape personal relationships between generations and, if necessary, between genders. The family is produced and exhibited daily by common practices, such as management of balance within the family on different levels, the construction of commonalities and care for each other (Kapella et al., 2022). As part of the family, children are considered competent and have an agentic role to play in their development while simultaneously being vulnerable. Changes in digital media environments and children's use practices lead to changes in childhood and socialisation and in the development of their views of the world (Hasebrink & Paus-Hasebrink, 2013).

Parental mediation and care

An important part of 'doing family' as a daily practice can be described under the different **care functions** of a family. In terms of digital technologies (DT) in a family, the 'caring for', 'caregiving', 'care receiving' and 'caring with' of family members strongly impact the well-being of children and young people in a family (Tronto, 2013). The **construction and shape of personal relationships** among family members in their daily togetherness greatly affect the well-being of family members and their use of DT. In terms of the effects on the use of DT, it has been shown that the attachment of adolescents to parents has a significant effect on adolescents' internet use (Ballarotto et al., 2018).

Four types of bonding were extracted in the majority of the studies. Care reflects parental warmth and affection versus indifference and rejection, and control reflects parental control and intrusion versus encouragement of autonomy and independence. Exposing a child to affectionless control in early life seems to predispose in maladaptive relationships with others in later life (Kalaitzaki & Birtchnell, 2014). There is also evidence that family support, social bonds and affective involvement of family members affect children's and young people's well-being (Hamilton-Giachritsis et al., 2017).

Children engage in a wide range of screen-based and non-screen-based sedentary behaviours at home, of which socialising, indoor playing, TV watching and using a tablet are the most common (Rathod et al., 2020). Among parents in the United Kingdom, there is a strong sense of the need to ensure a balance between children's digital and non-digital engagements (Kucirkova et al., 2018). The children cited parental rules as an important factor in limiting screen time (Veitch et al., 2013). In that regard, Bassiouni and Hackley (2016) pointed to ways in which children exhibit their own agency, for example, children who were able to develop economic literacy in negotiating with parents to obtain the latest games or consoles by searching offers and utilising birthday money, offering to do jobs around the house or even buying games jointly with adult family members. However, some findings highlight the potential importance of targeting sleep in weight management interventions for low-income children by promoting the consistent implementation of a bedtime routine, reducing chaos and disorganisation in the

home environment and encouraging caregiver monitoring of screen time (Appelhans et al., 2014). Dumuid et al. (2016) found that children with fewer electronic devices, particularly in their bedrooms, participated in less screen time, regardless of socioeconomic status (SES), while research by Appelhans et al. (2014) showed that the physical and social home environment, including screen time and sleep duration, may promote childhood overweight or obesity in low-income households.

Research shows that adolescents living in households with high parental warmth and an authoritative and authoritarian parenting style when it came to the use of the internet had lower levels of online game dependency (Özgur, 2019). Similar findings have been found with regard to the balance of emotional warmth and protection, which was deemed the strongest protective factor in terms of excessive internet use. In contrast, other risk factors, such as the lower SES of the family and increased time spent at home, were seen as minimal (Faltynkova et al., 2020).

Both adolescents' and their parents' mental health issues may be associated with the online behaviour of young people (Wartberg et al., 2017). Major predictors of online gaming addiction, among others, included domestic violence, the mother's child-raising rules being challenged by the father and the child's sense of responsibility for their parents (Pawłowska et al., 2018). Not only can parenting practices affect vulnerability, but a parent's own mental health can also be seen as contributing to problematic behaviours among their offspring, such as internet gaming disorder (IGD) (Wartberg et al., 2017).

Parental monitoring is an independent dimension that can be related to both active and restrictive mediation strategies. Depending on the context, parental monitoring acts as a mediator variable between online risks and active or restrictive mediation strategies and functions in different ways depending on the mediation strategies. The findings show that parental mediation strategies may differ depending on the context (Bayraktar, 2017). Daoud et al. (2020) measured digital competence and internet access at home. They identified that parents were overwhelmingly positive in terms of their own digital competence when measuring digital competence and internet access at home. Parents categorised as supportive and non-controlling fell into the group of digitally competent parents. However, the development of digital competence through internet access at home is reported differently depending on what or how data is collected (Daoud et al., 2020). In contrast, Siomos et al. (2012) acknowledged the lack of digital competence among parents and argued that parents should be given a suitable course, making them more involved in their supervision to a degree that does not curtail autonomy but instead respects personal boundaries.

Being in a supportive family contributes to both significant increases in life satisfaction and a greater likelihood of stability rather than fluctuation (Twigg et al., 2020). The social environment, including parental social support, has emerged as having a significant influence on children's activities (Veitch et al., 2013). Parents described their support as being very much about improving the young person's understanding of social codes and netiquette, as well as understanding instructions and, for some young people, the technology. Among other strategies, several parents are 'friends' with their children on different social media as a means of discussing issues with their children if they write or perceive any comments on social media that can be emotionally distressing (Sorbing et al., 2017).

While parents are important role models, parental control is associated with greater pre-adolescent life satisfaction. Thus, parents having more control over the time their child spends on social media, including the use of apps or software programmes, or encouraging their child to think critically about potentially harmful content, is associated with better pre-adolescent mental health (Fardouly et al., 2018). Open family communications about internet use where children can share their online experiences with their parents can be a protective factor against cyberaggression and involvement in cybergossip (Romera et al., 2021). Elevated problem-solving capacity and family communication can also reduce children's internet use (Pellerone et al., 2019). While parental control is important in terms of vulnerability, parents' attitudes are seen as crucial to benefit from the pedagogical potential of technology. Although children live with a panoply of digital devices at home, and despite efforts to equip schools with digital devices, their use for educational purposes is insipid, both at school and at home. For most parents, devices such as tablets are seen as toys for younger children, especially those below the age of eight (Brito & Dias, 2016).

Many parents agree that children's use of online environments should be controlled at home, and most parents do this, according to some of the research in our scoping review (Tuukkanen & Wilska, 2015). Furthermore, parents are seen as important role models through their own use of digital technology. A qualitative study showed that preschool children between the ages of five and six think their parents spend too much time on the internet at home and that parent's activities are mainly centred around playing games, browsing social media, messaging others and watching TV series and soccer matches (Erişti & Avcı, 2018). Moreover, the children in this study talked about feeling unhappy, lonely, bored and angry when their parents were online (Erişti & Avcı, 2018). Parent- and adolescent-related variables play a predictive role in adolescents' and parents' anxiety during the COVID-19 pandemic, and parental compulsion may likely interrupt daily activities due to constant web searches. Parents with higher compulsion may focus on their own emotions and spend more time on the internet searching for COVID-19-related information (Akgul & Ergin, 2021). Contrary to peer-related loneliness, perceived loneliness in the relationship with parents did not predict problematic internet use per se (Musetti et al., 2020).

More comprehensive access to ICT in elementary schools has already resulted in distinct profiles of use by children, which appear to be linked to different family resources and diverse parental involvement concerning regulation and support (Diogo et al., 2018). However, the pedagogical digital content at home is not fully exploited if DT are perceived more as a source of entertainment, as 'toys', primarily for children under eight (Brito & Dias, 2016).

Parents have the power to choose what to share online on behalf of their children. Children want to be asked about and listened to before their parents 'sharent'—that is, share stories or images about them on social media (Sarkadi et al., 2020). Adolescents who were more concerned about their online privacy were more likely to disapprove of sharenting; however, female adolescents or adolescents who are closer to their parents have more positive attitudes towards sharenting (Verswijvel et al., 2019).

The body of research in this area points us in the direction of the great importance of parental involvement in the lives of young children and adolescents. The research also indicates a need for digital competence amongst parents and areas where they can acquire such knowledge. It also seems important to develop areas where parents and children can discuss the balance between monitoring and respecting their children's right to privacy. There also appears to be a lack of knowledge about how and why parental style and contextual factors interact in creating negative or positive impacts on children's use of ICT.

Extensive internet use, a well-researched topic

Globally, there is a relatively high focus on research investigating the relationship between parental mediation originating from concepts like internet addiction, extensive internet use or problematic internet use. Although the emphasis on such thematic approaches is less focused in Europe, 40 studies in our scoping review mentioned these terms. There seems to be strong evidence of the influence of family relationships on young people's internet use or internet addiction. Optimal parenting (i.e. the balance of emotional warmth and protection) and adolescents' autonomy lower the risk of excessive internet use (Faltynkova et al., 2020). Interparental conflicts increase the risk of internet addiction by weakening the parent–adolescent attachment pathway (Wei et al., 2020). However, Uhláriková and Šeboková (2016) could show among Slovak adolescents that a higher level of enmeshed cohesion, characterised by strong emotional connections between family members, mutual dependence between parents and children and not having many friends and interests outside the family, increases problematic internet use. Family affective involvement plays a moderating role in the relationship between temperamental lack of control and salience of the internet such that internet salience tends to be lower for those with high family affective involvement but higher when family affective involvement is low (Pace et al., 2014). Gunuc and Dogan (2013) showed that adolescents spending time with their mothers had a higher level of perceived social support and a lower level of internet addiction; it was also found that as the number of siblings increased, the adolescents' levels of perceived social support decreased, and their levels of internet addiction increased.

Other studies focusing on excessive internet use have concentrated on callous-unemotional traits, defined as a set of characteristics that include a lack of empathy, remorse and guilt and a lack of concern about the negative impacts of one's own actions. In their results, Trumello et al. (2018) found that internet addiction is often distinguished by social isolation and withdrawal, which they believe is consistent with their results showing a positive correlation with callousness, which is most closely related to a lack of empathy. Other studies suggest that boys approaching early adolescence have a tendency to become more preoccupied with internet use and that children who report having a more favourable relationship with their parents are less likely to have compulsive internet use (Miltuze et al., 2021).

A longitudinal study by Strittmatter et al. (2016), aimed at understanding the effects of the internet on the emotional and social development of children and young people, suggested that students who have significant real-life problems were more prone to escape to virtual life. Thus, escaping from offline problems to virtual life can reinforce existing real-life problems. As more and more time is spent online and less time is spent offline, it is easy to imagine that offline problems become increasingly problematic and that virtual life gradually becomes attractive (Strittmatter et al., 2016). Other real-life problems can include attachment or relation problems as well as issues of self-control. For adolescents with low and medium self-control, interparental conflict increases the risk of internet addiction (Wei et al., 2020).

Certain studies have examined how children with some types of disability are vulnerable to internet overuse. For example, in a study that included adolescents with Asperger syndrome, depressive symptoms were found to predict higher scores on the Young Internet Addiction Scale, while parental control may protect against internet addiction (Coskun et al., 2020). A focus on children with autism spectrum disorder who might be more prone to problematic use of digital devices, such as TV, phone, tablet and computer, had longer screen time per day and had started to use electronics at an earlier age compared to typically developing children (Eyuboglu & Eyuboglu, 2020). A study investigating the risk factors of problematic internet use showed that inconsistent parenting had a mediation effect between ratings of hyperactivity and maladaptive cognitions in adolescents (Sebre et al., 2020). In contrast, in another study, most families with children in the autism spectrum disorder group stated that using ICT affected their children negatively, especially in the social or emotional context, along with domains that involve communication, behavioural problems and motor activity (Eyuboglu & Eyuboglu, 2020). Other studies have shown that heavy ICT use, coined 'addictive use', is related to decreased levels of empathy (McCrory et al., 2020).

Several studies have aimed to prepare the ground for specific training programmes or effective strategies for parenting. However, there are differences in how parental styles are described and how they work, making it challenging to identify one style as 'better' than another when comparing the studies. Siomos et al. (2012) underlined how affection and care, including an understanding of children's need for individuality and self-expression, are expected to be more responsive to prevention efforts based on how parents describe their involvement (Siomos et al., 2012). Likewise, problematic internet use is higher among adolescents without parental control, so empowering parents to moderate their child's internet use is encouraged (Gomez et al., 2017). Higher parental care and monitoring predicted lower excessive internet use (EIU) in adolescents, while higher parental overprotection and lower SES predicted higher EIU (Faltynkova et al., 2020). Italian data show that perceived behavioural control determines higher risk perceptions of internet use in adolescents (Pellerone et al., 2019). High parental responsiveness (warmth) seems to exert a protective effect against such behaviour. However, some research suggests that the most beneficial parenting style is authoritative parenting, which includes high responsiveness and adherence to rules (Lukavska et al., 2020). Furthermore, a study by Miltuze et al. (2021) suggests that when parents follow through on rules, this can serve as a protective factor in comprehensive internet use.

Several studies have investigated how parents' mental health and parents' ability to connect to their children affect children's internet use. Poor maternal mental health is associated with a decline in life satisfaction, while poor paternal mental health is associated with a reduced likelihood of stability rather than fluctuation (Trumello et al., 2018; Twigg et al., 2020). The connection between internet addiction and the emotional quality of relationships with parents was analysed, and lower levels of emotional quality in maternal relationships as opposed to paternal relationships were associated with higher levels of internet addiction (Trumello et al.,

2018). In addition, parents' interest in and readiness for parenting have turned out to be critical factors in reducing the risk of internet addiction (Wąsiński & Tomczyk, 2015).

Parent-related loneliness is associated with pathological internet use among adolescents in the context of detachment from parents (Musetti et al., 2020). Early adolescents and younger children find comfort and company in online activities that sometimes substitute for missing parent-related activities. The need for a constant connection to the online environment is also a consequence of parents' migration. In many cases, the internet offers the primary source of communication between children left in the country and their parents who live abroad to work. Consequently, constant access to the internet may be one of the factors supporting the addiction to the internet and computer games (Maftei & Enea, 2020). Among other variables, low perceived maternal availability appeared to be a predictor of internet addiction (Trumello et al., 2018).

Maftei and Enea (2020) argued that a much closer monitoring process of early adolescents' online activity would decrease their risk of developing IGD. They argued that a dominant permissive parenting style may increase the possibility of having IGD in early adolescence (Maftei & Enea, 2020). One explanation is that a permissive type of parenting involves less control over the child's way of spending time, with less communication and discussions related to threats posed by internet misuse or overuse (Maftei & Enea, 2020). Mathiesen (2013) argued that parents must be aware of the balance between monitoring their children's internet use and children's right to privacy from their parents because children's right to privacy may contribute to fostering their future capacities for autonomy and relationships.

It might not be appropriate to refer only to the amount of time spent online as the criterion for identifying internet addiction because adolescents may use the internet for different purposes, spending a lot of time online without missing their ability to control this activity. Despite a public concern surrounding the impact of digital media on today's children, children tend to use the internet more often as a form of communication and entertainment when they have more digital devices at their individual disposal. As Camerini et al. (2018) stated, "It is not certain from our data if this reflects a supply-driven or demand-driven social phenomenon" (p. 2500). These researchers suggest that the availability of digital devices for personal use does not depend on the SES of a child's parents (Camerini et al., 2018). However, research from DigiGen suggests that this is not the case and in fact SES does matter (Ayllón et al., 2021).

In the field of extensive internet use amongst children and young adolescents, a communicative climate within the family seems to work protectively. Inconsistent parenting, inter-parental conflicts and lack of parental control seem to negatively affect internet use, while warm and close relations combined with an authoritative parenting style seem to regulate internet use in beneficial ways. Socioeconomic background, different disabilities, children with few friends and fear of isolation in real life seem to contribute to a higher risk of extensive internet use.

Social networking as a social lubricant

Davis (2013) dispelled the myth that parents and peers represent opposing influences on adolescents. The results show how parent and peer relationships work together to impact adolescent identity (Davis, 2013). Specifically, the experience of positive mother relationships positively impacted levels of self-concept clarity, partly due to the mediating role of high friendship quality (Davis, 2013). Adolescents experiencing harmful behaviour online reported no significant differences in the level of support they reported either in total, or specifically from family, significant others or friends. When some participants found that their parents were supportive, for several, this was not the case, and then friends were of great importance (Hamilton-Giachritsis et al., 2020).

Video games are sources of family interaction, particularly for males in the family, and they are suggested to be one of the children's means of deploying power within the family context, as they are utilised as a source of family socialisation or withdrawal from it. A shared interest in games also seems to assist in bonding and cooperation among siblings (Bassiouni & Hackley, 2016). Mothers' and fathers' parental responsiveness and care correlated with lower gambling outcome scores and overprotection correlated with higher scores (Floros et al., 2013). Moreover,

research shows that boys, especially those living in urban areas, spend more time playing online games and tend to show more symptoms of online gaming addiction (Pawłowska et al., 2018).

However, playing games is seen as a valued activity within children's peer groups (Bassiouni & Hackley, 2016). Notably, the general impression formed from the sampled group in Bassiouni and Hackley's (2016) study showed that video games were an essential part of children's lives, especially for boys. Moreover, this study showed that boys and girls liked different games, and there was a different dynamic in the social role of games in their respective identity strategies (Bassiouni & Hackley, 2016).

The potential positive effects of ICT were noted in the context of making, maintaining and building upon family relationships (Cramer, 2018) and friendship quality in adolescents (Davis, 2013). However, despite the potential of social media as a new channel of communication that could be used to bring cohesion between young people in care facilities and their relatives, it was not utilised or supported by their foster carers or social work practitioners, who tended to view this new channel of communication as a risk or nuisance (Simpson, 2020). Moreover, the number and quality of connections established through social networking can become a much-needed social lubricant in adolescence (Hammond et al., 2018). Research on children in foster care has shown that young people are not passive recipients of their familial and friendship networks and do not deem their interactions through social media as 'contact'. Instead, these young people perceived these networks more as 'staying in touch', allowing them to control the 'who, how and when' of their relationships (Simpson, 2020).

Tuukkanen and Wilska (2015) explored the general change in sociability in children's lives. According to them, face-to-face social contact has decreased because it is physically easier to chat with friends in online environments than to go out and play (Tuukkanen & Wilska, 2015). Greater parental control over pre-adolescents' spending on social media can be associated with better pre-adolescent mental health. Less pre-adolescent time spent browsing social media and lower pre-adolescent appearance comparison frequency on social media mediated these relationships (Fardouly et al., 2018). Indeed, children's experiences as consumers of video games and associated digital communication technology, and the role this experience plays in their evolving sense of identity, are essential to an overall understanding of both the vulnerability and benefits of digital technology.

Conversely, research suggests that a higher number of online friends is associated with increased negative online experiences, such as embarrassing posts online or risky activities that include frequently chatting with strangers (Best et al., 2016). However, we are reminded that friendship quality partially mediates the negative relationship between online identity expression/exploration and self-concept clarity (Davis, 2013). Adolescents who are motivated to go online to express and explore different aspects of their identities tend to experience low self-concept clarity, partly because of the mediating role of low friendship quality. Thus, while online socialisation can be challenging, age and the quality of relationships are important in reducing vulnerability (Pellerone et al., 2019). Only restrictive parental supervision significantly affected adolescents' behaviour on social media; such supervision increased adolescents' risky online behaviour, and peers were of great importance to those with restrictive parental supervision (Sasson & Mesch, 2014). Inconsistent parenting may inadvertently encourage adolescent maladaptive cognitions or unfounded beliefs regarding the trustworthiness of friends online (Sebre et al., 2020). Social media can benefit children and young people in expressing thoughts and opinions (Papamichail & Sharma, 2019), offering anonymity, accessibility, acceptance and emotional support (Bell, 2014; McCrory et al., 2020). Moreover, ICT provides opportunities for learning and socialisation (Daoud et al., 2020; Tuukkanen & Wilska, 2015), self-disclosure and safe identity experimentation (Best et al., 2014; Best et al., 2016; Strittmatter et al., 2016). However, the fear of missing out (FOMO) is highlighted as a vulnerability. Social media activity (i.e., the number of accounts adolescents have and their self-reported frequency of checking social media) was moderately positively related to FOMO and loneliness, as well as with parent-reported hyperactivity or impulsivity, anxiety and depression (Barry et al., 2017).

Several studies have been designed to examine the differential contributions of various forms of parental mediation and beneficial and risky digital behaviour. Regarding social media use, risky behaviour online is measured by the frequency of posting personal details, sending insulting messages and meeting face-to-face with a stranger met online. Only restrictive parental

supervision had a significant effect, and such supervision actually increased adolescents' risky behaviours online (Sasson & Mesch, 2014).

Specific challenges in the digital era emerge for parenting children with intellectual disabilities when their children seek participation in online communities. According to parents, these young people encounter barriers due to their lack of reading skills, and they have difficulties generalising from one situation to another, so they might need support every time they enter, for example, an official website (Sorbing et al., 2017). However, parents of children with intellectual disabilities perceive that the internet is an arena that can help their children be more involved in social life. Parents of young people with few social interactions outside school, especially those experiencing difficulties in making social contacts, say this, even though the connection online has not always proceeded smoothly. At the same time, parents are concerned that these young people do not have enough knowledge of netiquette and that they find it difficult to read and interpret the subtle codes, which in turn contributes to them ending up in situations where they are either considered to be behaving badly towards others or, more frequently, not perceiving when others are mean to them (Sorbing et al., 2017).

The use of social media has also been explored by McCrory et al. (2020), who show that adolescents who use social media can feel disconnected and isolated, concerned about others' judgements, and show signs of being distressed, envy and boredom contributing to increased loneliness, depression, low mood and decreased self-esteem (McCrory et al., 2020). Yet, research has shown that adolescents' social environment, notably their relationship with their mothers, can protect them against the detrimental effects of social media use on body dissatisfaction. Furthermore, the moderating role of positive mother–adolescent relationships in the association between social media use and body dissatisfaction is equal for both genders (de Vries et al., 2019).

Parental efforts to monitor their adolescent's whereabouts, activities and contacts appear to reduce both exposure to and vulnerability of (possible) media effects (Tomic et al., 2018). Another study points to how parental control moderates the association between low self-control and offline and online delinquency (Ellonen et al., 2021). However, parents' use of technical controls proved to be equally ineffective in averting their children's compulsive internet use, with associations similar to those of parents forbidding certain activities (Miltuze et al., 2021). Strict parental rules about internet and smartphone use before sleep might prevent negative consequences of social media use at bedtime and sleep quality but only among less engaged social media users (van den Eijnden et al., 2021).

Sen (2016) found that online media erases some of the differences and inequalities amongst children and underlines how virtual relationships and self-expression on social networking sites can be central to young people's identities, even though the family dimension is not present due to the specific situation of the children. Parental monitoring of social media was not, however, associated with adolescent adjustment (Barry et al., 2017). Studying adolescents' excessive use of social networks shows that protective factors from excessive behaviour were conscientiousness, the existence of rules and being a boy (Malo-Cerrato et al., 2018, p. 104). Nevertheless, other studies on social media have suggested that high use of social media was found to be significantly associated with a change in happiness scores but not with worsening life satisfaction trajectories (Twigg et al., 2020).

Conversely, other studies showed that using mobile communication devices and the internet provides young people in care with a degree of independence, control and freedom from scrutiny that are not traditional features of life in care systems (Simpson, 2020). Furthermore, research has shown that adolescents living in foster or residential care can use previously experienced relationships cultivated through online connections that are helpful in transitioning beyond care. They may also be able to tap into the potential to make use of the social capital cultivated in these relationships (Hammond et al., 2018).

Interestingly, research has suggested that being in the middle of a mother–father conflict significantly predicts adolescents' social media addiction. The global distress in the family, a conflict between the mother and the adolescent due to the school, the case that the parents want the adolescent to be perfect and the effort of the parents to attract the adolescent to their own sides are correlated with social media dependence (Bilgin et al., 2020). Regarding parental

bonding factors, care functioned as a resilient factor in adolescent motivations for participation in social networking, while overprotection contributed to vulnerability among children and adolescents (Floros & Siomos, 2013).

Age and gender

Among the demographic variables, age was the strongest positive predictor of extensive internet use (Kalmus et al., 2015). Age has also been considered important, as research shows that adolescents who visit social networking sites more often are more likely to be older and have started using the internet sooner than their peers, seek friendship and try to escape from everyday life (Floros & Siomos, 2013). Moreover, age is a factor that can have an influence on a greater perception of risk in different uses and areas of the internet (Altuna et al., 2020).

In many countries, children start playing computer games in early childhood. In accordance with existing literature, Segev et al. (2015) found a correlation between having emotional or behavioural difficulties, spending more time using computers and finding it harder to disengage from the computer. Interestingly, this difference is evident only when assessing computer screen time; no difference was found in smartphone or small-screen gaming use. The results suggest that computer screen time follows an age-based course and that overuse must be examined within the context of age (Segev et al., 2015).

Age and gender play a significant role when parents consider the health implications of an appropriate balance in their children's activities, particularly for the youngest children. Family routines and parents' perceptions of children's media use are the closest predictors of their strategies supporting children's media use at home and their children's actual engagement with technology. For boys, parents were more concerned about the consequences of media use on their health than were the parents of girls (Kucirkova et al., 2018).

Age in social media use is positively associated with self-concept clarity. On average, older adolescents tended to report higher levels of self-concept clarity than younger adolescents. Boys were more likely to report higher levels of self-concept clarity. At the same time, girls were more likely to report high-quality friendships (Davis, 2013). Gender can be one of the predictive variables of the perception of risk for dysfunctional online activities, especially for girls, but elevated family communication can lead to reduced internet use (Pellerone et al., 2019). The most consistent factor in studies on social media was gender, with girls experiencing the largest decline in happiness and being more likely to have a worsening trajectory over time than boys (Twigg et al., 2020).

While gender might be a protective factor in predicting the excessive use of social networks, it does not seem to be a proactive factor when looking up pornography online. According to Sevcikova et al. (2014), adolescents are reluctant to discuss pornography with adults; however, girls do discuss their online experiences with peers, and this increases with age. Furthermore, researchers in this study did not find any specific pattern of individual-level predictors for intentional or unintentional exposure to such sexual material on the internet other than gender factors, indicating that both sexes used it to learn about sexual relations, but boys to a larger extent used it for their own arousal (Sevcikova et al., 2014).

As shown, several of the studies investigated how age and gender may contribute to resilience and vulnerability when it comes to ICT in the family. However, there are few clear answers, except for the findings showing that age and gender matter in how parents address their children's internet use, screen time and online gaming. This seems to be a field in need of more nuanced research.

Risky behaviour online and exposure to sexual and harmful content

Adolescents have a lower perception of the risks involved in internet and digital technology use than adults, indicating the need for adolescents and adults to collaborate to prevent internet risk behaviours (Altuna et al., 2020). At the same time, Sevcikova et al. (2014) showed that adolescents are reluctant to discuss a theme such as pornography with adults. This might

indicate that this field of knowledge is not easy to access. Not only is exposure to sexual material a threat to the well-being of children and young people, but a consequence of an increasingly digital world is that the threat of online child sexual abuse can increase. Currently, relatively little is known about the effects of online child sexual abuse (Hamilton-Giachritsis et al., 2017). These researchers argue that technology-assisted child sexual abuse is no less impactful than offline-only sexual abuse but that the technology aspect creates additional elements for young people to contend with (Hamilton-Giachritsis et al., 2017). For instance, technology has enabled the use of certain strategies, such as blackmail and night-time control (Hamilton-Giachritsis et al., 2017, p. 23). Such experiences can lead to a sense of powerlessness, anxiety, despair and depression (Hamilton-Giachritsis et al., 2017, 2020). In addition, parents or carers often accidentally discover online harm, leading to a sense of guilt for not questioning their child's unusual behaviour and being unaware that the internet posed a danger (Palmer, 2015). As such, parental knowledge and involvement in mediating teenagers' online activities were found to positively predict teen digital citizenship (Wang & Xing, 2018).

How internet use and online exchange can be both helpful and harmful has been given some attention. The review of evidence by Bell (2014) suggests that the internet offers vast scope for practice and prevention efforts under certain circumstances. Owing to their unique features, online support groups may be particularly suited to the psychological needs of young people who self-harm and experience suicidal crises when compared to face-to-face help (Bell, 2014). The conditions under which vulnerable young people can be drawn into either helpful or harmful venues, however, are not altogether clear, nor are factors that might make one more vulnerable to the negative effects, so there is a need to ensure that the most helpful sites are readily accessible (Bell, 2014).

Regarding risk factors and the use of social networks for social support, Malo-Cerrato et al. (2018) focused their research on factors that predict excessive use of social networks in adolescence that can help prevent problems such as addictive behaviours, loneliness or cyberbullying. In our search, we also included several review studies. One such study by Best et al. (2014) was a systematic review that included 43 papers focused on the effects of online technologies on adolescent mental well-being or related concepts. Accordingly, harmful effects of online technology include exposure to harm, social isolation, depression and cyberbullying (Best et al., 2014). It is important to point out that children and young people who are currently experiencing mental health problems are more than three times more likely to have been bullied online in the last year (YoungMinds, 2017). Best et al. (2014) also suggested that mental health problems are associated with cyberbullying. According to these researchers, cyberbullying, in particular, is associated with increased depression and is thus a real risk to adolescent well-being, as such instances of cyberbullying can increase vulnerability (Best et al., 2014). Those more likely to experience cyberbullying are adolescents who are younger, male, who spent long hours on social media and those with lower family SES (Hong et al., 2016). Additionally, adolescents whose parents have better SES have higher levels of digital access, digital etiquette and digital safety (Wang & Xing, 2018).

Based on the socioecological framework in the research by Hong et al. (2016), which focused on the family, peers and school contexts, the results showed that strong relationships within these contexts are associated with fewer experiences of cyberbullying. Other studies also pointed to risk factors of cyberbullying, such as being a boy, being older and spending more hours online and that inadequate parental supervision was also a significant factor in cyberbullying (Baldry et al., 2019). Interestingly, Baldry et al. (2019) found that parental monitoring online could protect children from cyberbullying and cybervictimisation, but this depends on whether their children perceive adults as competent and how much children feel that parents can support them rather than intruding in their lives, controlling them or removing their devices. Parenting practices, such as indulgent parenting, characterised by acceptance and involvement, have been shown to be the most protective parenting style in terms of cyberbullying, while authoritarian parenting, characterised by the use of physical and verbal coercion and privation practices, has been linked to a higher risk factor for cyberbullying and traditional bullying victimisation, especially for boys in the case of traditional bullying (Martinez et al., 2019).

A lack of empathy might also be related to antisocial behaviour, including bullying, which Tuukkanen and Wilska (2015) saw as one of four perceived effects representing opportunities and risks. Threats to security, such as security concerns and practices by parents to exercise safety, were crucial in curtailing adolescents' online gambling risks (Floros et al., 2013).

Indulgent parenting, characterised by acceptance and involvement practices, was the most protective style across all the outcomes analysed. This style can be a protective factor for traditional bullying and cyberbullying victimisation. Furthermore, the protective and risk effects of parenting on cyberbullying are consistent for both boys and girls (Martinez et al., 2019). However, research has shown that parental bonding is more effective than parental safety practices and that 'affectionless parental control' and gender are significant in terms of the increased prevalence of online gambling (Floros et al., 2013). However, children themselves point to the positive effects of being online; they also point to the bad things, such as viruses, bullying and people not being honest online. If children do not recognise these issues, it may be difficult for them to understand the aims of media education (Tuukkanen & Wilska, 2015).

As shown in this section, children access a range of potentially harmful content online. Several studies show that complex topics, such as bullying and sexual content, are difficult to address and that children seldom talk to adults about it. It seems that parental style has also emerged as important in this area. Parenting styles characterised by acceptance and involvement can act as protective factors. Children seem to need more understanding than control when they access harmful content, and boys seem to be more exposed to diverse, harmful content than girls. This indicates the need for more nuanced research on gender topics, connecting gender to other areas and practices in children's and adolescents' lives.

Gaps in existing research

The positive and negative effects of ICT use refer to pressure to conform, cyberbullying, exposure to indecent or inappropriate content, problematic internet use, social media dependency, family conflicts, parental mediation and risk of sexual abuse (Daoud et al., 2020; Lukavska et al., 2020; Papamichail & Sharma, 2019). Children's online lives can cause difficulties or conflicts within their families, and vulnerable children are at risk (Ardenne, 2020). Muniz (2017) showed that teens who were violent with their partners in an online environment indicated higher levels of family conflict, especially for girls. It seems important to look at the online socialisation context, together with that of the family and school, due to its relevance and impact today in the daily lives of teenage boys and girls (Muniz, 2017). Another issue that can create tension in adolescents' lives is striving for perfection, which can be strengthened or weakened by the family (Bilgin et al., 2020). Regarding protective conditions, several studies have highlighted social support and social connectedness (Hong et al., 2016; Karaer & Akdemir, 2019; Malo-Cerrato et al., 2018), including family climate (de Vries et al., 2019; Martinez et al., 2019; Muniz, 2017). Furthermore, parents are considered the most important partners for young children's interaction with ICT, and it is expected that the effect of digital media will depend on parents' choice of suitable media and the support of their children (Coskun et al., 2020; Lehrl et al., 2021).

However, the effects of ICT and social media differ from person to person and depend on how individuals process their experiences (de Vries et al., 2019). Within particular settings, the effect of technology use may be influenced by a complex pattern of understanding about the purpose of use and the participants involved, all of which influence each other (Best et al., 2016; Best et al., 2015; Daoud et al., 2020; de Vries et al., 2019; Hong et al., 2016; Lehrl et al., 2021). The review has also shown how parental mediation and parenting style, different family members and peer involvement in digital activities matter. This suggests that thinking about particular conditions contributing to children and young people being either negatively or positively impacted by ICT use in family settings might be more productive. Researching such particular conditions requires a shift in the research focus, as mentioned earlier.

Based on the studies presented, there seems to be a need for more studies addressing parental mediation style, as the review has shown the great importance of parental involvement in the lives of young children and adolescents. That parental mediation matters is well documented, but there is a lack of knowledge about how and why parental style and contextual factors interact in creating a negative or positive impact on children's use of ICT. The review has shown how parental mediation is important but what is the most 'effective' mediation depends on different factors described as vulnerabilities, such as age, gender, environment and how many friends the child has. However, research consistently suggests that parenting styles that are more open can contribute to children's resilience in handling risks better, while strict, rule-based mediation may work as a negative factor and increase children's vulnerabilities due to

limited experience and lack of digital competence. The research also indicates a need for digital competence amongst parents, indicating that parents' digital competence affects how they develop their mediation strategies. As mentioned earlier, researching if there are areas where parents and children can discuss the balance between monitoring and respecting children's right to privacy, digital competence and online life both inside and outside the family, in addition to investigating what such arenas can contribute within today's social society, could be a great contribution to the research field.

The research identified in this scoping review has a strong focus on internet addiction and extensive internet use, identifying several factors contributing to vulnerabilities and negative effects of children's lives online. The body of research suggests that online friends can contribute both positively and negatively to well-being (Best et al., 2016), and adolescents' digital skills positively predict online risks and opportunities (Rodríguez-de-Dios et al., 2018). The internet can provide social support but may create the foundation for serious addictions due to low levels of perceived social support (Gunuc & Dogan, 2013). These findings highlight how previous research has overemphasised the harmful aspects of ICT in many ways. When addiction is measured in time spent with a digital device, without examining what the device is used for, the research may be in danger of, as McCrory et al. (2020) pointed out, an exceptional breadth of findings through quantitative studies; however, the depth and context are less visible. This suggests the need for more qualitative research examining the correlation between membership of social groups, the fear of missing out and the feeling of loneliness, parents' mediation and children's well-being. There are potential positive effects of ICT on children's and adolescents' social lives. However, there is a lack of research examining the role of technology in the lives of children and young people and how family dynamics are affected in the digital age. Studies pointing in the direction of the importance of context have started this work, but knowledge about how and why parental style and contextual factors interact in creating a negative or positive impact on children's use of ICT is still in need of more research.

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4.2. DigiGen research results: Family

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In general, our data confirm that children today live in media-rich households with access to various devices and that DT are part of children's everyday lives. The use of DT by children aged 5 to 6 years is strongly related to other family members. The age at which children own a device, namely a smartphone, ranges from 8 to 12–13 years, depending on family rules and the integration of DT in the family. These results, drawn from our qualitative data, are consistent with the findings in our quantitative approach regarding digital access: 97.7% of children aged between 5 and 6 years old live in a household with internet access and 92.7% live in a household with at least one computer, according to the latest wave of the European Union Statistics on Income and Living Conditions (EU-SILC). Despite these figures, heterogeneity between countries is high: while Romania and Bulgaria show rates of both internet and computer lack of access above 10%, Austria, Belgium, Finland and France show figures between 1% and 2.5%. Furthermore, a secondary analysis of 2018 Programme for International Student Assessment (PISA) data shows that most 15-year-old European students first accessed a device when they were between 7 and 9 years of age (34.4%) or between 4 and 6 years old (25.5%), showing an early integration of digital devices into family life. When it comes to internet access, 37.8% accessed it first when they were between 7 and 9 years of age and 30.7% when they were between 10 and 12 years old.

In examining the family system, DigiGen has a broad definition of families. Family is understood as an exclusive unit of solidarity—a sociorelational structure or network of two or more people—built for longevity. Family, therefore, was always and still is diverse (e.g. Mitterauer, 2009; Nave-Herz, 2015; Segalen, 2010)[1]. To describe the impact of DT on the well-being of children and young people, the work of DigiGen is based on several theoretical concepts. In line with the social constructivist perspective, family is defined by daily practice and comes into being through 'doing family'. Furthermore, children and young people are not only recognised in their agency but also as being vulnerable and as co-constructers of 'doing family'. The use of DT can contribute in a beneficial or harmful way to the well-being of children, young people and families, depending on the resilience of children and families. DT and the activities and behaviour around it can be understood as a resilience-enhancing factor, as well as (risk) factors increasing the vulnerability of children and young people and harming their well-being. To grasp the vulnerability of pre- and primary school children and families, we employed a conceptualisation that comprises different but partly overlapping kinds of vulnerabilities, including inherent, situational and pathogenic vulnerability (Lotz, 2016; Roger et al., 2012). Vulnerability is not understood as an exceptional or even problematic status of being a child; instead, it is understood as a universal, inevitable, enduring aspect of the human condition (Fineman, 2008), since every human being is social and depends on care.

Our qualitative data revealed several forms in which DT can contribute to **exacerbating vulnerabilities or the emergence of new vulnerabilities**:

- The lack of digital competences of children for various reasons (e.g. overprotection, parental mediation style, lack of parental interest in digital activities of children and young people and SES of the family)
- The lonely or excluded child or young person
- Specific context or interaction with children and young people getting involved or confronted
- Young children especially get into the role of the 'manager of DT' in their families
- Some findings show in the direction of gender differences, but we are careful with this interpretation to avoid further reaffirmation of gender stereotypes

These vulnerabilities are further described in the following section.

The **lack of digital competences** is one of the key risk factors for children and young people to increase vulnerability or contribute to the emergence of new vulnerabilities in the context of DT. A lack of interest and confidence when using digital devices is also a key factor associated with digital competences. In that sense, from a quantitative perspective, DigiGen finds that, in Europe, conditioned on having internet and computer access, 8% of children are digitally

disengaged and 5.7% are unconfident when using digital devices (this report, Chapter 2). Both phenomena are associated with grade repetition and a low level of home possessions (a proxy for low SES). We observe that children who are more likely to report a lack of interest and confidence live in countries where the digital deprivation rate is high. Thus, although we cannot claim that there is a direct causal effect between access and interest or confidence, the analysis suggests a link. Children's digital confidence and interest and, thus, competences are related to access, environment and country-level digitalisation, among the other factors described above.

The lack of digital competences often originates in the family and/or is supported in the family, especially within the lives of younger children, for various reasons, as our empirical data show:

– Depending on the way families **integrate DT into their families**. For example, families with a highly sceptical and restricted approach to integrating DT into their families make it difficult for children and young people to gain digital competencies. Parents with this kind of approach often try to avoid the use of DT as much as possible and share their sceptical attitude towards DT with their children. In our data, we also could see some intergenerational transmissions of this sceptical attitude in these families.

– **Parental mediation style** has a strong effect on **children's digital competencies** and varies in the data between two extreme poles: a very restrictive and limited mediation style and a highly unrestricted and unmediated mediation style. A very restrictive and limited mediation style of parents, in which parents often focus only screen time and less focus is on the content or digital activities of children and young people. In contrast, we see a highly unrestricted and unmediated mediation style of parents in which children's and young people's digital activities are not monitored at all or only to a very limited extent. For the support of the development and maintenance of digital competencies of children, it would be more supportive if parents' approach is more active mediation by showing interest in children's digital activities and being more involved in digital co-activities with their child. In this way, parents can actively monitor their children's digital activities and support them in their digital competences.

– **Overprotection** from parents or significant others, which can make it difficult for children and young people to explore and gain experience. This overprotection was seen throughout all the age groups under study. Sometimes the behaviour seemed very controlling and partly violent or abusive.

– **Lack of parental interest in the digital activities** of children and young people. This is often reflected in children's and young people's feedback—that parents or significant others do not show interest in their digital activities. Young respondents reported, for example, that parents do not know what games they are playing or what they watch on YouTube or social media. This is also reflected in fewer digital co-activities in families, especially if children grow older. The following citation from our data material illustrates this point:

> Dad only watches TV all day, so I don't think he could care less. And mom's okay with that. She just doesn't get it, but she understands why I like it. But she doesn't want to know why. Or she understands why, but she's okay with it. Unless it's something very bloody or something.

– **Lack of parents' digital competencies or knowledge**. If parents or significant others have limited knowledge and/or abilities in DT, they do find it harder to support children and young people in their digital activities, and it seems that active parental mediation strategies will be put less into practice. Children and young people also report that parents and significant others have limited awareness or are unaware of online risks, and because of that, they are unable to support children and young people.

– **Socioeconomic status of the family** can contribute in several dimensions to the raise or create new vulnerabilities in children and young people in terms of a lack of space at home, lack of time and financial budget and lack of equipment and software, which can result in a lack of access or digital deprivation (for more information on digital deprivation, see Ayllón et al., 2020 and Ayllón et al., 2021), and this could lead to social exclusion for children and young people, as one young person for example stated: *"I am the only one without a smart phone."* We saw huge gaps between families with a higher SES and those with a lower SES, such as the possibility

of higher investment in resources and/or better education (schools and teachers). In addition, teachers in several countries reported that they see differences in access to and use of digital equipment at home based on the socioeconomic backgrounds of their families.

– In some ways, the ethnic **background of families** is linked to SES. In some participating countries, we could see that in families belonging to an ethnic minority group (e.g. Roma families), children seem to have a higher risk of being digital deprived.

In addition to the lack of digital competencies of children and young people, there are various other aspects that can contribute to increasing vulnerabilities or the emergence of new vulnerabilities, as our data revealed:

The **lonely or excluded child** in regards to DT. Depending on the age of the child, the feeling of loneliness and/or exclusion differs: Young children are often excluded from the digital activities of other family members in which they cannot join or are not welcome to join (having no access, not owning their own device, being too young, etc.). Older children may feel alone and excluded because of their interest in DT or because of specific digital activities or their own ideology, where their families might think differently about DT (political activism or belonging to a minority group). Some children aged 10 to 15 years reported that they sometimes found themselves overwhelmed and missing hanging out with friends. Especially during the COVID-19 pandemic, children felt left alone in figuring things out by themselves (e.g. in home schooling).

Specific content or interactions via digital activities: Children and young people are aware of multiple risks in DT. Across the different age groups, children talk about, for example, the danger of experiencing different forms of violence in their digital activities or meeting strangers and maybe making new 'fake' friends, facing different negative effects on their physical, mental and emotional health, going through the experiences of negative emotions, and being exposed to inappropriate, harmful content (sexual, violence, etc.). Children and young people also report that parents talk to them about, for example, not talking to strangers (both online and offline), although they have the impression that parents do not really know the platforms.

If children or younger people have to take over **the role of the 'manager' of DT in the family** and have to support other family members (parents, siblings, grandparents, etc.). Often, this is caused by the lack of parents' or other significant others' digital competencies and/or knowledge. Being forced into that position entails the risk for children and young people to feel overburdened because they are confronted with tasks and decisions that are not age-appropriate or in accordance with their developmental stage. With older children and young people, it becomes obvious that older children are often an important resource for gaining knowledge and getting help in the development of digital skills for younger siblings and/or other family members, as they are often more competent in DT.

Regarding **gender differences in DT,** some participating countries could see some differences in their data, but not all countries. Some observations should be mentioned; in addition, these observations should not contribute to the reaffirmation of already existing gender stereotypes, and for that, they should be interpreted in a careful way. Some data suggest that there are gender differences regarding the use of specific social media platforms, digital activities and the preference of online and offline activities. For children and young people identified as boys, DT seems to be more important and more integrated in personal life than for children identified as girls. Children identified as girls tend to use smart TV and smartphones more to watch cartoons, YouTube or social media platforms.

DT also has the potential to contribute to **reducing and preventing the exacerbating of existing vulnerabilities or the emergence of new vulnerabilities** in children and young people. Therefore, DT can be considered a resilience-enhancing factor that contributes to and maintains the well-being of children and young people. On the basis of analysing our qualitative data, several individual and/or family practices can be described as resilience-enhancing factors:

- Being able to stay in contact
- Children and young people developed several (protective) strategies to avoid the negative impact of DT

- Information is easy and quick to access
- Feeling of we-ness supports social bonds and contributes to (family) identity
- Co-activities
- Care function is supported by DT and possible without a physical co-presence

DT help to **stay in contact** with family members, friends, a specific community, etc. and support finding new friends and making new contacts. This helps to uphold social relations with others and meets human needs as social beings. These possibilities proved especially important during the COVID-19 pandemic to stay in contact with people. Children and young people reported that DT served as a substitute for face-to-face contact in supporting social contacts and staying in touch with one another.

By using DT in a mediated and active way, children and young people gain and maintain digital competences that protect their well-being. The children reported that they had learned to prevent and handle negative effects using DT. Our qualitative data show that children developed **(protective) strategies to avoid negative impacts**. Some examples of these strategies are as follows:

- Children and young people reported that they have learned not to play competitive (ranked) games to avoid conflicts or grudges; this helps them to leave or ignore the situation
- Take breaks from using digital devices and take care of a better balance between online and offline activities, as well as actively search for other offline interests, such as sports.
- Develop new habits, such as putting something to drink next to the computer to avoid getting dehydrated
- Work-arounds to avoid unpleasant situations (e.g. creating closed groups while playing online games, staying in private mode if online, avoiding special platforms and blocking or muting participants)
- Pay attention that they get enough sleep
- Protect themselves, for example, avoid or be very careful in contact with strangers, protect their privacy (e.g. using the private mode, be careful with sharing or showing personal information) and be aware of data protection
- Try to dissolve conflicts with others by stepping in and/or admitting one's own flaws.
- Using DT (e.g. gaming) as a kind of reward after they have accomplished other tasks and responsibilities, such as finishing homework or learning for school

Another way of preventing the rise of new vulnerabilities or reducing the exacerbating of existing vulnerabilities is in the fact that through DT, **information is easy and quick to access**. Having enough information is a key point, for example, to meet fears, correct misinformation and ensure the participation of children and young people. Of course, it must be mentioned that children and young people have to be able to know where to get the right information from trustworthy sources. Especially through the COVID-19 pandemic, home schooling and the ability to learn have become important for avoiding vulnerabilities in the learning and education of children (risk of exclusion in education).

DT and their integration into the family, as well as co-activities, contribute to maintaining the building of a **feeling of we-ness, belonging to the family and an identity of the family**, and by that, protecting and securing a safe base for children's development. Identity, feeling of we-ness, etc. serve to establish and maintain social bonds, among other things, through processes of inclusion and exclusion. The formation of identity and the feeling of we-ness are central aspects of 'doing family'. It also has the potential to anchor families and/or individuals in communities and thus helps to build up and maintain identity. In terms of individual and family identity, we see in our data that integration and the DT approach contribute to the formation of identity, even through intergenerational transmission. For example, the negative attitude towards DT has been passed on from the grandmother to the daughter and to the 8-year-old child. DT can also serve as a political socialiser in which political interest or activism is passed on intergenerationally.

Co-activities also allow parents and older siblings or other significant others to actively mediate the DT use of children and young people and their digital activities. These co-activities can be either in the sense of being 'active-together' or even in being 'alone-together', and in the co-

presence of others, children and young people feel safe, guarded, accepted, etc.; additionally, co-presence allows active (parental) mediation techniques.

Multiple care functions (Fisher & Tronto, 1990)—care about, care for, caregiving, care receiving and caring with—are supported by DT. Our data show that **care in the family context is going digital** and care benefits and work through DT is possible **without a physical co-presence**. This is becoming especially important for specific family forms, such as transnational families, families with multiple households and families or individuals of a certain community to stay in contact with others (e.g. ethnic minority groups and sexual minorities).

The effects on the vulnerability of children depend very much on the diverse dynamics children are involved in through different systems, especially in the family system. As described earlier, our data could reveal many different factors that have an impact on the vulnerability of children. In DigiGen, **these factors are understood as part of 'doing family'**. Family is constructed and exhibited on a daily basis through joint practices, such as managing balance on different levels (organisational and emotional, for example), constructing commonalities and interactions, creating a feeling of 'we-ness', building a family identity and caring for each other. This is understood as 'doing family', and DT contribute and support these practices in several ways (for the 'doing family approach, see, e.g. Jurczyk, 2020; Morgan, 2011; Nelson, 2006). There is comprehensive evidence that DT contributes to 'doing family' in several dimensions (Kapella et al., 2022). In our qualitative data, there is strong evidence that DT support processes of 'doing family' on a daily basis among the diverse family forms and living arrangements we could include in our sample. Our data reveal that this does not only concern families with intensive use, highly positive assessment and less strict rules regarding DT but is also relevant for families that are far more sceptical about the integration of DT in family life. Doing family is established in ways of sharing the different attitudes and values towards DT within a family, regardless if they are positive, negative or rather neutral. Different family practices of using and integrating DT in families' everyday lives contribute to 'doing family', for example, co-activities with DT, discussions on different attitudes and values around DT and its use, shared and stored family memories, co-creation of digital content and support in balancing daily family life by DT (e.g. online shopping list, outsourcing of control and monitoring digital activities to digital solutions). Furthermore, DT support care practices in the family and make care possible without physical co-presence, despite a physical distance between different family members.

Parents are often challenged by the mediation of DT in the family regardless of the age of the child or young people. First, this requires a certain level of know-how according to the rapid development of DT and demands a constant adaption to new situations, information, new devices, etc. from parents. Second, the results indicate that mediation styles applied within one family context strongly depend on the respective parents' assessment. This, in turn, is firmly based on their own interests, experiences, knowledge and competence regarding DT, as well as their fears and subjective benefits. In their upbringing of children, parents can draw on a range of common parental mediation practices regarding DT, such as restrictive mediation, mediation through monitoring, active mediation by negotiation and description through co-use, and active distractions. Our data reveal that **setting rules appears as a dominant mediation style of parents**, oscillating between two poles: (1) parents' mediation is characterised by very precise and clear rules regarding the integration of DT into family life and (2) parents' mediation is characterised by different mediation styles and is less focused on rules. Rules often revolve around limiting the time for digital activities. To strengthen children in their digital competences, mediation styles of parents and significant others that are more active, such as digital co-activities, interactive negotiations and agreements, would be helpful. The genesis of rules in the family is manifold. For example, rules might be grounded in long discussions among parents or parents can leave it to one parent alone. Rules can be based on the advice of experts or stem from the general gut feelings of parents. At best, parents might involve children in negotiation processes and in the co-creation of rules.

Children generally believe that rules are necessary. In particular, they believe that they are important in order to avoid the negative effects of DT. For children and young people, it is clear that DT plays an important role in their daily lives, but it is also clear that they have other needs and wishes and enjoy other activities that are not necessarily linked to being online or using digital technology. Children in younger age groups (e.g. kindergarten) highly accept

the rules of parents. Kindergarten children present it as normal that rules exist and have to be obeyed. At this age, they generally do not question the rules of parents or other adults, such as kindergarten teachers. As children and young people grow older, they show greater awareness, level of reflection and understanding but also a greater probability of questioning existing rules and, furthermore, parents' assessment and roles in the process of defining and controlling rules. From an age of 8 to 10 years on, we could see in our data that children tend to start to observe, question and criticise parents' digital behaviour and the different rules as they start to compare them with those of other families and peers. Our data also indicate that children are aware of how to evade or avoid rules. Some strategies children and young people apply include, for example, hiding digital devices and using them secretly or using their acting skills when they pretend to study. On the other hand, young people sometimes consent to rules and regulations, even if they do not agree with their parents' perspectives, to avoid conflicts.

Children, young people and parents **are aware of various beneficial and harmful effects** of DT in different dimensions. They report multiple beneficial and harmful effects of DT in regard to their health and development, their social and emotional life, and their safety, including the topic of violence, their digital competences and doing family. A different view on the beneficial effects of DT, but also fitting into the holistic approach of DigiGen, was chosen by the Estonian case study team (Sisask et al., 2022). Their data showed that it is self-evident that DT have become an essential part of normal everyday family life and are therefore also part of children's normal daily lives (Sisask et al., 2022). The way we interact has changed, and it is a norm in current society that we use DT to mediate and facilitate communication. It can even be said that DT contribute to providing human needs, as described in the classic pyramid by Abraham Maslow. This view of DT is potentially creating a shift of paradigm in the way families relate to DT and incorporate it into their lives with regard to needs satisfaction:

- Physiological needs: online shopping, ordering food, rest and entertainment
- Safety needs: calling for help, getting all sorts of information, staying informed of the COVID-19 situation, working from home and distance learning
- Love and belonging: staying in touch with extended family and sharing life events, feeling satisfied and safe knowing one is not alone, preserving history and memories and communicating with friends living far away
- Esteem: exchanging information, posting life pictures and seeing what your acquaintances and friends are doing
- Self-actualisation: learning new things, carrying out activities that support development, working out and meditating

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5. Use of digital technology for leisure

5.1. Scoping review: Leisure

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Introduction

A scoping review of 428 studies retrieved from a database search on the use of ICT was conducted to answer the review question: What are the conditions contributing to children and young people being either negatively or positively impacted by ICT use during leisure time? (Please see Chapter 3 in this report for a complete description of the methods used for the scoping review.) Out of this sample, a further examination based on inclusion and exclusion criteria led to a final pool of 75 papers. Thus, approximately 18% (75 out of 428) of the papers identified were considered to potentially serve as the final sample to be analysed for the scoping review to be presented, adhering to the DigiGen microsystem of 'Leisure'. The works studied were diverse in relation to country coverage, research questions, themes covered and methodology.
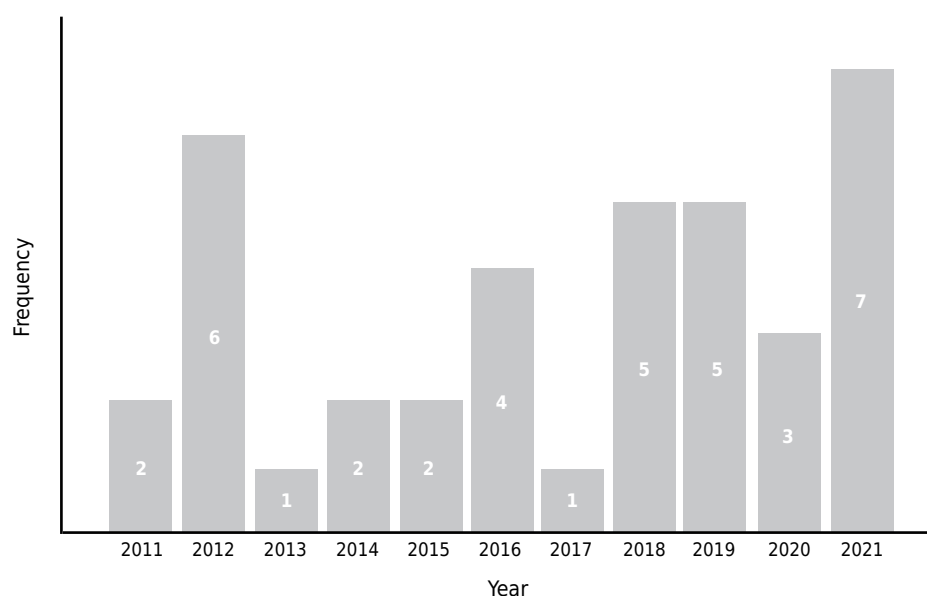
Figure 5.1: Distribution of studies selected for scoping review per year

A great diversity in relation to country coverage is apparent when analysing the studies' geographical interest in ICT and the transformation of leisure, proving that there is worldwide interest in the research questions examining children's and adolescents' digital habits. Respective countries vary from Mexico, the United States, Turkey, South Africa, Australia, Canada and China to European countries, namely Germany, Switzerland, Italy, Sweden, Belgium, Norway, Finland, Greece, Cyprus, Spain, Austria, the United Kingdom, Albania, the Netherlands and Denmark. Moreover, one study analyses data derived from Eurostat's Community Survey on ICT, covering European Union (EU) member states (with a special focus on Spain). With that in mind and the criteria selection set out for the present review, studies from the EU and, in general, European countries were prioritised, with the absolute number of the respective studies being 37. A paper from Australia was also included among the studied works, as it had a specific focus on

Minecraft, which was used for the empirical study in DigiGen's Work Package 4 (on ICT and the transformations of leisure) as part of the ethnographic research with children playing Minecraft with peers, making the total number of papers included in the final corpus equal to 38.

The 38 studies included in the scoping review covered a time span of a decade—more specifically, from 2011 to 2021. Figure 5.1 depicts the allocation of studies per year. It is noted that most studies refer to the most recent year (i.e. 2021, whereas the median of the years equals 2018). This means that more than 50% of the studies referred to works published in 2018 and later.

Overview: Methods used, themes covered and main research outcomes

Throughout the selected papers, both quantitative and qualitative analysis are performed, and a variety of social research methods are used, such as interview-based qualitative research (pair-interviews, semi-structured interviews, flexible interviews and scroll-back interviews), questionnaire-based quantitative research (both paper-based and online questionnaires), secondary analysis of data collected by a third-party and, more specifically, Eurostat, online challenges, game observations (video and audio recordings), focus groups, participatory ethnographic research with the use of video cameras, interviews and diaries, qualitative longitudinal panel data analysis, content analysis, snowball sample surveys and YouTube video analysis, among others. In relation to repetitiveness, a number of studies make use of a random sample design, such as stratified random sampling, for example, allowing for reliable inferencing about the entire population, while others use convenience or snowball sampling.

The selected papers cover a wide variety of fields and research themes. As far as the disciplines are concerned, they vary from (cyber) psychology and (mental) health and education (learning, digital skills) to (cyber) sociology, sociology of leisure and media and communication. They cover a wide spectrum of research themes and more specifically:

- Communication as established in the Framework for the Development and Knowledge of Digital Competence in Europe (DigComp): interacting through new technologies, sharing information and content, collaborating through DT and managing digital identity
- Content creation and sharing
- Gender differences
- Construction and validation of attitude scales, such as the Problematic Internet Entertainment Use Scale for Adolescents, the Teenagers' Digital Competence in the Area of Communication in Digital Environments questionnaire and the Real and Electronic Communication Skills questionnaire (RECS), a questionnaire drawn up ad hoc to assess the digital competence of compulsory education students (ages 11 to 13) in the area of communication
- The use (also extensive use) of digital technology and online social media and the relation between internet use and loneliness
- Internet use for the aid of children with disabilities (e.g. those who have speech and/or hearing disorders, children with additional support needs)
- Playing online games and gaming disorders
- Digital identities
- The role of social media in, for example, building the self-esteem of younger adolescents or increasing popularity
- Digital inequalities and the digital divide

Several interesting research outcomes are presented in the selected papers. In the following section, we present the contribution of the papers in the discussions around digital inequality, vulnerability and resilience in more detail. Here, we collect some of the findings as a kind of mapping exercise to outline the main research outcomes.

Digital competency is a topic that is frequently investigated, and research shows that there is a need for young people to acquire further training in sharing information and data, especially when it comes to knowing the media they can use to share videos, contents, data or resources and knowing how to access and use the digital services available (Iglesias-Rodriguez et al.,

2021). Moreover, a suggested construct (RECS) seems valid and reliable, and it creates a bridge between the overarching constructs of offline and online social competence and quantifies the relationship between offline and online social skills (Mantzouranis et al., 2019).

Another issue that gains importance in the examined literature is gender. Gender differences in ICT use, as well as gender identities constructed online, are some of the questions tackled. According to Metcalfe and Llewellyn (2020), gendered identities are heightened online. For young people, popularity is accrued in digital spaces through 'tagging', which is translated physically to a higher status in school. In another paper (Eek-Karlsson, 2021), it is suggested that boys and girls negotiate their social identities depending on what is regarded as normality in a specific context. Through their acts, the youth construct frames for being an appropriate boy or girl while performing their social identity.

Some articles focused on national contexts, examining different aspects of possible gender differentiations. In Germany, a longitudinal study showed that only small differences in ICT literacy exist between boys and girls (Gnambs, 2020). In the field of gaming, girls in Sweden seem to spend less time on video games and play more often for pleasure, being less exposed to negative consequences than boys (Hellström et al., 2012). In 2018, Minecraft was the most dominant digital game title played by children in this age group (3–12) in Australia. Despite some notable and important differences in the amounts and types of Minecraft play between genders, many girls do indeed play the game and interact with Minecraft content outside the game (Mavoa et al., 2018).

On the other hand, in a study conducted in Spain (Gomez-Baya et al., 2019), girls reported a higher frequency of communication via phone calls and text messages than boys. More frequent text messaging was related to more ease of making friends and avoiding bullying in adolescents with more initial difficulties. In a different context and by using data from Eurostat's Community Survey on ICT, Sanz and Turlea (2012) show that the younger cohort, aged between 16 and 19 years, has a significantly higher probability of engaging in the activity of uploading content than the older one (aged between 20 and 24). This seems to provide evidence of the growing sociological importance of mass self-communication and convergence culture.

The quality of communication is deemed crucial for overall well-being. High communication quality (as perceived by the adolescents) decreases the likelihood of internet use being associated with more loneliness and increases the likelihood of it being associated with less loneliness. This influence goes beyond the positive effects of family support in general terms (Appel et al., 2012). Nevertheless, Gioia and Boursier (2020) pointed out that in Italy, online communication promotes online intimacy, but concurrently, it might represent a risk factor for psychological outcomes, such as a problematic preference for online social interactions.

In a similar vein, Brighi et al. (2019) showed that negative emotional symptoms and low levels of parental monitoring are risk factors for both cyberbullying and problematic internet use, and their effect was mediated by the time spent online. In addition, parental monitoring highlighted the strongest total effect on both cyberbullying and problematic internet use. However, in another study (Sanz & Turlea, 2012), the problematic user profile presented no evidence of sociodemographic differences, such as gender and household composition.

In a study conducted in Greece, it was found that internet addiction (IA) is frequent in internet cafés, possibly due to an online gaming addiction affecting multiple aspects of a person's life (Frangos, 2020). Enjoying social interactional effects appeared to be the main reason young people engaged in simulated gambling games. Kristiansen et al. (2018) documented the characteristics of both a catalyst pathway and a containment pathway, emphasising that, for some young people, simulated gambling may increase the likelihood of involvement in real money gambling, while it may decrease it for others.

Finally, the interconnection between education and leisure is highlighted in studies such as that of Bjørgen and Erstad (2015). According to them, various digital practices in the classroom become meaningful in the translation to leisure time (Bjørgen & Erstad, 2015. Digital practices initiated in the classroom may be relevant to students' out-of-school worlds based on how they get opportunities to unite and translate practices between these two contexts. This has to do

with how school's digital practices may be important in connecting identities across contexts. The issue of identity must be understood as connected to digital literacy. The school context plays a prominent role in introducing youngsters to new digital practices, which might be important in developing digital literacies.

Addressing inequality

It is apparent that there is widespread use of technology in entertainment and communication in relationships between teenagers. An important consideration for children's, adolescents' and young people's use of ICT in their leisure time includes issues like problematic internet use, internet addiction, safety issues regarding content creation and sharing, as well as pathological gaming or gambling habits. Some of the studies examined in this scoping review address relevant issues concerning inequality or vulnerability in the background of the research sample, vulnerability or resilience in research outcomes or results and autonomy.

Typical dimensions of the digital divide, such as gender, location and household composition (especially having children in the households, one of the crucial drivers of general e-inclusion), do not influence frequent internet use, accessing communication tools or uploading self-created content among young people (Sanz & Turlea, 2012). Similarly, Gnambs (2021) concluded that there are only small differences in ICT literacy between boys and girls in Germany. The observed effect does not warrant alarming conclusions regarding potentially increasing disadvantages in ICT literacy for girls. An advantage of this work is the relatively large sample and the longitudinal characteristics of the study, with the first assertion being conducted in 2010, which increases the credibility of the results.

Moreover, one study included in the review examined 20 immigrant families in Norway (Helgesen, 2016). It is noteworthy to mention that although their skin colour was seldom an issue at school or at home for the children who participated in this ethnographic participatory research, and although it appeared largely irrelevant to everyday life, the children consistently crafted white avatars. Users could choose among a variety of skin colours and tones when creating a new avatar, including black, brown, pink and green, yet whiteness seemed to be the only predictable and stable characteristic in the flux of rapidly shifting attributes and subject positions.

Other studies, such as that of Molina et al. (2017), highlight differences stemming from variables such as gender, family, educational level, health and place of residence. More precisely,

> [The] results indicate that being a girl generates a positive influence on the time devoted to communications while being a boy generates a positive influence on the time devoted to computer gaming. We also find that a greater number of family members with secondary studies, that is to say, the habitual presence of older brothers and sisters, generates a positive influence on the time spent on gaming. Children with better health exhibit higher levels of intelligence and, consequently, spend more time in communications and gaming activities, and living in larger cities produces an urban positive effect on the time specifically dedicated to computer gaming (p. 363).

Parents' educational background seems to be significant in shaping teenagers' online interests and activities. Schols and de Haan (2016) examined cultural and media socialisation by collecting data from 892 high school students throughout the Netherlands. The findings of the study highlight that popular culture is more often the subject of teenagers' online conversations than highbrow culture. The differences in their online communication about culture are mainly explained by their own and their peers' offline cultural participation and their internet use and digital skills. Furthermore, spending more time online may lead to being confronted with a greater number of different cultural topics and activities, resulting in more online communication about these topics. Higher levels of digital skills are positively related to online communication about highbrows and popular culture. Digital skills appear to be a precondition for online communication about both popular and highbrow cultures.

Vulnerability and/or resilience?

The literature and research on online communication in general and on the online communication of children and young people in particular have pointed to the dubious nature of e-communication technologies and their potential impact. On the one hand, these technologies have a growing appeal for children and adolescents and can provide several opportunities for online communication, such as enhanced self-esteem, relationship formation, friendship quality and sexual self-exploration; on the other hand, there is evidence of several risks, including cyberbullying and unwanted sexual solicitation (Valkenburg & Peter, 2011).

In some cases, however, such as for young people in care, the use of mobile communication devices and the internet provides young people with a degree of independence, control and freedom from scrutiny that are not traditional features of life in the care system (Simpson, 2020).

Nisiforou and Zaphiris (2018) conducted a literature review of studies published between 2014 and 2016 devoted to the state of ICT as a play-based tool for children with disabilities. The paper attempted to identify and create an overview of the most and least researched topics in the area of play and ICT for children with disabilities, as gathered from the predefined database: (i) to analyse and evaluate research-related activity devoted to the field of ICT as a play-based tool for children with disabilities, (ii) to develop an analytical corpus with the main categories and construct a map and (iii) to summarise the purpose of each code category of the map and inform the research agenda.

Concerns are often raised in relation to gaming. A comparative study between Spain and the United Kingdom (Lopez-Fernandez et al., 2014) used a validated and reliable scale (i.e., the Problematic Videogame Playing [PVP] scale) to identify such behaviour. The objectives of the study were (i) to examine its psychometric properties in two European countries, (ii) to estimate the prevalence of potential pathological gaming among adolescents in both countries and (iii) to assess the classification accuracy of the PVP scale based on its symptomatology as a way of exploring its relationship with both the behavioural component model of addiction and the proposed IGD. The scale that was applied in two countries showed adequate sensitivity, specificity and classification accuracy in both countries; it was able to differentiate between social and potential pathological gamers and from their addictive symptomatology.

More precisely, Lopez-Fernandez et al. (2014) showed that males played significantly more frequently on a daily basis than female adolescents. In both countries, females were much less likely to be pathological players. The younger the gamers, the more endorsement of symptoms of pathological gaming were found. In Spain, the pathological player profile was a male, aged from 13 to 16 from a state school, owner of at least one console (75%) and a computer with internet (75%). In the United Kingdom, similarly, almost all were males (90.7%), aged from 12 to 17 years old, from state schools (63.3%), owners of at least one console (81.8%) and a computer with internet (88.6%).

In a case study in Sweden (Hellström et al., 2012), in which 7,757 adolescents were involved (3,872 boys and 3,885 girls aged between 13 and 18 years old), the girls seemed to spend less time in video games and to play more often for pleasure, being less exposed to negative consequences. Time spent online gaming is also associated with negative consequences among adolescents. Gaming for fun and social motives were associated with a reduced risk of negative consequences, whereas gaming to escape, to gain status or due to demands from others were associated with an increased risk of negative consequences.

The aim of a relevant study (Lopez-Fernandez et al., 2013) was to review the currently available scales for assessing problematic internet use and to validate a new scale of this kind for use, specifically in this age group: the Problematic Internet Entertainment Use Scale for Adolescents. The research was carried out in Spain with a gender-balanced sample of 1,131 high school students. Psychometric analyses showed the scale to be unidimensional, with excellent internal consistency, good construct validity and positive associations with alternative measures of maladaptive internet use. This self-administered scale can rapidly measure the presence of symptoms of behavioural addiction to online videogames and social networking sites, as well as their degree of severity. The results estimated the prevalence of this problematic behaviour

in Spanish adolescents to be around 5%. More specifically, problematic users started using the internet as entertainment at an earlier age, did so with almost daily frequency, spent more than twice as long as occasional users and represented the group most likely to report that internet entertainment was affecting them in some way. Of the group of problematic users, those that present symptoms of internet use disorder, 62.2% were male, their average age was 14, 30.2% consumed tobacco or alcohol, 28.9% had technologies as their main hobby and 68.2% considered themselves to be highly expert.

In Spain, and more precisely in Barcelona, another paper examines the problematic use of ICT among adolescents. Based on a cross-sectional, multicentric descriptive study, Muñoz-Miralles et al. (2016) tried to determine the prevalence of the problematic use of ICT, such as internet, mobile phones and video games, among adolescents enrolled in mandatory secondary education and to examine associated factors. The study offers information on the prevalence of addictive behaviours in ICT use. The problematic use of ICT devices has been related to the consumption of drugs, poor academic performance and poor family relationships. This intensive use may constitute a risk marker for ICT addiction. Another cross-sectional study addressed the abuse of technology in adolescence in the region of Andalusia (Nasaescu et al., 2018). The study showed that a high level of social and emotional competencies was related to less technology abuse (Nasaescu et al., 2018). Moreover, using emotional content in online communication, bullying victimisation and perpetration were related to more technology abuse.

In Austria (Appel et al., 2012), adolescents' perception of qualitatively good communication with parents predicted less compulsive internet use (i.e. perceived communication quality can influence the relationship between internet use and the well-being of adolescents). In a study conducted at three high schools in Tirana, Albania, Shehu and Zhurda (2017) provided evidence on parental control over adolescents' online communication. Most teenagers (82.7%) claimed to communicate with their parents about how they interact with their friends, and 56.5% said that they were sometimes subjected to control by their parents for what they did online.

Another study on parental mediation and parental authority was conducted in Flanders, Belgium. Focusing on families and drawing quantitative data from children and parents, Symons et al. (2020) attempted to examine the correlations between parental mediation styles and the acceptance of parental authority. According to the study, adolescents' acceptance of parental authority plays an important role in whether adolescents have contact with strangers via social networking sites and the amount of time spent on social media. Bjørgen and Erstad (2015 traced digital literacy from school to leisure in Norway and concluded that the school context plays a prominent role in introducing youngsters to new digital practices that might be important in developing their digital literacies. Moreover, children from an early age can act as 'knowledge brokers' of children's culture, as research conducted in two primary schools in England has shown (Marsh, 2012). In this paper, which examined the nature of children's contributions in participatory research studies, examples of children's creativity and capability to combine traditional playground games and rhymes with their media culture were found.

Resilience and autonomy

Iglesias-Rodriguez et al. (2021) examined the design, validation and implementation of the Questionnaire to Assess Teenagers' Digital Competence in the Area of Communication in Digital Environments in Spain. More specifically, the research question was to assess the digital competence of compulsory education of students (aged 11 to 13) in the area of communication. The test measures students' knowledge, skills and attitudes in the six competences that make up the area of communication, as established in the Framework for the Development and Knowledge of Digital Competence in Europe (DigComp): interacting through new technologies, sharing information and content, enabling participation of online citizens, collaborating through DT, applying netiquettes and managing digital identity. The results of the assessment reveal the need for students to acquire and use these types of skills, especially those related to collaborating through DT, which include being aware of the digital tools they can use to work cooperatively or being capable of correcting text documents using the track changes option. They also require further training in sharing information and data, especially when it comes to knowing the media they can use to share videos, contents, data or resources, as well as in

matters revolving around citizen participation online, such as knowing how to access and use the digital services available.

In the field of gaming, research with teenagers in Norway (Aarsand, 2012) has highlighted the ways in which children and young people reflect upon their online leisure activities and position themselves as players. Examining how teenagers deal with discourses of concern when presenting their own playing, this paper focuses on how 'adult' stereotypes are used in teenagers' talk about playing digital games (Aarsand, 2012). In the dichotomy between 'hardcore' and 'casual' players, a third figure, that of a 'knowledgeable' player, appears in the discourse of adolescents who seem to understand but also act upon existing risks within gaming. At another level, teenagers tend to define and present themselves as 'ordinary players' (i.e. as an alternative to the hardcore and the casual player):

> The implication of viewing ordinariness in such broad terms is that deviant and troublesome positions, such as the hardcore player, are less likely to be found among teenagers. Rather, what are seen among teenagers are variations on ordinariness. Ordinariness, however, is not constructed in a social and cultural vacuum, it is related and adjusted to discourses of concern, but on teenagers' own terms (Aarsand, 2012, p. 974)

In a similar vein, Mustola et al. (2018) attempted to overcome the two dominant contradictory images of children when it comes to gaming: on the one hand, the passive, antisocial children uncritically and mechanically consuming digital game content and on the other hand, the active, social children creatively using and interacting with digital game content. Using data collected through a research project with six-year-old children (10 girls and 3 boys) from one preschool group of a Finnish day-care centre playing digital dress-up and makeover games, Mustola et al. (2018) problematised and contextualised a series of binaries that permeate discourses on digital play: 'passivity – activity', 'consumption – production', 'mechanical – creative' and 'antisocial – social'.

Research gaps

Children, adolescents and young individuals use DT and social networks extensively in their leisure time. However, specific research on cross-country comparability and studies concerning divergences among European countries are limited. Cross-national comparability at the EU level on the digital habits of children, adolescents and young individuals is performed through large-scale sample surveys conducted mainly for other reasons, such as the PISA and International Computer and Information Literacy Study (ICILS). Across studies examined, only one study (Sanz & Turlea, 2012) used data from Eurostat's Community Survey on ICT. Most involved single case studies or a comparison between two countries (i.e. Spain and the United Kingdom [Lopez-Fernandez et al., 2014] and Spain and Germany [Molina et al., 2017]); therefore, almost none approached the issue from an internationally comparative point of view. Moreover, factors explaining positive or negative ICT use during leisure time are underexplored. In the relevant papers examined, only basic sociodemographic variables, such as gender, age and household composition, were mainly used, while marginalised groups, such as ethnic minorities or materially deprived groups, remained under-researched. In terms of factors that can positively influence digital leisure, the role of education and family are explored, proving that they can act as a counterweight to, for example, possible internet or gaming addiction. Little or no attention is given to the strategies and practices of self-protection and resilience deployed by children and young people themselves. In other words, the literature seems to predominantly adopt a top-down approach, in which children and young people are examined mainly as subjects exposed to risks. Even in cases where resilience is highlighted, enhancing or enabling factors are usually actors beyond children and young people (e.g. parents, rather than children and young people themselves). In this sense, although the applied research questions in many cases revolve around subjective well-being, the subjectivities are somewhat concealed. It is important to grant agency to children and young people, not only because they deserve it but much more importantly because this may be the best way to better understand research findings that look at first glance ambivalent, if not contradictory.

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5.2. DigiGen research results: Leisure

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Research conducted within the microsystem or domain of leisure has led to some significant findings regarding children's and young people's leisure time, which, in some cases, overlaps with findings from other microsystems investigated in this project. To begin with questions of inequality in terms of access and connectivity, such issues were mostly raised by participants in Romania, where some children, especially those from rural or low-income families, seemed to share some of their devices with their siblings. Sharing devices was also reported in other countries, especially with younger children, but it was not necessarily linked to the reduced capacity of parents or families to cover the relevant costs.

As far as the types of devices used, smartphones seem to be the most important for children and young people. The question of digital capital mainly revolves around the issue of whether to obtain a smartphone, while the age of acquiring one's first smartphone is considered a milestone.

The main reasons for which digital devices are used on a daily basis are communication and gaming. Communication with friends is enabled through digital media. Children communicate with their friends every day by chatting or calling using different apps. The reasons for communication may range from practical ones, such as exchanging information about school, doing homework together or arranging meetings, to social reasons, such as hanging out, discussing and sharing news.

Games are a significant part of all children's and young people's lives among the five countries participating in our research: Austria, Romania, Greece, the United Kingdom and Norway (please see Chapter 3 in this report for an in-depth description of the data and methods). Playing online games with strangers is generally experienced as different from playing with friends. There appears to be agreement on how to behave while playing with strangers: communication while playing is reduced compared to when playing with friends; the content of that communication is restricted to nonpersonal information. Online activities in general, including gaming, have a strong element of socialisation. The maintenance of friendships, particularly during lockdowns, was made possible thanks to digital media.

Ultimately, *screen time* seems to be an issue for (almost) all families in (almost) all countries. In Norway, however, screen time is less of an issue, as the parents accept it as a way of being social and spending leisure time, while the children report having a perceived entitlement to screen time if they fulfil other obligations, such as schoolwork and participation in other leisure activities. In most cases, children describe specific rules, such as no games or content for people above 18 years of age, not spending too much money on gaming, no cell phone on the table, no cell phone right before going to sleep or right after waking up, etc. and different amounts of screen time according to schooldays and weekends.

Another crucial point is parents' monitoring of children's online activities. Although, in most cases, this is accepted by children and young people as a 'necessity'—given the risks described below—it is perceived as an imposition or as an indirect pressure. However, it does not seem to generate worth-mentioning conflicts between children or young people and parents and is reduced by the time they reach a certain age.

When it comes to vulnerabilities, several issues regarding ICT use during or for leisure were raised by the children and young people themselves. Even if most of the respondents, particularly the younger ones, negotiate with their 'screen time' their parents, some of them admit that there is a risk of addiction or of 'overdoing'. Gaming in particular is a way of "having a lot of fun", but "these apps can make you addictive," as one Austrian girl phrases it.

Threats encountered on the internet seem to have occurred for most of the participants, either in the form of strangers approaching them on social media platforms or having seen scary material. The latter was reported even by young children. It seems common for children from an early age to be exposed to videos or photos that can frighten them. There are cases where such experiences can lead to discussions with parents, teachers and schoolmates, such as the case

of a video on TikTok—not seen but talked about—in which someone supposedly killed himself live, mentioned by a ten-year-old boy in Norway.

Therefore, safety and privacy are considered important. Threats do not necessarily come from other users (e.g. strangers chatting over social media or game platforms), but there is also a kind of mistrust of online platforms. This is one of the reasons that most of the participants avoid sharing personal material, such as photos and videos, or any other kind of personal data and even personal thoughts, opinions or ideas. Whether this is based on their perception of online platforms or because they have been compelled by their parents to do so is an open question. What matters is that children and young people believe that there are some risks regarding online safety and privacy.

A point mentioned by most—if not all—participants is that ICT use might prevent other activities, such as board games and particularly physical activities, leading very often to disagreements with parents: "My parents think I should spend more time outside and less on the phone and the internet when I don't have school or homework," says a girl from Romania. "They tell me not to play a lot online for my eyes. My dad encourages me to do gym or sports," adds a boy from Greece.

Apart from physical health, which is often a matter of concern for parents, online activities may present risks that have to do with mental health and social well-being. Socialisation facilitated by video games may present greater risks than other forms of socialisation and communication, including possible inappropriate or even aggressive behaviours that do not necessarily occur in face-to-face interactions. As one 14-year-old Romanian girl reported, "On the phone, online, some people speak ugly things but when it is face to face, nothing!"

Finally, ICT use can lead to loneliness or keep children in the virtual space for too long, with potentially harmful effects. There is a risk of isolation and distancing from what is going on in the 'outside world': "Um, I guess I think they [people] prioritise the enjoyment that they get from their social media instead of the enjoyment that they might get socialising physically," says a girl from the United Kingdom. Therefore, the risk of being connected but isolated is present for children and young people, calling for the establishment of mechanisms that can prevent self-isolation and loneliness.

On the other side of the coin, our research has detected several points of strength related to children's and young people's ICT use. In fact, the risks and vulnerabilities mentioned above are contradicted by the existing forms of strength gained through the use of ICT.

To begin with, ICT use enhances everyday communication and the maintenance of friendships, even in extraordinary circumstances, such as the pandemic. In most cases, the possibility of online interactions prevented children from feeling lonely or isolated from the 'outside world' during the lockdowns. Moreover, everyday communication, particularly on weekdays, takes place through digital media. In this sense, ICT functions as an enabler of communication and can enhance social interactions and relationships.

There are a variety of activities, devices and platforms that children can undertake to spend their free time with the help of technology: communicating, watching content and playing. Regarding the latter, numerous reports of children and young people have indicated that they take advantage of the socialisation mechanisms in video games and social media by hanging out with friends and meeting new people: "(I meet people) both on social media and on the game. With one girl, I became friends on the game. Insta (Instagram), I had fan page accounts and that's how I made most of my virtual friends," says one Romanian girl.

Moreover, being online is not only about fun. Many children stated that they use (group) chats or videocalls to do homework together or to help each other: "We did it every day, everybody, always after the class we did it and finished the tasks together (…) Yes, we worked, so to speak, and afterwards we would just kid around together," says one Austrian boy. In this way, DT provide the possibility of combining work and leisure. In addition, it has been reported that gaming is very often perceived as a motivation to get homework done in order to deserve playtime.

Another positive aspect highlighted by the respondents was that gaming and, in general, 'screen time' finally helped to enhance one's digital competencies. Many children and young people verified what has also been found in the microsystem of education in the DigiGen project (please see Chapter 6 in this report) that the increased use of ICT due to the lockdowns helped them become more competent regarding many applications, not only social media or games. However, even the latter (i.e. playing games) can help someone in practising a language, reading coordinates, enhancing logical thinking, etc.: "Yes, it helps, too. I know now more words; I have learned many words through Fortnite," says an Austrian boy. There are also some interesting developments in creating new language forms that combine local languages with English used in games, such as the 'jeg leaver-jeg joiner' (binary developed by children and young people in Norway) or the «νουμπάς//προίλας» (newbee//pro) one (developed in Greece).

Finally, as far as the question of ICT preventing from other activities is concerned, the analysis of available statistical data, that of the third wave of the Children's Worlds database, shows that there is no evidence that children who use ICT more intensively spend less time on other activities. For both, time spent relaxing, talking or having fun with their families and seeing their friends, we find a significantly positive association (please see Chapter 2 in this report). The more intense the use of new technologies, the more time children spend with their families or seeing friends. This suggests no crowd-out effects on these activities. Moreover, heavy ICT users reported allocating remarkably more time to their families or friends than those who had very low ICT use scores. A similar (yet weaker) pattern was observed for time spent playing sports or doing exercise.

To conclude, we should stress that seeing ICT use mainly as a threat to children's well-being does not seem relevant. As shown in our research, while children use new technologies more often, their overall well-being increases relative to those who do not use technology that often. Moreover, children who spend more time using digital devices do not report dedicating less time to other activities. In general, it seems that ICT is positively related to free-time satisfaction, as well as satisfaction with time use.

In a similar vein, the findings from our fieldwork research show that for children and young people, ICT use is strongly linked to their *social capital*: everyday communication with peers and friends, including the exchange of information about school issues, is performed through digital media. Even gaming, which parents perceive as an excessive and potentially harmful way to spend leisure time, includes strong elements of socialisation and even learning. Here, one can easily find a kind of 'generation gap' between children and parents, as the latter—according to children—are not able or even willing to understand what gaming is all about.

In this framework, negotiations within families seem to be perceived in most cases as a 'necessary evil' or sometimes as a performative act that entails a certain lack or difficulty of communication. Even when children admit that they might overdo it with ICT and screen time, they feel that their parents are not willing to even understand the lives of the digital generation, as this quote illustrates:

> And I don't play with them at all because my parents don't care either. Well, my father, when he's at home because he's a police officer, he likes to work on his old motorcycles in his free time. And my mother, too, when she has time, she wants to cook every now and then. Then she's also very fond of reading. Well, my parents don't care about computers. Although, funnily enough, my father has two tablets, an Apple Watch, an iPhone and Air Pods. My mother looks at things on the table if anything. But then these are not games, just … out of interest, Wikipedia or YouTube or something. I think. I honestly do not know. But they definitely don't play. Well, they don't do that. Well, they don't care. (Austrian boy)

Similarly, as shown in DigiGen's research on ICT use in education, teachers do not seem to be prepared to understand increased ICT use by children and young people and to potentially incorporate it into their educational logic (please see Chapter 6 in this report for a description of research findings on digital technology in education), particularly nowadays, as the lines between ICT use for leisure and ICT use for educational purposes seem blurred. ICT use can be both a form of leisure and a means of learning at the same time; it can be misused for leisure within the educational context, and it can be used for informal or nonformal educational purposes within the context of leisure.

Therefore, it is necessary not only to hear children's and young people's voices, when it comes to assessing the impact of digital transformations on their lives and well-being, but also to bring together children and young people with parents and teachers and bridge the distance of how they understand ICT use in several aspects of everyday life, including leisure, without neglecting that leisure is a social good to which children and young people are entitled. During leisure, social interactions can occur, while family and broader social bonds can be strengthened, even in a ludic but still meaningful way.

6. Use of digital technology in education

6.1. Scoping review: Education

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Introduction

Expectations of what digitalisation may lead to in schools and in education have been high and, at the same time, of a general type. The use of digital devices and virtual learning technologies in the classroom and for schoolwork has been expected to first boost the potential for students' learning and improve their school achievement and second to revolutionise teaching quality and efficiency (Alkan & Meinck, 2016; Falck et al., 2018). For example, the use of keyboards and tablets in early writing instruction has been seen as a tool to motivate students, especially struggling learners (Wollscheid et al., 2016). Computer-assisted instruction has been expected to help adjust levels of difficulty and learning speed for repeating learning material, individualised instruction, better monitoring of student progress and more effective time use (Falck et al., 2018). For students with specific learning disabilities, computer-assisted technology has been used to facilitate and improve academic learning (Ok et al., 2020; Stulz, 2017).

However, Falck et al. (2018) observed that research that attempts to establish the relationship between digital technology and students' learning often produces a null effect. These authors nuance this general finding, pointing out that while the use of some digital technology in the classroom produces a positive effect, other technologies used by the same students may produce a negative effect; thus, different uses of different technologies may offset each other. Selwyn (2017) warns against imagining the relationship between education and digital technology as straightforward because education and learning are highly complex processes:

> [O]ur primary focus should not be on technological devices, tools and applications per se, but on the practices and activities that surround them, the meanings people attach to them and the social relations and structures that these technologies are linked to. (p. 2)

In addition to the perspective of social shaping, not only of technology but also of the activities of teaching and learning, schools and education systems are expected to furnish students with the digital competences and digital literacy required for learning from using DT. Aesart et al. (2015) showed how the concept of ICT literacy has gone through a three-stage evolution of 1) mastery, 2) application and 3) reflection, also to be found in aims for digitalisation across educational systems over the last decades. Thus, the aim of mastery of digital technology was dominant until the mid-1980s, when ICT literacy was perceived as understanding how the computer works and how to programme it. This phase was more about learning *about* digital technology than about using it for learning (Aesart et al., 2015).

A second phase of ICT literacy started when operating systems and software applications reached mass usage and lasted until the late 1990s. Here, the main interest was in how software could be applied for education, leisure and work, while specialist knowledge about how computers and programmes worked faded into the background. Still, Aesart et al. (2015) noted that the 'application' phase of learning and practising skills for software use had a technical-procedural dimension, continuing the previous 'mastery' phase.

A third and still dominant 'reflective' phase in conceptualising ICT literacy has moved to what Aesart et al. (2015) described as a more evaluative and critical use of computers. To keep up with rapid technological changes suffusing Western-world everyday life, basic ICT knowledge and skills need to be complemented by a broader set of competences and cognitive capabilities, including the creative and innovative use of technology for problem solving and information processing accompanied by critical thinking. Recent definitions of ICT literacy or computer and

information literacy (CIL) may therefore refer to combinations of general cognitive capabilities, technical capabilities and attitudes, depending on how the use of digital technology is perceived from these three phases (Aesart et al., 2015; European Commission, 2014). Thus, the definition of computer literacy used in *the International Computer and Information Literacy Study* (ICILS) is formulated as "an individual's ability to use computers to investigate, understand, create and communicate in order to participate effectively at home, at school, in the workplace and in society" (Fraillon et al., 2013, as cited in Aydin, 2021, p. 2). These skills may be operationalised as retrieving, collecting, reading and understanding digital information; managing, assessing and transforming digital information; and sharing and creating digital information (Aydin 2021; European Commission, 2014).

However, the first ICILS study from 2013, involving more than 60,000 pupils in 8th grade from a total of 21 countries or educational systems, showed that in all participating EU countries except the Czech Republic and Denmark, 25% of students demonstrated low levels of CIL. The European Commission (2014) concluded that being born into a digital era is not a sufficient condition for being able to use technologies in a critical, informative and creative way and that schools have a key role to play for all children to achieve these means. In a study by Aesart et al. (2015), it is likewise clear that the majority of students (N = 378) had a medium to low score on a test in ICT proficiency) i.e. retrieving and processing digital information and communicating through a computer). Only a slight minority of the 6th graders performed at a more advanced level.

In addition to a computer-based competence test, ICILS collects data at the student level from a survey of student backgrounds. The survey data from ICILS 2013 showed lower average computer and information literacy among students from disadvantaged socioeconomic backgrounds and revealed a gender gap in favour of girls. Talaee and Noroozi (2019) suggested that when investigating the educational outcomes of ICT use, students' individual characteristics (age, gender and disability) and the economic and social resources that students possess should be taken into account.

Based on the results from ICILS 2013, the European Commission (2014, p. 15) stated, "The effectiveness of the use of ICT for learning does not stem from ICT use per se, but largely depends on how these technologies are implemented in classrooms." Talaee and Noroozi (2019) commented that despite many schools having adequate access to ICT and digital learning resources, teachers may feel that technology is less relevant to their teaching practice. It is further known that the effects of using computers on students' learning may differ depending on the students' general achievement levels and computer familiarity (Falck et al., 2018).

Therefore, this scoping review builds on the following review question: *What are the main conditions contributing to children and young people being either negatively or positively impacted by ICT use in education?* We answer this question by reviewing a sample of 43 studies retrieved through a database search, described in detail in this working paper's Chapter 3. The studies extracted from the search were divided into categories suggested by Talaee and Noroozi (2019):

1. Individual characteristics

    1.1. Age

    1.2. Gender

    1.3. Disability

2. Structural characteristics:

    2.1. Socioeconomic background

    2.2. Ethnic minority background

A limitation of the analysis was then set up to identify studies based on data from children and young people between the ages of 7 and 16 years. This excludes studies based on data from

teachers, parents or school level, unless these studies also included data from children in the particular age group mentioned. The retrieved and analysed studies were published between 2011–2021 using empirical data from samples located mainly in Europe.

Age

A student's age is generally used for characterising the sample applied for studying ICT in education but seldom used for analysis as an independent variable in itself. Two studies comment on the general lack of data in research on the youngest students, and one study compares age groups using ICT in education.

Wollscheid et al. (2016) concluded that most studies on digital reading and writing competences have been conducted on students in secondary or tertiary education. The same was also found in studies evaluating students' general ICT competences (Aesart et al., 2015). While early writers are vulnerable in terms of acquiring critical basic literacy skills to help them in their academic careers, there is a lack of consistent evidence regarding whether digital tools or pencil and paper help them achieve this aim (Wollscheid et al., 2016).

Falck et al. (2018) compared data on students in 4th and 8th grade from Trends in International Mathematics and Science Study (TIMSS) 2011. At both levels, students' results benefit from being used to looking up information on computers, while having practised on computers to rehearse skills and procedures yields a negative effect. However, for students in 8th grade, this is restricted to science, while for students in 4th grade, the effects are most pronounced in maths. Looking up information using computers may be superior to teaching methods traditionally used for retrieving information, while the opposite is true for rehearsing skills and procedures. The difference in effect may therefore stem from how mathematics is taught in the lower grades, emphasising explorative learning (Falck et al., 2018).

Gender

The intercausal relationship between social inequalities and the digital divide raises the issue of gender and ICT. In preparing generations as future digital citizens and for active socioeconomic participation, ICT plays a key role in respecting gender equality. Although older studies have shown that gender plays an important role in digital exclusion (e.g. ICILS 2013 studies), in recent years, other research (Acilar & Sæbø, 2021; Antonio & Tuffley, 2014; Elena-Bucea et al., 2021; Joiner et al., 2015; Perifanou & Economides, 2020; Singh, 2017) with a focus on economically developed or developing countries has identified an improvement in these aspects. The following section presents the results from the articles selected for this review, which included gender as an analytical category. First, the two multinational studies ICILS 2013 and ICILS 2018 are briefly discussed, as well as studies that made secondary use of these data. The second part discusses independent European studies included in the review that deal with gender and digital skills.

One of the studies covering the topic of digital inequalities and gender is the ICILS study. The first ICIL study from 2013 showed significantly better CIL results for girls than for boys in all nine EU countries participating in the study. The gender difference in ICILS 2013 is also commented on by Alkan and Meinck (2016), who pointed out that the background questionnaire shows that girls spend more time on social media and use digital devices for communication to a greater extent than boys, which may explain the better CIL results for girls.

Other studies using ICILS data showed similar results. For example, Ercikan et al. (2018) reached a similar conclusion: girls overall scored better for CIL, while boys scored better on access to and more enjoyment of ICT uses than girls.

Another study (Punter et al., 2017) revealed that regarding sharing or communicating information, girls performed better than boys, as well as for evaluation and reflection on information (e.g. recognising phishing). Regarding understanding technical functionalities, "significant gender differences in favour of girls were found in five of the nine countries under review" (Punter et al., 2017, p. 769).

Scherer et al. (2017) used ICILS 2013 data from Norway to study students' profiles with regard to ICT use and identified two latent profiles to describe the use of ICT. Students using ICT often

for school-related purposes but not so often for other purposes followed Profile 1, while Profile 2 was assigned for "consistent and frequent use of ICT for different purposes and in various settings" (Scherer et al., 2017, p. 493) (e.g. communication, social, information exchange and recreational). As the study concluded, boys' ICT use fell more in the line of the 1st profile, while "girls were more likely to belong to profile 2" (Scherer et al., 2017, p. 494). This reveals that female students used ICT in different contexts and with different intentions in addition to school-related purposes.

Furthermore, Heldt et al. (2020) used ICILS 2013 data from the Czech Republic, Denmark and Germany to study response time as one possibility to explain the differences in students' CIL, taking into account the background characteristics of students. Based on the response time, two profiles were identified: fast and slow processing profiles (i.e. speed of finishing computer-related tasks). In the Czech Republic and Germany, female students appointed to the fast-processing profile demonstrated a higher CIL compared to girls in the slow-processing profile, whereas in Denmark, the difference between girls was not so significant. In the Czech Republic, boys assigned to the fast-processing profile demonstrated significantly higher CIL compared to boys in the slow-processing profile, while this difference was not visible in Denmark or Germany.

These early last decade studies related to digital literacy focused mostly on observable skills but did not take into account other psychological or motivational aspects, such as self-efficacy, self-confidence and motivation related to ICT use. Later studies, such as ICILS 2018, focused on more fine-grained processes.

The second ICILS study from 2018, gathering data from 14 countries and from more than 46,000 students, identified the following gender differences at the level of CIL: a) Overall, girls outperform boys in CIL, scoring on average 505 CIL scale points, to boys' 488. b) On average, boys did better than girls in the computational thinking (CT) portion, scoring 502 CT scale points, compared with 498 by girls. Aydin (2021), using results from ICILS 2018 to compare Finland and Korea, concluded that gender, along with computer experience and family socioeconomic levels, are the demographic variables found to be significantly associated with student achievement in both countries. The same study showed that compared to male students, female students indicated higher CIL achievements, as seen in most of the ICILS 2018 countries. In addition, CT "tended to be higher among male students" (Fraillon et al, 2020, p. 89). It was also demonstrated in ICILS from 2018 that in regard to confidence in using general ICT applications, the difference between girls and boys was small, where "male students expressed greater confidence in regarding their use of specialist ICT applications" (p. 113). In addition, "male students had greater expectations than female students of using ICT for work or study in the future" (Fraillon et al, 2020, p. 114). Regarding ICT self-efficacy, there was little difference between female and male students, albeit significant. "There were significant gender differences in ICT self-efficacy regarding the use of specialist applications favouring male students in all countries" (Fraillon et al., 2020, p. 163). "More strongly negative views of ICT for society were expressed by female students than by male students in eight ICILS 2018 countries" (p. 167).

Other independent studies also assessed gender differences in ICT use. The following summarises the results, mostly focusing on more fine-grained differences in digital literacy.

One study (Finland, mean age 11.73) found differences in skills in favour of the girls (Kiili, 2020), with girls outperforming boys on measures of content, argumentation and integration in the written task products, while another Finnish study (Kaarakainen, 2018) revealed that among the upper secondary students, the average scores of male students were higher than the average scores of female students (although for basic digital skills, the difference was not significant). However, older studies (Heemskerk et al., 2012) investigated students' attitudes towards ICT applications in schools for general secondary education and found that in general, girls reported fewer skills. Furthermore, girls were found to appreciate more instructions that were clear and easy to follow and found applications with a competitive element less attractive than boys.

Pagán et al. (2018) studied internet use among secondary school students and revealed differences between the type of internet use of boys and girls. While boys prefer to access the internet to play online more than girls, girls use the internet more in regard to their

homework (e.g. looking for information). Male students perceived the internet as more positive and beneficial compared to female students, while female students showed higher levels of dependency on the internet.

A study by van Deursen et al. (2014) assessed internet skills among 76 children (aged 9–13) from three Dutch primary schools with a performance test. The test measured operational skills, formal internet skills, information internet skills and strategic skills and was based on the number of successfully completed tasks. Interestingly, the performance test did not reveal any differences between the performances of boys and girls. van Deursen et al. (2014) pointed out that "this is inconsistent with findings using self-report measures to assess internet skills but supports the assumption that gender differences in self-report measures of performance might arise due to boys' tendency to overrate their actual performances" (p. 1356).

Peart et al. (2021) looked at 78 students in their last year of compulsory education (15–17 years and older) in Spain to identify and describe the influence of digital scenarios and sociodemographic variables on learning strategies. The study showed a significant relationship between digital scenarios and learning strategies; therefore, "digital scenarios influence the participants by increasing their use of aid for information processing learning strategies" (Peart et al., 2021, p. 143). The study showed that female students, compared to male students, are using more learning strategies "to recover and process information", and female students "are also more adept at generating solutions or answers to a problem than their male counterpart" (Peart et al., 2021, p. 143–144). Regarding the acquisition and codification of information, there were no gender differences.

Aesart et al. (2015) found that gender was closely related to pupils' ICT competences such that girls performed better than boys on digital information processing and communication. This result is based on a stratified Flemish sample of 378 pupils in 6th grade located in 58 schools, completing a test in proficiency in retrieving and processing digital information and communicating through a computer, in addition to a student background questionnaire. The study addressed higher-order digital competences, such as transforming, creating and communicating digital information.

Finally, some studies did not reveal gender differences. Using data from TIMSS from 2011, applying competence tests and student background questionnaires, Falck et al. (2018) found that the specific use of classroom computers did not show any gender differences in student test results. Both boys' and girls' test results benefited from having practised on classroom computers to look up information and ideas and suffered when classroom computers have been used to practise skills and procedures.

Regarding specific ICT uses, digital game-based learning (DGBL) has been in the spotlight in recent years. For example, a study conducted by Liu et al. (2020), aimed to explore correlations explaining student interest in DGBL, indicated that gender doesn't have a significant effect on students' situational interest within DGBL. However, this shows that contentment can influence students' interest in DGBL and their degree of freedom in DGBL environments. In another study, Camilleri and Camilleri (2017), in their investigation of students' (6–12 years old) perceptions of DGBL, found that children possess dissimilar skills, as they exhibit different learning abilities, and some of these could be attributed to gender differences.

Other studies mention gender only as a background variable but do not go in depth in discerning gender differences. For example, studies that have another primary focus (e.g. disability) might not necessarily pay attention to detailed gender differences (e.g. Bagon & Vodopivec, 2016; Cranmer, 2020; Frutos et al., 2017).

To conclude, although on a surface level, girls seem to outperform boys or report similar digital competencies, when looking at more in-depth processes, such as confidence, enjoyment or specific skills, girls are no longer at an advantage. This proves that merely looking at competencies without taking into account more fine-grained inequalities is not enough.

Learning difficulties and specific learning disabilities

Attempting to develop strategies based on data to ensure the digital inclusion of children with special educational needs in education is an important pillar in minimising the digital divide. The types of disabilities investigated in the literature on children's and young people's use of ICT for educational purposes can be divided into learning difficulties (LD) and specific learning disabilities (SLD). The latter covers perceptual disabilities, brain injury, minimal brain dysfunction and dyslexia but not learning problems resulting from visual, hearing or motor disabilities, mental retardation, emotional disturbance or environmental, cultural or economic disadvantage (Stulz, 2017). We divide the studies first into subsections describing ICT in education for students with LD and SLD. Under each of these subsections, we refer first to literature reviews, then we present studies (both quantitative and qualitative) that refer to the study sample as only "children with LD" or "children with SLD", without differentiating between the children's diagnosis. If studies present such a diagnosis, they are grouped together and presented at the end of each section. In this review, highly gifted students are not included neither in the LD nor the SLD category.

It is our general impression that many of the studies on ICT for children with LD or SLD do not differentiate between what kind of digital technology is used; instead, they refer to computer-assisted instruction (CAI). CAI is defined as "any instruction in which a computer is the central feature of an intervention that supports learning, presents learning materials, or checks a learner's knowledge" (Root et al., 2017, p. 276). According to Stulz (2013, p. 3) "[...], CAI reduces the need for in-person trainers by allowing for programmed responses to student actions. It offers a dual benefit of giving instantaneous feedback to students and continually adjusting the material that the student is being taught."

ICT for students with learning difficulties (LD)

A main problem for students with LD is the waste of energy on simple tasks, leaving them with less energy for the development of learning. In addition, students with LD may have low self-esteem and motivation from negative experiences in school (Harish et al., 2013). Ok et al. (2020) reviewed 20 studies between 1980–2017 that evaluated the effects of CAI on the mathematics performance of students with LD. Most of these studies reported a medium or large positive effect of CAI on teaching mathematical skills to students with LD. Studies have also shown a positive effect of CAI on the maintenance of learning.

Bagon and Vodopivec (2016), studying a sample of 78 primary school children in Slovenia with LD and their attitudes towards learning and on the motivation that arises from teaching, found that in general, students report high autonomy and positive attitudes towards the use of ICT. A survey based on 61 Spanish children aged 9–16 with learning and behavioural problems showed that children's lack of digital skills and computer equipment in their homes often makes it difficult for them to complete some of their homework (del Rio et al., 2019).

In a randomised control trial study of 40 children aged between 10–18 years with visual impairment in the United Kingdom and India, Gothwal et al. (2018) investigated the impact of the use of tablets on education, specifically on children's independent access to educational material. The intervention group used iPads with low-vision applications and instructions, including accessibility features. Reading speed, reading accuracy and comprehension did not change significantly during the intervention, but participants used the tablet to gain access to the curriculum by installing textbooks and taking photographs of paper-based worksheets to enlarge them on screen. Cranmer (2020) studied how seven visually impaired adolescents (aged 13–17) in the United Kingdom experienced DT for learning. The study found benefits to using DT, particularly tablets. However, digital accessibility practices were potentially stigmatising, and barriers occurred when teachers had not developed inclusive digital pedagogy.

ICT for students with specific learning disabilities (SDL)

Stulz (2017) reviewed 25 studies between 1981–2016 on the effects of CAI on students with SLD. This literature generally supports the use of CAI for teaching mathematics to students with SLD, although the literature is not clear on whether CAI should be used as a primary means of

instruction or as an augmentation of classroom instruction. In addition, Stulz (2017) concluded that further research is needed to test the efficiency of CAI for students beyond the elementary level. Snyder and Heartly (2019) reviewed 22 studies from 2006–2017 to assess the nature of academic content taught to students with intellectual disabilities using CAI, including student outcomes associated with this technology. The results showed that outcomes targeted, the technology used and the training and implementation of CAI varied across studies; however, CAI can still be effective for teaching academic skills to this student group. Root et al. (2017) reviewed 29 studies between 1995–2015 to investigate the effectiveness of CAI in teaching academics to students with autism. Evidence from the analysed studies demonstrated that CAI can help children with autism in the educational process. Stančin et al. (2020) reviewed 21 studies between 2010–2019 on DGBL, asking which technologies and games are used to accomplish learning for students with intellectual disabilities. Fifteen of the studies showed a positive impact of DGBL on students with intellectual disabilities (i.e. mathematical skills, healthy eating habits and physical activity).

In survey results from 2,734 Spanish students in secondary education, Pagán et al. (2018) found that students with specific learning support needs use the internet less frequently than students' global average. There is also a lower use of this tool by students with such needs as a training resource for doing homework.

Stulz (2013) conducted a quantitative experiment in which 58 high school students with SLD used CAI to multiply and divide simple and mixed fractions in mathematics. The results showed no statistically significant difference between CAI and traditional teacher-directed activities. In the United Kingdom, Tyler et al. (2015) studied Headsprout Early Reading (HER), an internet-based programme designed to teach the skills and strategies necessary for efficient, fluent reading to six children (aged 7–14) with intellectual disabilities. This pilot study demonstrated that children with intellectual disabilities can access applications like HER and may benefit from phonetics-based reading instruction incorporating the five essential components of such instruction.

Straub and Vasquez (2015) investigated online writing instructions for four students with SLD (age: 13–16) using synchronous online collaboration software to investigate the effect of self-regulated strategy development on instruction in persuasive writing. After online writing instructions (online tutoring, video and audio feed, visual aid in Adobe Connect, coupled with real-time editing capabilities in Google Docs), the scores of students with SLD increased in essay elements.

Using the perspective of social constructivism, Vasalou et al. (2017) investigated DGBL for dyslectic children, where children spontaneously engaged in 'game talk'. According to Vasalou et al. (2017), the results facilitated the development of a theoretical understanding of DGBL concerning engagement and learning as social processes. Gaggioli (2018) aimed to determine whether didactic work carried out in digital classrooms is beneficial to students with learning disorders. In the study, 186 Italian students (primary and secondary schools) were tested, and 6.5% of the sample had dyslexia. Technology had an effect on the improvement of writing skills for all students, where technology helped them to have customised paths, an extension of watchful times and immediate feedback from teachers about tasks completed.

Four studies on students with autism spectrum disorders (ASD) were assessed. Charitaki (2015) studied five children (aged 5–7 years) with ASD in the United Kingdom and Greece using open software for emotional education. Both parents and teachers stated a clear differentiation in children's reactions in specific emotional situations. Marchetti and Valente (2015) investigated the use of a tangible, digital interactive installation called MicroCulture aiming at bridging learning of history across museums and schools in Denmark. Through mediated play and teacher's facilitation, 15 students aged 9-15 years occasionally engaged in interaction leading to conceptual thinking, cooperation and forms of roleplay, but this was conditioned by the presence of the teacher. In a United Kingdom–based intervention with 22 children with ASD (age: 5–11 years) by Smith et al. (2020), the teachers used an app for developing and delivering personally digitally mediated social stories to the children over a four-week period. Social stories are highly structured and personal social narratives designed to address the behavioural, communicative and social difficulties associated with autism. The intervention showed a reduction in children's anxiety and an increase in their understanding, some of which were still present at follow-up.

Based on a literature review and preliminary interview study conducted in Portugal, Santos et al. (2017) propose digital learning activities for development of mathematical understanding for children diagnosed with ASD between 6 and 12 years of age.

To summarise the studies on ICT use for students with LD and SLD, the literature review shows that overall, CAI can have a positive effect on learning for children in both groups. However, there are also studies that show no significant effects on learning from CAI for these children. Children with LD may display a positive attitude towards the use of ICT in school, but ICT may also stigmatise these children and requires that teachers master inclusive pedagogy. For children with SLD, ICT may help them acquire reading skills and collaborate in writing. For children within the autism spectrum, ICT can help alleviate anxiety and facilitate engagement in learning situations, but in these cases, teachers are central to the studies' positive results.

Socioeconomic status (SES)

The main axis of social inequalities, such as SES, influences the ways individuals access ICT and use the internet and their digital competences to get benefits or outcomes from interactions with digital technology (Ragnedda, 2017). The issue of digital inequalities among students is closely linked to and determined by SES.

Among the analysed studies that aimed to explore the extent to which SES influences educational outcomes in terms of access to DT and ICT use in the learning process, all used a quantitative methodological approach.

Impact of SES on students' digital literacy

The first ICILS study from 2013 showed significant SES gaps in terms of CIL such that the result showed a lower average CIL amongst young people from disadvantaged socioeconomic backgrounds. In this study, SES was measured by parental education and occupation and the number of books in the household. However, students' educational aspirations are positively related to CIL scores in all participating countries (Alkan & Meinck, 2016; European Commission, 2014). The CIL ranges from 24 scale score points in Hong Kong to 93 scale score points in Thailand (Ercikan et al., 2018). Furthermore, Ercikan et al. (2018) noted that the largest differences in CIL scores were observed between, rather than within, jurisdictions, which has implications for assessing international disparities. Heldt et al. (2020) used ICILS 2013 data from the Czech Republic, Denmark and Germany and revealed that so-called negative time-on-task effects can be seen with regard to the socioeconomic background. In the Czech Republic, a negative time-on-task effect can be observed for both students with high cultural capital and students with low cultural capital. Starting from the interdependent manner in which family SES interacts with the level of cultural capital that can be achieved, theories of cultural capital and family educational resources have identified a reproductive effect of social origin on student achievement (Roscigno & Ainsworth-Darnell, 1999; Tondeur et al., 2011; Xie & Ma, 2019). These studies show that students with higher SES (measured by parental occupation, parental education and the number of books in the home) can achieve a higher CIL score. Students from families with a Highest International Socioeconomic Index of Occupational Status (HISEI) of less than 40 points are visible: 68.08% of the students who belong to the fast profile (in terms of learning mechanisms and academic achievements) have a higher CIL in comparison to the 31.92% of students in the slow profile. Such a significant negative time-on-task effect is also evident in Germany concerning students with high cultural capital but not among high school students with low cultural capital. For Germany, a significant negative time-on-task effect can be identified and for students with a HISEI less than 40 points. In Denmark, neither students with higher cultural capital nor students with low cultural capital showed a significant correlation between their processing profile or processing time and their computer and information literacy. There are no significant differences regarding any of the HISEI categories in Denmark.

Mirazchiyski (2016) looked at ICILS 2013 data and identified that "statistically significant CIL gaps between students in regard to their individual SES is found in all 20 countries" (p. 32). Mirazchiyski (2016) also concluded that in all countries, the effect of individual SES is sizeable and statistically significant. This was confirmed by the ICILS 2018 study; the findings showed that in all countries, students in the high SES groups scored significantly higher than those in the

lower SES groups on the CIL achievement scale (p. 51). The same applies to the computational thinking scale: "in all countries, students with the high SES groups scored significantly higher on the CT scale than those in the lower SES groups" (Fraillon et al, 2020, p. 89). In a comparison between Finland and Korea, using results from ICILS 2018, Aydin (2021) found that the number of books in students' homes showed a significant relationship with their success only for Finnish students, while the socioeconomic level of the family was significantly related to student achievement in both Korea and Finland.

Fraillon et al. (2020) identified that, on average, students with a higher SES had significantly higher CIL scores. Students with a parent who had completed a bachelor's degree or higher had a CIL score 31 points higher than students whose parents did not hold a degree. On average, students with a higher SES had significantly higher CIL scores. Students' CIL was associated with access to computers at home and years' experience using computers". In all participating countries (including benchmarking participants), students with two or more computers at home had statistically significantly higher CIL scores compared to students with less than two computers at home. This digital divide at the level of digital skills leads to digital marginalisation and ultimately social exclusion, the diversity of digital devices used and the level of interaction in the online environment being elements associated with SES (Harris et al., 2017). Fraillon et al. (2020), using data from ICILS in 2018, showed that, across the participating education systems, on average, students and their teachers have positive attitudes towards ICT in education and society, even though they acknowledge potential areas of concern.

When Aesart et al. (2015) uncovered relatively low ICT competency levels amongst a stratified sample of 378 students in 6th grade in Flandern, they also found that the higher the educational degree of the mother, the higher the mean level of students' ICT competence in digital information and communication. In a study on TIMSS data from 2011, Falck et al. (2018) found larger positive effects of using computers to look up information for students with high SES and larger negative effects of using computers to practice skills for students with low SES.

Studies (Davis-Kean, 2005; Hoff & Laursen, 2019) showed that parents from different socioeconomic levels expect different developmental timetables. Referring to the parental mediation style and the use of ICT for education purpose, Pagán et al. (2018) revealed that students from the lower class have less parental control and are using the internet more frequently from their mobile devices to have fun, while students from the upper class are using computers as devices more often. In addition, students with better resources and from higher classes are putting the internet to better use, as they dedicate their time more to educational activities than for leisure purposes. The study concludes that to explain students' ICT use, the social class of the student is crucial, as it is "one of the key factors that keep determining a digital divide between the type of use and consumption made of technology" (Pagán et al., p. 7).

Impact of SES on ICT use in the school context

In addition to the strong relationship between CIL and SES, there is also a correlation between school SES and CIL. The difference in CIL between students with higher and lower SES tends to be lower in schools where the students are mainly from families with higher SES (ICILS, 2018, p. 36). The same applies to the SES context of schools, meaning that the aggregate SES of students at school levels is significantly related to student CIL, and this relationship is much stronger than that of individual student SES (Fraillon et al., 2020, p. 37).

Social inequalities are closely linked to children's academic achievement and active participation in the classroom. To ensure quality and sustainable education, the development of strategies aimed at minimising inequalities should be a priority in the current public policy agenda. Reinhold et al. (2020), addressing the pressing issue of how to raise the performance of disadvantaged students in mathematics, found that digital support principles implemented in evidence-based instruction help disadvantaged students acquire mathematics knowledge and maintain this knowledge. Senkbeil (2018), analysing the relationship between ICT-related competencies and motivation based on ICILS 2013 data, developed a concept and measurement of ICT motivation. The results showed that ICT usage motives were differently correlated with social background (the instrumental motive factor was positively correlated and hedonic and social interaction factors were negatively correlated). The findings showed that students with higher SES displayed higher motivation to use ICT to look for information, to learn and for

work (instrumental factor). Students with lower SES illustrated higher motivation to use ICT for entertainment and escapism (hedonic factors), as well as for self-presentation and social exchange (social interaction factors). According to the results obtained from ICILS 2018, providing students and their teachers with ICT equipment alone does not automatically result in the development of sophisticated digital literacy skills (Fraillon et al., 2020). Students need to be taught how to use computers effectively, and their teachers need to be supported in their use of ICT in teaching.

SES can have effects at the level of students' CT, which are key skills in using ICT with confidence and for educational purposes. Fraillon et al. (2020) built on the ICILS 2018 data with the aim of comparing the socioeconomic gap in CIL with the corresponding one in CT, showed that students from more advantaged backgrounds performed better on both CIL and CT tests compared with their peers from less advantaged backgrounds (p. 4); in addition, the gap in CT scores tends to be larger than the one in CIL test scores (p. 4).

Given the intertwined relationship between social and digital exclusion, the digital divide increases the risk for socially disadvantaged groups of being 'left behind', thus social inequalities being accentuated. Digital inclusion is not limited to closing the gap in accessing the internet in itself (first level of the digital divide) but also comprises a certain level of digital competences and motivation to use DT (second level of the digital divide) to improve personal well-being (third level of the digital divide) (DiMaggio et al., 2004; van Deursen & Van Dijk, 2014; Ragnedda, 2017).

Ethnic minority background

In addition to SES, students' ethnic minority backgrounds affect the use of ICT in education. While more is discussed on the former, ethnic minority background—while undoubtedly related to SES—has been discussed less.

The results from ICILS 2018 (Fraillon et al., 2020) showed a relation between students' CIL and immigrant background: "[s]tudents from non-immigrant families had statistically significantly higher CIL scores than students from immigrant families" (p. 52). Similar patterns are also visible when looking at the language spoken by the students—students reporting speaking mainly languages other than the language of the ICILS test had statistically significantly lower CIL scores compared to those speaking the language of the ICILS test at home. Similar results emerged regarding CT scores. Students from migrant families and those who reported speaking mainly languages other than the language of the ICILS test had lower CT scores. Interestingly, there were two European countries in which these patterns did not emerge as strongly as in the rest of the participating countries. In Portugal, there was no statistically significant difference in CIL scores between students from migrant or non-migrant families, and the same applies for language use, as this did not affect the CIL scores. In addition, Poland did not display any statistically significant differences in achievements regarding language use.

Still, the language barrier issue for ICT use is highlighted by Heemskerk et al. (2012) in a study on how 495 students from the Netherlands from different gender and ethnic backgrounds appreciate the various characteristics of ICT tools. Heemskerk et al. (2012) found that students from a minority ethnic background "seemed to be attracted to applications with explanatory images, requiring less reading" (p. 167). In addition, understanding the language when working with ICT was considered important by students with minority backgrounds, as were ICT skills in general. Both the preference for explanatory images and the importance of language skills are understandable, as minority students hold a language disadvantage.

Frutos et al. (2017) also looked at the use of ICT and the mother tongue in the academic performance of 117 immigrant students in Spanish secondary education within a vulnerable context, measured by considering student SES and ethnic background. In contrast to Heemskerk et al. (2012), Frutos et al. (2017) found no significant differences in outcomes for students who use their mother tongue versus Spanish but found that "the academic performance of the students in a vulnerable context improves if they use ICT at home to work on their assignments and exercise" (p. 194).

An example of this could be found in the pilot intervention study conducted by Ecalle et al. (2020), where a group of newcomer migrant children aged 7–15 followed a training programme

consisting of two different software applications designed for children struggling with learning to read in French. One group with little or no experience in reading French was assigned to working with a software application to stimulate the French alphabetical code, and the second group with a little more reading experience in French worked with software to stimulate word reading. The training for both groups lasted for five weeks, with a total of 10 hours of exposure to the software applications, and the children were tested for reading skills in French before and after the intervention. In the first intervention group, the results showed significant effects on one of four domains of learning French alphabetical code. For the second intervention group, three domains for stimulating word reading were tested, and about half of the children progressed in oral comprehension and word reading, while two children progressed in all three domains: word reading, oral comprehension and vocabulary. Ecalle et al. (2020) commented that the study did not show that using computer-based software was the best way to achieve progress in reading. However, Ecalle et al. (2020) emphasised that software designed on the basis of fundamental research adapted to children's initial levels could be a tool for both teachers and children that allows independence in learning.

While ICT can offer a tool for learning, as Pagán et al. (2018) pointed out, computer-mediated internet access possibilities are lower among those with foreign origin. According to their study, students of foreign origin show a significant difference in the use of the internet during weekends; as compared to others, they use the internet for less hours. The study was conducted in Spain involving more than 2,700 students aged 12–16, and compared to autochthonous students, "students of foreign origin have less computer equipment at home" (Pagán et al., 2018, p. 11). In addition, "plenty of them have a computer at home with no internet access" (Pagán et al., 2018, p. 11). Because of the lack of equipment and access to the internet, computer-mediated internet access is lower for students of foreign origin.

Scherer et al. (2017) identified two latent profiles regarding ICT use when investigating data from ICILS 2013 in Norway: Profile 1 described frequent ICT use for school and studying purposes, with less use outside of school, and Profile 2 described "consistent and frequent use of ICT for different purposes and in various settings" (p. 493). As the study revealed, for those with an immigration background, the probability of being a member of Profile 2 was more likely, while those without an immigration background were more likely to belong to Profile 1.

Heldt et al. (2020) used ICILS 2013 data from the Czech Republic, Denmark and Germany to study response time as one possibility to explain differences in students' CIL, taking into account the background characteristics of students. Based on the response time, two profiles were identified: fast- and slow-processing profiles. In the Czech Republic, students without an immigrant background belonging to the fast-processing profile had a higher CIL compared to those in the slow profile. However, there was no significant difference for students with immigrant backgrounds. No significant difference could be found in Denmark when comparing students with and without immigrant backgrounds. Nevertheless, both Germany and the Czech Republic show negative time-on-task among students who reported speaking the test language at home. In addition to the language spoken at home, the parents' country of birth was included to determine their immigrant backgrounds. Compared to the language spoken at home, the only difference in results emerged from Germany, where students with both parents were born abroad; a significant negative time-on-task effect was identified.

As these studies illustrate, ethnic minority and immigration backgrounds have various ways of affecting the use of ICT. While minority groups are already troubling accessing the devices and internet, their use of ICT differs compared to those of non-immigrant backgrounds. In addition, language barriers might be experienced when using ICT, and these barriers could be overcome with the use of ICT itself.

Conclusion

Following the typology from Talaee and Noroozi (2019), this overview has demonstrated the relevance of both individual and structural characteristics of students' backgrounds in research on ICT in education. However, as independent variables, these characteristics are given different emphases in the studies. While the reviewed studies rarely treat students' age as an independent variable in itself, gender and SES dominate as explanations for students' CIL. From big datasets such as ICILS in 2013 and 2018 and from smaller, yet quantitatively based and statistically

analysed samples in various national studies, girls generally score higher than boys on CIL. In addition, the finding that students' CIL is correlated to different measurements of family SES (i.e. parents' education, occupation/income and having a certain number of books in the household) is highly consistent across the different studies. Because being born to immigrant parents correlates with family SES in the host country, it is not surprising to see that this background variable is related to low levels of student CIL, similar to the data from the ICILS.

The studies incorporating gender, SES and immigrant and/or language minority background often combine these variables in their analyses. In relation to our main review question on what conditions may contribute to different outcomes of ICT use in education, it is important to point out that these studies do not address the outcomes of ICT use in education per se; rather, they map important aspects of the *context* that situates 'ICT use in education' in terms of demographics. Thus, these studies tell us that the students populating the more or less digitised classrooms in Europe have different CIL propensities or profiles relating to gender, family SES and majority/minority background in terms of their parents being born outside their current country of residence and the language spoken at home. However, these studies do not tell us what ICT in education does to these students' learning, not for their CIL or for learning outcomes in regular school subjects. The processes of learning and the creation of learning outcomes shaped by pedagogies or didactics—the social actions and the social relations surrounding and facilitating ICT in education (Selwyn, 2017; Talaee & Noroozi, 2019)—are not addressed in these studies.

This is a different matter from studies on ICT applied by or for students with LD or SLD. These studies are often qualitatively based on small samples. Even if the study design incorporates pre- and post-intervention tests that can be analysed using statistical techniques to measure improvements in either general CIL or specific learning outcomes in, for example, mathematics, we find that these studies often lack control groups. Since these studies emphasise the implementation of the software or application used in the intervention, we come closer to knowing what the students did and what was done to facilitate their learning (i.e. instructions from the teachers) involving the use of ICT. Still, only a minority of these studies have built or reflected on theories of learning to discuss and assess learning outcomes from using ICT for students with LD or SLD. An exception is studies on DGBL that apply a socio-constructivist learning perspective to students with SLD.

When returning to our review question, we see that we have only half the answer. While gender, family SES and immigrant background are demonstrated to be highly influential on students' CIL, undoubtedly an important factor for understanding and utilising ICT in education, there is an overall lack of studies on how students with diverse backgrounds actually learn from using ICT. This points back to the explanatory potential of studies that were not included in our review sample, meaning studies on teacher practices concerning ICT. For example, Gerick et al. (2017) concluded from ICILS 2018 that "teaching staff characteristics appear to be the most important supporting factor for the use of ICT in teaching" (p. 8). Future research may address and bridge this gap between teaching practices and students with diverse backgrounds when it comes to learning from using ICT.

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6.2. DigiGen research results: Education

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The results of the project's research on ICT in education across five European countries show different strengths, referring to various beneficial aspects and potentials of ICT for teaching and learning, but also vulnerabilities, particularly referring to inequalities on different levels and different ways in which health and well-being are affected. In this context, overlaps and interfaces of the microsystem or domain 'ICT in education' with other microsystems in children's and young people's digital ecosystems are emerging, such as with family life, especially through the COVID-19 distance learning phases, as well as with leisure and civic participation in terms of better understanding and empowerment of digital citizenship. The resulting vulnerabilities and strengths regarding ICT in education and beyond can be located at three levels: the children and young people level, the teacher level and the school level.

Children's and young people's level

Vulnerabilities

Regarding vulnerabilities on the level of children and young people, some children and young people do not have the same access to digital devices as others. Our research also shows that some also indicate that (only) teachers have or use a device such as a laptop in class. Some children and young people, usually those from disadvantaged backgrounds, get left behind or use DT for simple, immediate benefits and do not get to explore the full potential of DT. With respect to access to and availability of software for children and young people in schools, collaboration platforms and learning management systems are the most frequently mentioned. However, it is often stated in our data material that there is basically no access for children and young people to software. Another central vulnerability emerges from children's and young people's reports on technical problems and problems with their concentration and attention. In connection with mental health, well-being and stressors, including social disadvantages while COVID-19, the aspect of tiredness and suffering from anxiety is mentioned. When considering risks arising from ICT use, children and young people see the major danger in internet safety and malware, such as hacker attacks and viruses. Regarding digital responsibility, data protection, lessons regarding online safety and password safety are mentioned under the aspect of privacy and data protection. Moreover, the consideration of the consequences of publishing information online (moral and ethical) is often related to uploading photos. Regarding the aspect of online identity, most children and young people state that cyberbullying is not an actual problem. However, some children and young people feel that there is a danger of being excluded from social groups online. Another aspect is that children and young people perceive differences in teachers' digital skills and their willingness to integrate ICT into teaching and learning, both in primary and secondary schools and across subjects. While there are skilled and supportive teachers, some need support from children and young people. The same goes with the frequency of ICT use in teaching. Challenges in ICT use in distance learning phases arise from problems of connectivity and inequalities between students (e.g. regarding equal treatment and rights). Children and young people expressed a wish for more ICT use in the school context and an improvement in teachers' digital skills.

When considering overlaps between the microsystems of 'ICT in education' and family life, it becomes apparent at the children and young people level that everything starts at home. For example, when parents overuse ICT, it is difficult to expect children and young people to act otherwise. It has also been shown that some parents are unable to help their children with ICT. In addition, children and young people reported the perception that more fathers and fewer mothers support children and young people in acquiring digital skills. Often, children and young people are more competent in ICT than their parents. This was clearly demonstrated during the COVID-19-induced lockdown, in which children and young people were often left to figure things out on their own. Another point is that children and young people have different digital equipment at home. Inequalities in digital capital (devices owned), access to software and

even connectivity among families can affect how well children do in school; a lack of digital equipment is linked to (social) exclusion. Moreover, children and young people experience very different rules and limitations at home about how long and which ICT devices they are allowed to use. Additionally, some parents are against or sceptical towards digital technology, and this can affect children's and young people's digital competence. Some parents are unaware of some of the risks of using technology and are unable to fully support children's and young people's use. Furthermore, many parents do not fully grasp the potential of ICT, rendering technology useless. Moreover, there is an overall huge gap in understanding in some families, many with extremely controlling, authoritative or abusive behaviour and many with no digital competences, including those related to security.

In connection with the microsystem of ICT in leisure, several vulnerabilities become apparent. One point is that children and young people are—according to parents' statements—spending too much time on mobile phones in their free time. In this context, there are concerns about the deterioration of children's and young people's health (e.g. an overuse of ICT can lead to headaches) and fitness through the increasing use of digital devices. Distraction from schoolwork may also occur. In addition, online dangers, such as phishing and fraud, can occur in the leisure domain. Distance learning during lockdowns had a negative impact on the amount and quality of leisure time in most cases. Misunderstandings and tensions among classmates and friends arise in digital communication, particularly in chatting. This can also lead to social exclusion up to and including ghosting. There is also a poor connection between leisure use and the development of creativity. Overall, there are blurry boundaries between free time and school time when working digitally at home (especially during the COVID-19-induced distance-learning phases).

Across the microsystems of education and civic participation, most children and young people have no idea of the important role that DT have in their future, especially for the careers they want to pursue. Also, discussions with teachers and parents are often limited to issues of internet safety and sometimes privacy, but no discussions on possibilities for further participation are reported in our material. In addition, children and young people perceive digital competences and skills as a necessary means for professional development, not as an enhancement of one's civic responsibility.

Strengths

However, when it comes to the beneficial aspects of ICT in education regarding children and young people, especially the potential of internet use is emphasised, which allows for learning more, getting answers beyond schoolbooks and enabling the study of new themes on one's own, fostering autonomy while providing flexibility and increasing motivation to learn. Some children and young people from Germany argue that learning apps, such as Antolin, keep them motivated, even outside school, to continue learning and enjoy using them. Furthermore, teachers from Greece highlighted that ICT use in schools can lead to more playful lessons and more fun, especially in primary schools. Children and young people further benefit from ICT use, as it is easier to communicate with their teachers and classmates, and all the material needed for school to be available online makes it more comfortable for children and young people. In many cases, children and young people no longer have to bring heavy books to the class, which is seen as another great benefit of working with ICT in education. It is also stated that the online world offers help with completing homework, doing research and learning new languages. Writing is easier and faster on a computer or tablet and saves a lot of time while making learning more interesting in general. Some children and young people further highlight that working with ICT in school prepares them for their future careers, as DT play an important role in today's world of labour. In addition, one young person from Romania mentioned that he could imagine using DT to advertise his art as a painter in the future. Teachers also pointed out that ICT can help children and young people develop self-confidence and improve their creativity and collaborative skills. Moreover, children and young people have the opportunity to become creators of digital content.

In connection to the microsystem of the family, some strengths of ICT in education emerge. In many cases, parents and siblings are a source of help and support regarding ICT use and the children and young people gain a lot from learning from their family about using DT at home. For example, internet safety is addressed by some parents, siblings and grandparents

and reflected upon together with the children and young people, which is appreciated since it is not addressed at school. Parents—or at least one of them—in most cases seem to be able to help deal with technical or other issues that arise from using ICT for educational purposes. There is mutual assistance between parents and children and young people, helping each other in enhancing digital skills. Some parents are aware of the informational advantage of ICT and perceive it as an important tool for their children's education. Parents who act as coaches also learn different things. In this way, they can interact with children and young people and spend time together. Moreover, parents provide a foundation in terms of digital responsibility and digital tools that are needed to do schoolwork at home. In addition, parents limit access to certain digital arenas, such as apps, mainly focusing on age limits and the amount of time spent in front of the screen.

Regarding the microsystem of leisure, it can be emphasised that children and young people can learn new digital skills. ICT provides ways to get information (e.g. with news messaging apps). Social media helps children and young people keep in touch and interact daily with peers, especially during COVID-19-induced lockdowns and restrictive measures. Familiarisation with entertainment apps and games sometimes makes it easier for children and young people to deal with the applications and software used for educational purposes. Languages can also be learned in their spare time. Some children and young people reported acquiring social skills and management skills starting with online games, where they had to follow specific rules. In addition, the use of robots and virtual reality can have educational value. Self-learning (e.g. using online tutorials) and hidden learning (e.g. learning via coordinates in online games) can take place. In addition, self-regulation can be strengthened (e.g. setting rules for one's own ICT use), whereby it should be kept in mind that this ability develops differently depending on the age of the children and young people.

Regarding the microsystem of civic participation, many children and young people are knowledgeable when it comes to online behaviour and aware of threats in the online world. They can learn to see the internet as a tool to inform themselves, whether it is in a school-related context or only out of their own interest. In addition, children and young people have a strong foundation in being critical of sources, and schools focus a lot on looking at multiple sources of information, especially if they are not sure whether the information is true or not. Showing video clips helps them get their thoughts on a topic, and then they can develop a greater sense of responsibility.

Teacher level

Vulnerabilities

At the teacher level, different harmful and challenging factors emerge. Among teachers, gaps between individuals, generations or subjects can be identified in understanding and openness to school-related ICT use between individuals, also reported by children and young people among generations and subjects. Beyond attitudes, digital skills and confidence differ between individuals, challenging teaching with and about ICT and thus interfering with the preparation of children and young people for the digital age. In this context, hesitation to use the potential of ICT due to a lack of the necessary know-how, especially in data protection matters, leaves teachers vulnerable in this area and limits their willingness and ability to exploit ICT's full potential in schools.

Furthermore, some teachers have better access to hardware and software than others. While teachers in Estonia and Norway have access to a wide range of digital devices in every class, German teachers mentioned that not only are there some classes that are not yet well equipped but also some schools that lack equipment and particularly lack a stable internet connection. The same findings are also evident in data collected in Romania. In Estonia and Germany, teachers report having access to a laptop outside school across both levels (i.e. before and after children's transition). While the Estonian and Romanian teachers reported that there are cases in which teachers use their own personal laptops for work, especially teaching classes after the transition, the teachers in Germany are provided with staff devices when teaching classes before the transition. Moreover, in Estonia and Norway, the teachers pointed out programmes and apps that had to be purchased first in order to use them. While teachers in Estonia purchased

their own access to software in some cases, teachers in Norway mentioned that their access to digital resources was partially limited by paywalls. However, for the Norwegian teachers, the municipality provided the opportunity to access relevant apps for teaching.

Teachers from Estonia and Norway have the possibility of controlling what students do online (in Estonia, especially before transition, and in Norway after transition), while in Germany, only a few cases report being able to control children's and young people's ICT use at school to a limited extent, while no reports on this emerge from data from Romania. With regard to teachers' evaluation of mental health stressors for themselves, increased stress and additional work for teachers were especially highlighted by teachers across all participating countries. Teachers in Estonia argue that excessive ICT use can decrease the quality of sleep and that headaches, hurting eyes and poor eyesight can be consequences. Teachers in Germany, Estonia and Romania agree that work time has moved into personal time, which leads to additional stress. Teachers in Norway added that it is more difficult to get their students' attention when teaching with digital media because they tend to focus more on devices and apps than on the teacher.

Teachers in Estonia further report that being able to use ICT does not necessarily implicate the level of preparation for the future, going along with reports by teachers in Norway highlighting that the digital future is not known; thus, it is challenging to know how to prepare the younger generation for the digital age. Teachers in Greece argue that after the transition, DT cannot resolve all the issues linked to education. Teachers also felt unprepared regarding the transition phases. Teachers in Germany, Norway and Greece highlighted, for example, the lack of communication between primary and secondary schools when it comes to children and young people's digital competences. Therefore, teachers across all participating countries wish for more support, such as a simple guide with concrete examples of lesson plans integrating ICT or the integration of toolkits as part of teacher training on both levels before and after the transition.

Regarding the microsystem of the family, especially during lockdown phases, it has been shown that teachers were available for parents almost 24/7, which represents a stressor and health issue. Teachers reported difficulties communicating with parents through digital media during the lockdown. Moreover, parents are sometimes not involved in the education of their children and young people, so teachers cannot connect with them and keep them interested in learning.

Regarding the teachers' own microsystem of leisure, blurry boundaries between free time and working time for teachers became apparent. In addition, teachers are concerned about their health when most of their school lessons are based on work with tablets.

Strengths

Perceived and reported as beneficial by most teachers across the five participating countries is that ICT use allows for working with a variety of appealing materials and methods in class. The strengths of ICT are also found in teachers' organisation and classroom management, as (digital) lesson plans and (digital) lesson results can be documented and stored to be easily accessible for the next few years, which can be considered smart and sustainable work. Frequently reported benefits refer to ICT as a time-saving tool for teachers and teaching, provided that the technology is working properly, especially with the internet connection. Furthermore, teachers in all countries reported that ICT allowed them to teach individually and to be more flexible while planning lessons. Teachers in Estonia and Germany also argued that ICT saves many copies and costs for copying material and addressing sustainability. Moreover, teachers in Estonia and Germany highlighted that, especially during the COVID-19 pandemic, ICT allowed for ongoing communication between them and the children and young people while considering disparities between children and young people's individual backgrounds and skills.

Across the microsystems of family and education, it becomes clear that ICT allows for quick communication and good coordination between parents and teachers. In addition, parents addressed concerns with teachers about the use of technology. However, an important point is that the digital competences that children and young people learn at home can complement teachers' teaching.

Across the microsystems of education and civic participation, it emerges that this is highly dependent on teachers (i.e. how they present social problems and social media). This places high responsibility on the teachers, as well as a huge opportunity to support children and young people in this regard.

School level

Vulnerabilities

Not only between teachers but also between schools, differences emerge in terms of ICT equipment and infrastructure; thus, there is no equal opportunity for teachers to teach with and about ICT and hence no equal opportunity for children and young people to work digitally, to learn about ICT and to develop digital skills. Those differences in preparedness appear between individual schools, partly along the lines of school types in the sense of being public or private schools or discrepancies before and after transition levels, which can then pose a challenge for less digitally familiar children and young people to catch up. A lack of systematic, continuous development and support for the acquisition of digital competences among teachers and gaps between strategies and their implementation can be identified as harmful aspects and vulnerabilities in terms of ICT in education. In this context, bureaucratic requirements increase vulnerability, as deprived children and young people have not been equipped with digital devices quickly enough to engage in distance learning, for example, during the COVID-19 pandemic.

Regarding the microsystem of a family, it emerges that parents complain about having to take on the role of coaches in digital skills and feel that the school transfers responsibility almost exclusively to parents. Parents functioning as coaches for their children in a digital life also means that some parents are able to support children and young people, while others are not.

With regard to the microsystem of civic participation, some schools have better access to resources when it comes to preparations for adult life than others, which represents inequality. We have not detected any strong evidence of there being education on digital citizenship and political engagement related to ICT in the schools in our material. Due to the increasing use of social media platforms, awareness of data protection and identity theft in relation to taking and posting pictures of oneself or others is elevated, but it is rarely part of school education.

Strengths

On the school level, data from the participants provide reports on efforts and strategies made to supply a school's ICT infrastructure, particularly in the context of COVID-19-related distance learning (e.g. schools providing tablets for children and young people who do not have devices at home to participate in online classes or follow up during distance learning in general). However, regardless of COVID-19, differences among schools appear in terms of digitally advanced and less advanced schools. 'Less advanced' may here also refer to schools where all teachers and every child and young person are equipped from the school with devices and where ICT is an integral part of daily teaching and learning, fostering inclusivity in ICT.

In general, our findings about strategies at the school district level show that in all countries, there are strategies offered at the school level. It is reported that the teachers from Estonia, Germany and Romania make use of (external) training on ICT, while the teachers in Norway use local expertise. Teachers in Greece reported that in private schools, there is a greater variation of strategies. In all countries, the teachers had different experiences with strategies at the school district level. While the teachers in Estonia emphasised the importance of a community that supports the school, teachers in Norway reported that it was unclear whether there was a national strategy. Moreover, the in-service courses provided by the Norwegian teachers did not seem to be systematic among the teachers. This observation was made in Romania as well, where teachers reported that there was no support received from the state. Only some schools were supported at the city level. In Greece, teachers before transition argue that they are unsatisfied with the help provided by the Ministry of Education, and after transition, it is reported that most help comes from sponsorships and other private or ad hoc initiatives. In Germany, national strategies are mentioned by teachers teaching before and those teaching

after the transition. In addition, there is criticism in terms of implementation; moreover, schools work with companies that support the school with digital devices.

In the microsystem of 'family', it is shown that acquiring digital skills at home is helpful for formal education; good organisation for schools is dedicated to children and young people with special needs. In the microsystem of leisure, the potential of leisure activities for educational purposes, such as online learning games, is unlocked. However, it seems clear from our data that schools are the setting for the first experiences of civic participation or activism. School thus appears to be an environment that can enable participation or activism.

7. Use of digital technology for civic participation

7.1. Scoping review: Civic participation

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Introduction

Young people's political participation and civic engagement in their communities are crucial to their democratic citizenship and help inform policy and development. DT, including the internet, social media and other digital media technologies, have become fundamental in contemporary times for young people's digital citizenship in Europe. Moreover, as Green (2020, p. 6) explained, "society is poised at a tipping point of a global discussion around children's rights, as young people enact these through their use of digital resources." Yet, despite the plethora of ICTs, the literature on children's and adolescents' digital citizenship reveals several conditions and dynamics that influence the scope and scale of young people's civic engagement and political participation in the digital arena.

We conducted a scoping review of 56 studies selected from a database search (see complete description of methods, including criteria for inclusion and exclusion in Chapter 3 in this report) broadly encompassing the democratic citizenship of young people and ICTs. Of these studies, further consideration based on inclusion and exclusion criteria led to a final corpus of 25 studies, which formed the focus of this literature review discussing the positive and negative influences on young people's use of ICTs as democratic citizens. Mainly European studies focusing broadly on civic engagement and political participation are included, where we examine autonomy and vulnerabilities, as it relates to young people's agency (the concepts 'vulnerability' and 'autonomy' relating to this review are also further described in Chapter 3 in this report). Specifically, we look into youth agency in relation to structural factors, such as ICT access, sociodemographic inequalities and institutional concerns (i.e. privacy, surveillance, algorithm design and personal factors, such as news consumption, digital literacy, political interest, peer-to-peer influence, family, age and gender). We also examine the opportunities and vulnerabilities of democratic citizenship emerging from young people's use of ICT. These are explaining factors that influence young people's agency online. The studies examined encompassed both qualitative and quantitative approaches, together with mixed-method studies.

In the following sections, we re-examine the scholarship on democratic citizenship in light of factors that contribute to young people being negatively or positively impacted by their use of ICTs for civic engagement and political participation.

ICT access and agency for young people

Autonomy and self-efficacy are two dynamics critical to how young people experience and participate within their societies, including elements of agency that are facilitated by access to digital media. Research across Europe over the last decade has documented different perspectives on the democratic citizenship of young people. While some scholars argue that young people's political participation has declined (Mascheroni, 2013 Siongers et al., 2019; Sloam, 2014), in more recent years, these theorists argue that digital media technologies appear to offer new channels for young people. Therefore, ICTs broadly depicted in the literature, including mobile phones, social media and the internet, are positioned as providing 'agency' for young people's democratic citizenship. Fonseca (2019) explained that agency involves the competence to take action, the effectiveness of such action, reflexively transformative of the agent's world, a belief in the ability to act and an attitude of participatory and transformative action. In relation to young people's ICT use as democratic citizens, agency involves the "ability to take effective civic action online, the sense of being able to take such potentially transformative action, the

fact of actually taking such action (which I will call participation), and the commitment to doing so" (Fonseca, 2019, p. 335).

Across the most recent studies on democratic citizenship, a strong positive connection is made between the availability and access to ICTs and young people's civic engagement and political participation within their immediate societies (Akom et al., 2016; Boulianne et al., 2020; Burke et al., 2018; Cicognani et al., 2016; Hirzalla & van Zoonen, 2011; Holt et al., 2013; Siongers et al., 2019). The corpus of the studies identifies young people's portrayal of ICTs as creating the agency by serving as platforms of empowerment and self-efficacy, information and as alternative avenues for civic engagement and political participation. Sloam (2014), in their study of young people and the role new media play in protest mobilisation across Europe, argued that social media networks create alternative modes of political participation that tally with the non-institutionalised, horizontal engagement preferences of younger people: "For example, it is much more attractive to sign an online petition, forwarded by a friend, on online 'snooping', than to actively support the broad programme of a top-down organisation like a political party" (Sloam, 2014, p. 218).

In a separate account, Kaskazi and Kitzie (2021) echoed Sloam's (2014) point, explaining that ICTs radically altered the political engagement landscape for young people, given the abundance of different digital media tools, especially smartphones and social media. Fonseca (2019) also argued that the multi-functionality participatory attributes and non-hierarchical and less formal structure of ICTs appeal to young people in their information search, leisure and political engagements. "The ability to do things such as collect and share information, including political posts, images, and entertainment resources, …offer them a sense of freedom, without necessarily being associated with a corresponding feeling of responsibility for their actions" (Fonseca, 2019, p. 356). Within this framework, young people's civic and political participation may not be deliberate but engineered as a natural part of their interactions and experience online.

Furthermore, Cicognani et al. (2016) examined offline and online civic engagement between Italian and migrant youth, which makes a case for how ICTs are making participatory action more expedient, easier and widespread. Another example is presented by Clark et al. (2014 p. 926): "Students too, emphasised the immediacy of social media platforms." Holt et al. (2013) identified the constant use of social media among adolescents as a crucial influence on political participation. Research has also shown how media has become ingrained into young people's everyday lives such that it forms a core part of their activity or operates in the background (Sveningsson, 2014, p. 4). These arguments share a common attribute in their demonstration of how the endemic presence of ICTs and constant exposure to political and social media affect young people's civic and political participation. The greater their access, the greater the consequence of involvement due to the awareness generated through DT. For instance, Holt et al. (2013) found that using social media for political purposes increased the political interest and political participation of young people, who are ultimately more expressive online.

Hoffmann and Lutz (2019) studied digital divides and political participation in Germany and found that ICT use among young people influences political and civic involvement. Adolescents' internet affinity and self-efficacy make them more active participants in the digital space:

> The analysis reveals a strong significant effect of Internet use on online political participation …We find that online and offline political participation are strongly related … There is a positive and significant direct effect of Internet use on offline political participation…Thus, Internet use seems to foster offline political engagement, even after accounting for the creative and social internet uses captured by online political participation. (Hoffmann and Lutz, 2019, p. 18).

One of the practical manifestations of the positive impact of ICT agency on young people's democratic citizenship is that the internet and social media specifically reduce participation inequalities and divides between young people from disadvantaged and marginalised backgrounds and those belonging to stable or well-off groups in society:

> With the emergence of social media, the conceptions of individual agency and of mobi-lizing agency as a basis for mobilisation are in need of modification. We would expect social media to make an impact on both counts. On the individual side, we need to consider

two dimensions – motivation and resources. In particular, social media arguably reduce the impact of resource inequalities on civic and political engagement, since social media offer new and open types of information networks alongside the networks embedded in organised civil society. (Enjolras, 2012: 894).

Herrero-Diz and Ramos-Serrano (2018) examined how young activists use the internet for social well-being. They found that ICTs promoted spontaneous bottom-up movements, which offered young minorities a platform for advocating for activities to better their societies. From this perspective, young people have acquired agency through ICTs to initiate organisations and mobilise action through activism and advocacy. A salient finding was the role that ICTs played in eradicating gendered technology stereotypes in participation. Using multiple cases of global female advocacy, they showed how technology empowers political participation among young girls, particularly on gendered issues and other concerns affecting young people. For instance, specific advocacy includes girls' education themes, while others revolve around social well-being.

> The cases analysed demonstrate that children and adolescents can use technology for denouncing, protesting and addressing their realities, as long as they find the necessary motivation. Furthermore, the individuals in the cited examples, … acted on their own initiative when they detected a problem in their social circle… it is logical that these adolescents would use the same technologies that they normally enjoy for entertainment, that is, social media networks and blogs. Because, even though technology does not generate social change on its own, it is a natural instrument for these young people to use to address their communities. (Herrero-Diz and Ramos-Serrano, 2018 p. 108)

In their study of technology and digital organising in a food revolution in East Oakland, Akon et al. (2016) argued that ICTs encourage participation among socioeconomically underprivileged migrant young people. According to their research, recent developments in mobile mapping, SMS and location-based services have decreased the digital divide over the last decade. For young people, this implies that those from significantly lower socioeconomic backgrounds, such as migrant communities who have settled in host European society, increasingly gain access to digital devices, greatly enhancing their civic and political participation. Compos and Simoes (2014) considered socioeconomically deprived Portuguese Afro-descendant youths and the role of the internet and other DT in driving inclusion and participation. They examined Black rap music as a cultural expression and identity construction for socioeconomically disadvantaged groups. Their study highlighted how ICTs create agency for migrant young people by aiding amateur artistic productions and enhancing the circuit of ethics and cultural expression. In this way, platforms eliminate constraints and enable young people to define their cultural agendas. Moreover, this study contends that access to digital tools helped reverse the cultural devaluation of Black communities by serving as empowerment platforms. However, despite the perceived benefits of DT, digital inequalities in socioeconomic differences exist between districts and groups (Šerek & Machackova, 2014), albeit in varying degrees from one European country to the other. Such differences impact access and consequently serve as limitations for young people from lower socioeconomic backgrounds. Unfortunately, research in this specific area is limited.

News consumption's influence on participation

News and other types of information available and accessible to young people is another dynamic that impacts young people's use of ICT for civic and participatory practices. News consumption is an alternative form of participation in which young people become cognizant of social and political events affecting their communities. The research documents that young people depend on social media to access news about their political surroundings (Swart, 2021; Vizcaíno-Laorga et al., 2019). In doing so, social media creates agency for young people by giving them the power to access information. News consumption among young people is a factor that increases their political interest, self-efficacy and autonomy, and these shape their democratic citizenship (Šerek & Machackova, 2014; Swart, 2021; Vizcaíno-Laorga et al., 2019).

For many young people, social media platforms are the first point of call for a news experience. Young people's perspectives are instructive in this context. In a United Kingdom study exploring digital platforms and the narrative of young people, a young participant argued that "you see things on Twitter before it's even on the news" (Clark et al., 2015, p. 926). Similarly, Swart

(2021) found that young people depend heavily on social media to stay up-to-date. "Some used apps or websites of major news brands, usually a recent habit motivated by the pandemic. However, Instagram, Facebook, Twitter, and WhatsApp formed the most important gateways to news and journalism" (Swart, 2021, p. 4).

Consequently, the effect of young people's exposure to news through social media is demonstrated in a Finnish study considering internet use among adolescents and young adults where "internet use directed towards gaining information is strongly related to both conventional and alternative forms of political participation by strengthening young people's political efficacy, interest and political competences" (Siongers et al., 2019, p. 67). Teenagers and young adults who frequently access information through the internet were more prone to participate in both conventional and alternative forms of political participation. Similarly, online leisure activities, including entertainment and pleasure, are linked to alternative political participation:

> This suggests that even entertainment-oriented use of the internet can be an accelerator for young people to be active in this newer and less institutionalised forms of political participation…the more information-oriented use of internet … influences institutional political participation indirectly by strengthening young people's political efficacy, interest and competences. (Siongers et al., 2019 p. 77).

A Swedish study found that young people felt ICTs were easy to keep abreast of public affairs and that platforms offered fast news updates at a glance of their smartphones (Sveningsson, 2015, p. 5). This is no surprise, given Sweden's embedded ICT infrastructure and development, a characteristic common across Europe. Roughly half of the study sample involving adolescents had a smartphone with installed news media applications from which they access information daily. In particular, and as demonstrated in other studies, "social media, especially Twitter, is held as a very important source of news because of its immediateness" (Sveningsson, 2015, p. 6). Moreover, the use of social media is linked to civic engagement, social capital and political participation (Vizcaíno-Laorga et al., 2019, p. 557). The quotes below are particularly telling of young people's views about ICTs:

> I was thinking about news, you know that's something that Twitter's really good at. Like, first you get, like, just a few words and then you go on reading if you don't understand what they mean. So, from there on, because you update it all the time, or more often than they do at the DN4 app anyway, so you get the news quite fast that way. (Sveningsson, 2015 p. 6).

For another participant, "But things that happen right now, that's where Twitter is just great" (Sveningsson, 2015, p. 6).

While news consumption influences political awareness, interest and participation, and social media provides a gateway to news, two critical factors could limit young people's experience as democratic citizens: algorithmic design of social media and information overload. For the latter, young people have to navigate through the challenges of "having to select from the large amount of information circulating on Twitter is also shown as a problem for less active users" (Vizcaíno-Laorga et al. 2019, p. 561) but also a large amount of news and information circulating on online platforms. As Vizcaíno-Laorga et al. (2019) explained, young people, although digitally savvy, do not tend to be critical or activists in social networks, at least for the majority. News on social media could overburden young people and discourage their interests or expose them to wrong choices.

Technology exerts agentic powers, and with regard to algorithmic literacy, algorithmic systems shape user experience in social and online media spaces. Because of young people's online dependence, media organisations are exploring platforms and adapting to the changing phenomenon to encourage young people to participate more in news consumption and sustain their interests (Swart, 2021, p. 1). However, the mediating influence of algorithmic systems, although beneficial for curating news and influencing how young people develop an understanding of their society, can also produce a negative effect. Specifically, Swart (2021) argued that algorithmic systems considerably limit users' agency. Recommender algorithms can help limit information overload and support users in finding relevant news stories in today's

vast stream of information. However, these structures limit user agency by nature, making automated decisions about what information to display and filter out. Young people also link algorithms to censorship, given that the design automatically excludes certain content, and in doing so, young people miss out on other content:

> Tom (22): "I always find those Stories so odd. It always starts with something else. For instance, when my cousin or friends post, I very often won't see it."

> Interviewer: "Why don't you see what your friends post, you think?"

> Tom (22): "I have absolutely no idea. [. . .] It's very occasionally [that they post], they're not active on social media. [. . .] But I think I follow about 800 people. Even if only half of them posts a Story, I'm missing out on a lot." (Swart, 2021, p. 2)

Algorithmic design customises the platform experience for young people by tailoring content based on their online behaviours and, in doing so, aids their interests as democratic citizens. However, a negative consequence is that the same system can limit young people's experiences. Only certain news is tailored, and usually, young people are overloaded with biased content. As deducible from Tom in the excerpt above, peer-to-peer influence, which is an essential driver of participation, is also limited by algorithmic systems, with the exclusion of other information. Peer-to-peer impact is critical in that "students are influenced by and, in turn, themselves influence the content that circulates within their online social networks, without necessarily understanding their actions in civic terms" (Fonseca, 2019, p. 364). By their nature, ICTs provide a medium in which adolescents can enthusiastically imitate and dispense "content of interest to them and their peers; they are acting as opinion-makers and reinforcing messages" (Fonseca, 2019, p. 364). These actions all contribute to enhancing the democratic citizenship of young people using DT.

Authoritative and institutional sources are a factor relied on by some young people to limit the impact of algorithm curated bias since they have to make informed choices between numerous information sources available online and offline. Therefore, access to authoritative and institutional sources is critical for their digital literacy, political interest and dutiful citizenship endeavours. As Macheroni (2017) found, in Italy and the United Kingdom, young people rely on authoritative and institutional sources for information and media consumption, with high trust in such content. A quotation from a girl (Simone, aged 24):

> Facebook . . . yes, it's an important source of information, but there's everything there, you can find both the most illuminating comment from the public intellectual and the most idiot thing from some weird guy. So you need to discriminate. . . With newspapers you are not required to do so. They do it for you. Newspapers tell you, "This is a journalist, so it's worth reading. (Mascheroni, 2017, p. 4637).

Peer-to-peer influence, family, age and gender

The support systems available to adolescents and children are another dynamic that influences young people's ICT use as democratic citizens. Psychosocial influences include the support of family members, teachers and members of society in general, as well as peer-to-peer support and social networks (Harrero-Diz & Ramos Sarrano 2018, p. 108). Cicognani et al. (2016), in their study of online and offline civic engagement intentions of migrant youths in Italy, made a solid link to proximal factors, including family, peers-to-peer influence, school and the broader environment. Other influences include distal macro contextual factors, such as the country's political, cultural and economic climate and demographic characteristics, including age, gender, socioeconomic factors and psychological and psychosocial factors, which could range from attitude, self-efficacy and social norms (Cicognani et al., 2016, p. 283). Crucially, these dynamics provide a double-edged sword effect, on the one hand, serving to provide agency for adolescents and children to acquire the competence and confidence to participate as democratic citizens where the facilities are available and, on the other hand, serving as constraints when absent or challenged. For instance, in terms of gender, they found the following:

> Intentions of offline civic engagement are stronger among females in the majority and Moroccan group than among males. Among Italians such differences are coherent with explanations in terms of gender stereotypes on male and female roles in participation

(the opportunities offered for participating are still gendered: e.g., political engagement is higher among males and civic engagement among females...). Among Moroccans, the explanation might be found in the more critical position of female adolescents, caught between parents' expectations of adhering to traditional religious norms and their active attempt to adopt more Western traditions as regards lifestyles and behaviours. (Cigonani et al., 2016, p. 296).

Cicognani et al. (2016) found that peers provide a source of normative influence on civic engagement in both online and offline spaces in the dominant majority. For ethnic minorities, "the uninfluential role of peers for migrant youth suggests that, within social contexts that limit access to formal citizenship (and, thus, perceived as discriminatory), engagement may not be experienced as a collective endeavour (e.g., to make claims for themselves as a group)" (Cicognani et al., 2016, p. 295). Finally, the apparent impact of engagement on social change produces agency for young people's active digital citizenship. The efficacy of political participation enhanced the youth's intentions to engage with ICTs as democratic citizens across distinct communities. "For these youths, past engagement experience is a concrete sign of increased perceived efficacy and confidence in one's ability to engage in different forms of civic actions" (Cicognani et al., 2016, p. 295).

Furthermore, research shows that young people from an early age develop activist cultures from social media platforms and connect to activist feeds that inform their experiences. Social media provides a platform for young girls to connect to their peers locally and internationally, engaging and drawing on the experiences of others within their networks. A direct link is made between peer-to-peer influence and the increased self-efficacy of young people—in this case, girls involved in activism. For instance, with regards to #CropTopDay, there was a protest against gendered stereotypes who target teenage girls: "Marlo learned about the hashtag via her Twitter network and was eager to 'spread the message' that the policing of girls' bodies through dress codes is unjust" (Keller, 2019, p. 1). The hashtag is a classic example of the effect of peer-to-peer influence on participation for a hashtag that was first used by a young person in Toronto and inspired a global movement.

In their study examining the role of cognitive dispositions in mediating online political participation in Germany, Hoffmann and Lutz (2019) identified social media self-efficacy and privacy concerns as crucial factors that can impact young people's use of ICTs as democratic citizens. While social media and ICTs have been demonstrated as empowerment tools that provide access, empower self-expression and facilitate collective action among young people, privacy concerns, in particular, fears of being targeted (surveillance) due to internet vulnerabilities to profiling and harassment and trolls (Fonseca, 2019; Keller, 2019), age, education and gender (Hoffmann and Lutz, 2019) contribute to distinguishing how young people calculate their intentions, capacity and willingness to exercise their civic and political involvement. The visibility that comes with online platforms can be exploited by dominant players to the disadvantage of young people. The knowledge of the exploitative potential of ICTs, targeted by targeting family, peers-to-peer conflict and other institutions, creates hesitancy and negatively impacts the platforms' autonomy, agency and democratic potential among young people. Therefore, the social environment and institutional context are essential drivers of the democratic citizenship of young people (Hoffmann & Lutz, 2019, p. 14). The quote below is particularly telling:

> One student, Su, says, "We were told to kills ourselves actually. . . a group of boys attacked us and they all got their mates involved. And it actually got quite nasty and it was quite unpleasant." The girls reported that this comment, from a group of boys they did not know, was particularly "threatening" and "hurtful" and made several of the girls question the usefulness of Twitter as a tool to educate and engage people outside of their feminist communities, a goal that several girls mentioned. (Hoffmann and Lutz, 2019, p. 6)

> Many of the British teens reported that they would "definitely not" use Facebook to share a personal experience of sexism. Interestingly, girls were very attuned to, as 'Jos' puts it, "the repercussions of putting [your encounter with sexism] on a Facebook page and having people reply." (Hoffmann and Lutz, 2019, p. 6, 7).

Therefore, trust in institutions and organisations is crucial for young people's participation, particularly within institutional contexts, as in the case of schools. Clark et al. (2015) found

that a lack of trust in staff among students emerged as a concern. Regarding students' online activity, while staff demonstrated concerns about the criticality of students' comments expressed on platforms, more importantly, students showed apprehension about the penalties of staff surveillance of their actions online (Clarks et al., 2015, p. 927). For instance, one student in their study argued, "I wouldn't add a teacher. If they got like a Twitter thing or if they had a Facebook and they added me, I wouldn't accept them because they could see all my own stuff I get up to." (Clark et al., 2015, p. 927). These limitations disturb young people's overall confidence, self-efficacy and digital engagement, particularly within institutional settings where learning should inform the opposite, encouraging digital competencies and engagement.

In their comparative study of the United Kingdom and Finland, Reinikainen et al. (2020) identified organisational listening as a dynamic with positive and negative consequences for young people's democratic participation. On the one hand, a decline in trust in institutions, social media organisations and the government can represent a disadvantage for digitally active young people's participation (Reinikainen et al., 2020, p. 187), with implications for low self-efficacy and confidence. On the other hand, increasing trust has a positive impact on participation. They found that "organisational listening is connected to higher levels of perceived benefits from social media as well as higher levels of trust in the information that brands, public authorities and non-governmental organisations share on social media" (Reinikainen et al., 2020, p. 185). Furthermore, increased listening to young people's advocacy and interaction online builds their self-efficacy and confidence in both civic and political participation due to the realisation of the potential attainment of their goals. The results highlight the connections between organisational listening and trust, with higher levels of online participation and engagement.

It is noteworthy that the internet and DT also offer young people the agency to combat associated challenges. For instance, "girls not only turn to Twitter to avoid contact with particular antifeminist family members or friends on their Facebook, but also as a way to network with other feminist girls outside of their local communities" (Keller, 2019, p. 5). Furthermore, Keller (2019) asserted that due to young people's technical know-how of social media, they exhibit a strong understanding of the different platforms they use daily. The result is that "they make conscious decisions about what to post and where, weighing issues like public visibility, peer support, anonymity, and social privacy before uploading content" (Keller, 2019, p. 9). This is a particular benefit for young people involved in activism and other forms of collective action. This discourse also highlights the importance of digital literacy as a positive influence.

Digital literacy and inequalities in digital literacy

Digital literacy or deficits thereof have positive or downside implications for young people's use of ICTs as democratic citizens. For lack of digital media literacy, previous research has demonstrated that shortfalls in young people's understanding of civic engagement, political participation and their roles affect their capacities to effectively participate as democratic citizens, especially in their use of ICTs (Clark et al., 2015; Fonseca, 2019; Mascheroni, 2017). Besides SES and political interest, studies have shown that inequalities in online political participation may emerge due to disparities in digital literacy (Mascheroni, 2017, p. 4632). The inability to discern the core tenants of activities related to participation and pitfalls in young people's technical and cognitive skills could impair the efficacy of political participation and socialisation in online spaces. For instance, digital literacy is crucial for news consumption, a core aspect of contemporary civic and political engagement but also a predictor of political interest and participation. However, for news consumption, being critical and able to discern information online is crucial for self-efficacy. However, these skills are inadequate for young people, as demonstrated in some studies (Swart, 2021: Clark et al., 2015). According to this interpretation, young people belonging to marginalised groups are most disadvantaged in expressive forms of democratic citizenship.

Within institutional settings, young people also demonstrate ambivalence about the mediation of technologies by respective authorities since the scope of DT in institutional settings is determined by the staff and managers in the institution. Staff are used to traditional working methods, including learning platforms, desktop or networked computers and controlled Wi-Fi access. However, students recognise mobile technologies for their ease of use and access to

information (Clark et al., 2015, p. 926). The uncertainties generated by the heavily structured institutional access to DT create limitations for young people by restricting them to particular technologies and specific skillsets. However, the literature also shows how young people are increasingly subverting and bypassing institutional restrictions (proto-agency) through their coded uses of personal mobile technologies within such settings.

> In this moot area, the constraining features of the college's regulatory system were revealed and a contested space for mutual dialogue identified: a digitally enhanced communication space between staff, students and institution can be a 'danger zone' of potentially inappropriate behaviour in an 'open' and 'public' arena. (Clark et al., 2015, p. 926).

Still, regarding digital literacy, Mascheroni (2017) stated that educational inequalities in participation manifest in young people's vocabularies of citizenship. Essentially, "the broader the vocabulary of citizenship, the wider the repertoires of civic and political practices one can access. However, vocabularies are unequally distributed" (Mascheroni, 2017, p. 4631).

> Those in their 20s … lament their lack of the civic skills and literacies that are required to meaningfully engage with the political discourse. Teenagers' feeling of exclusion, instead, is grounded in their narrow understanding of participation… For different reasons, then, both teenagers and young people share a sense of political inefficacy for not being heard, and feel ill-equipped to vote. (Mascheroni, 2017, p. 4641).

From the above statement, deficits in digital skills and the feeling of not being heard by respective authorities are seen as negative factors in using ICTs as democratic citizens. Nonetheless, as Fonseca (2019) explained, whether intentionally or not, young people's reproduction of audio-visual media content in virtual spaces is still linked to political life. ICTs, to a certain degree, help eliminate the barriers associated with participation by providing a level playing ground for young people's agency, whether deliberately or not.

Similarly, there are other, perhaps more inconspicuous, constraints to digital literacy, especially regarding how students construe digital communication opportunities for diverse civic and political participation forms. Varying understandings of the benefits of DT, besides leisure, are crucial for young people's use of platforms, as this will lead to extensive involvement. As a teaching staff member pointed out in Clarks et al.'s (2015) study, some students only perceive DT in terms of their 'chat' functions literarily. "They think of it in terms of making arrangements on a social level but they don't quite see maybe how those same kinds of arrangements can be made for another purpose, how you can garner an audience for another purpose" (Clarks et al., 2015, p. 927). This demonstrates the negative impact of deficiencies in literacy. According to Clark et al. (2015), a heavily structured and tightly timetabled institutional context is a crucial challenge.

Mediating role of ICTs and sociodemographic stratification

The mediating role of ICT spaces and sociodemographic stratification has positive and negative consequences. Access to digital media platforms is mediated by controls enforced by technology companies, government and other relevant authorities working with children and young people. Typical examples are manifested through controls such as filters used by schools on the internet, restrictions on mobile phone use in schools (Clark et al., 2015, p. 926) and similar restrictions by parents at home and other organisations. These types of mediations can, despite the intentions to protect young people against online harm, also hurt their experience by potentially limiting their overall self-efficacy, confidence and competence, thereby curtailing the democratic potentials of such platforms. Clark et al. (2015) elaborated on the negative consequences, stating that mobile phones were previously perceived as communication tools rather than learning technologies within a school environment in which digital education occurs. As such, the institutional setting viewed young people's use of such technologies as a potential distraction. It remains a general normative parental and policy dilemma, one that hasn't been dealt with adequately by relevant authorities across Europe.

> Those staff who were aware of mobile phones' potential to support more continuous and flexible learning felt unable to build on such opportunities due to the existing college policy on students' mobile phone use. Overall, new and emerging technology platforms

initially remained heavily constrained by institutional digital policies around curricular needs, safeguarding students and legal, ethical and privacy concerns. (Clark et al., 2015, p. 926).

Similarly, education is a factor. In Siongers et al.'s (2019) study, young people's educational background and attainment emerged as crucial determinants of both forms of political participation (conventional and alternative). For example, adolescents with higher academic accomplishments or whose parents had higher education tended to participate more as democratic citizens in the digital space and in real life. According to them, "Adolescents who are enrolled in general education or have finished their secondary education in a general track participate more than their peers who are enrolled in or have finished their secondary education in the technical or vocational track" (Sionger et al., 2019, p. 76). Here, we see how educational stratification can affect participation among young people with links to well-off and less well-to-do backgrounds. Technically, inequalities in society are also reflected in the digital arena, disadvantaging marginalised groups.

Similarly, age emerged as a factor in people's use of ICTs as democratic citizens. The disparities in young people's skills and access from children and adolescents to young adults play a role. These different stages impact young people's understanding and appreciation of ICTs and the political issues that affect them. This also has consequences for political self-efficacy, confidence and participation using digital tools. "There are …some differences concerning the effects of age and life stage. While alternative political participation is not related to age, the view one holds regarding conventional political participation is. When young people grow up, they become more convinced of the importance of institutional politics" (Sionger et al., 2019, p. 76). At this stage, they take an interest in ICTs offering a window of opportunity and level playing ground (Fonseca 2019) for young people, especially those excluded from mainstream media, due to economic and sociodemographic factors (Enjolras et al., 2012; Hoffman & Lutz, 2019; Keating & Melis, 2017).

Political interest

Keating and Melis (2017) examined Britain's youth social media political engagement. They found that political interest is a crucial driver of young people's online political engagement. Social media provides a window of opportunity for young people's voices and expressive culture to thrive. Keating and Melis (2017) tested the hypothesis that adolescents with greater political interest are often more likely to use ICTs for political purposes, including civic engagement. ICTs are mainly instrumental tools, while existing political interests drive young people's democratic citizenship. According to them, "what distinguishes Non-Engagers from Responders and High Engagers is their level of political interest (or lack thereof)" (Keating & Melis, 2017, p. 889).

Similarly, Mascheroni (2017), in a comparative study of Italy and the United Kingdom, also found that young people's behaviour as democratic citizens online is tied to their political interests. Although young people's understanding of dutiful citizenship varies, a personal sense of duty is not necessary for participation; it is influenced by personal interest and the realisation of issues that directly affect them (Mascheroni, 2017, p. 4635). Personal interest in itself is a product of several factors. First, young people view access to ICTs as a gateway to information that enthuses political interest. Second, the exposure availed of by access also leads to experience. More specifically, successful experiences from previous civic and political engagements (formal and informal) further stimulate political interest. These experiences provided already well-equipped young individuals with further civic competences and forms of cultural and social capital that reinforced their central position in the political field. Sarah said, "You can change things so easily in the students' union . . . so having the power to actually really influence things is a privilege" (Macheroni, 2017, p. 4651).

> For example, at the age of 19, Marco was part of the campaign staff of a party leader during the 2013 national elections and acquired the civic and digital skills that enabled him to produce and share political content on social media, and moderate heated political discussions. Alternatively, because of his prior involvement in the students' movement and the particular party he belongs to, Alberto has developed critical media literacies that are usually distinctive of "radical antagonists". (Macheroni, 2017, p. 4637)

Similarly, Mascheroni (2017) found that young people's information practices are connected to their dispositions about national politics.

> They rely on a limited number of mainstream media sources, prefer the short-news format, and delve deeper only in the news they are more interested in, such as local news or issues that affect young people, like mental health and bullying' (Mascheroni, 2017, p. 4641).

Political interest and the use of ICTs can be negatively affected by the complexities and vulnerabilities associated with online platforms. For instance, while admitting the benefits of social media for groups and disseminating information, some of the young people in Mascheroni's (2017, p. 4637) study recognised the profit-making nature of online platforms and the challenging consequences of political exploitation as a disadvantage. Essentially, young people are exposed to both real and fake information circulating online, the discernment of which is conditioned on individual media and digital literacy. Moreover, online harm also creates vulnerabilities that threaten the democratic potential of ICTs, discouraging participation.

Sociodemographic stratification of ICTs

Besides political interest, as theorised above, sociodemographic dynamics, including age, education level, gender and economic status, have been demonstrated to create both positive and negative effects on young people's ICT use as democratic citizens. These dynamics serve as predictors of ICT use among diverse groups of young people. For instance, in terms of age dynamics, a positive impact is that ICTs eliminate the access and one-sidedness barriers associated with traditional mainstream media, which disadvantage younger people. Enjolras et al. (2012), in their study of social media and the mobilisation of offline participation in Norway, argue that those mobilised through social networks have lower SES and belong to a younger age compared to those galvanised by civil society organisations. According to them, "social media, therefore, seems to offer a channel that supplements established political and civil society organisations, by reaching different and less privileged groups" (Enjolras et al., 2012, p. 904). Underprivileged young people from lower economic classes and migrant communities will have access to affordable technologies. The inclusivity of such digital platforms across Europe increases civic and democratic participation. Therefore, age is a "predictor of being an internet user, and once this is taken into account, young people are no more or less likely to engage in online political activities than older internet users" (Enjolras et al., 2012, p. 880).

However, when economic status and education are considered, ICT uses duplicate offline inequalities for political engagement among young people (Enjolras et al., 2012, p. 880). What this means is that marginalised groups with lower economic status and those with lower education, especially within migrant populations, will still be excluded from the use of ICTs for participation due to their socioeconomic situations and limitations, more so depicting adolescents as a uniform cohort following civic ideals risks obfuscating the variances between young people and the unrelenting social and digital inequalities in their civic and political participation (Mascheroni, 2017, p. 4631).

> Indeed, social inequalities account for differences among disengaged and engaged young people in terms of political skills and citizenship orientations …and for their unequal voices in society. Whereas actualising forms of engagement appear to reduce inequalities of participation based on age and gender, they tend to increase inequalities based on education and socioeconomic status… (Mascheroni, 2017, p. 4631)

Social inequalities also affect the digital literacy and participation of young people. As Mascheroni (2017) pointed out, such disparities are apparent in young people's vocabularies of citizenship. Essentially, the wider the vocabulary of citizenship, the broader the repertoires of the democratic participation practices of young people. Vocabularies in relation to educational attainment are disproportionately dispersed, leading to an unfair participation advantage for youths with broader access to education (Mascheroni, 2017, p. 4631).

Navigating vulnerabilities in mediated platforms

An important consideration for young people using ICTs for activism includes issues of privacy, surveillance and incivilities common in offline spaces. Young people's agentic power and self-efficacy in online spaces are threatened when they feel platforms are regulated or their liberty to express their thoughts will be censored by institutions, organisations, government or family. For instance, "Teenage girls *strategically* choose how to engage with feminist politics online, carefully weighing issues like privacy, community, and peer support as determining factors in which platform they choose to engage" (Keller, 2019, p. 1). In their study exploring the platform vernaculars of girls involved in feminist activism, Keller (2019) found that young people's preference for platforms hinged on whether the platforms were umpired or supervised. For example, "Marlo was adamant that Twitter was the best social media platform .... Her characterisation of Facebook as 'conservative,' a platform used by her grandma and 'her parents' generation,' meant that sharing her feminist views on Facebook posed a risk of a family dispute" (Keller, 2019, p. 1). Consequently, the participants in the study felt that Twitter provided freedom and more autonomy and translated to increased agency and self-efficacy for young feminist activists. In another study:

> Another general appreciation is that the use of Facebook (or its lack of use) is linked, precisely, to family contact (which is, as mentioned, related to age). According to participants, Facebook would have become an environment in which family participation (parents, but also uncles or grandparents, for example) would have caused precisely their transfer to other platforms to be out of family reach and be able to express more freely. (Vizcaino-Laorga et al. 2019 p. 561)

The mediating influence of family and the avoidance of conflict is a factor that discourages young people's from participating in their use of platforms. Young people are also critical of surveillance by state and technology companies. Young people expressed concern about their knowledge of being monitored and increased anticipation about drawing the line between giving up data privacy and ease of use (Swart, 2021, p. 6). Algorithmic systems and other applications referenced earlier raise concerns about being exploited and targeted by governmental or corporate organisations. Worries about being watched formed negative feelings, particularly when users did not articulate the processes.

> As Joeri (19) said, "As a user, it's kind of awkward. You think: why does this happen? How do they know this?" Recent privacy scandals around Facebook and uncertainty about what data were being collected had fostered skepticism toward personalised news apps or websites For example, while Marit (16) said she would like news apps to be tailor-made to her preferences, she immediately added data privacy concerns as a condition: "You know, as long as they don't eavesdrop on you via your microphone." (Swart, 2021, p. 6)

Research gaps

Young people use DT and social media more than any other age group. However, research on the democratic citizenship of young people as it relates to ICT use for civic engagement and political participation is still limited and is a developing subject across Europe, particularly within the last decade. With endemic developments and ongoing innovations in DT, policy and interventions, research is needed to bridge the knowledge gap that could further boost young people's participation. Across the studies examined, very few approached the subject from a cross-comparative angle, with most studies involving single-case studies. Nonetheless, there are still too few studies addressing young people's digital citizenship. In terms of specificities, research examining themes including digital literacy, the dynamics influencing (positive/negative) marginalised groups, such as LGBTQ+ groups, and migrant young people's active engagement are underexplored in the literature. In addition, more theory-guided research is needed to examine various explanatory dynamics for different classes and groups of young people. Finally, more research is required to explore how ICTs can encourage citizenship, responsibility, equality and a level playing ground, including barriers and challenges for young people in the EU.

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7.2. DigiGen research results: Civic participation

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Led by the University of Leicester, the study of DT in relation to civic participation aims to assess the online political behaviour of young people, accounting for socioeconomic and gender considerations. We also look into young people's motivations and the ways in which they use digital content and devices to express political opinions and engage in political actions as they move to work and public life (digital citizens). Overall, we aim:

- To identify the socioeconomic, gendered and political culture-related pathways of young people's engagement in online political life in diverse societies and how this might affect them offline
- To investigate how young people are engaged in different kinds of (digital) networks associated with setting up, explicitly or implicitly, political, social, professional or public profiles as digital citizens
- To explain why and how some young people are politically active in hybrid (online and offline) environments, while others are not, and what forms these activities take
- To critically assess educational systems and the incorporation and promotion of digital citizenship among their priorities

This qualitative comparative study across the three countries (the United Kingdom, Greece and Estonia) uses netnography (Kozinets, 2009). We also collected original data through qualitative interviews with participants involved in the production of online political discourse, followed by digital storytelling workshops (DSWs) with young people involved in the production of online political discourse, focusing on how they were affected by the online environment of choice. Please see Karatzogianni, Tiidenberg, and Parsanoglou (2022) and Chapter 3 for an in-depth description of the data and methods.

Netnographic Study

In the first phase of the data collection in the three countries, we focused on dominant strands of civic participation, which include online movements mobilising for racial, social and environmental justice. In Greece, we collected primary data on youth mobilising against gender-based violence and police brutality. In Estonia, we focused on online youth activism regarding LGBTQ+ and Black Lives Matter (BLM), while we focused on anti-racist civic participation BLM and environmental civic participation Extinction Rebellion (XR and XR Youth) in the United Kingdom. In the latter case, we also interviewed older participants to find out how they were mentoring the youth in these organisations and their own experiences of adolescent political education and ICT use development.

In Estonia, speaking out for the marginalised is seen as a matter of responsibility and the only way forward to a better society, leading to other people becoming more informed and changing their minds. Reasons for political engagement are linked to the personal experience of discrimination that informs a person's capacity for empathy, as well as cultural discourses surrounding social justice. In Greece, there is mistrust of political parties and governmental organisations, and there is interest in doing some things, not to change the world, but first to change everyday life. Activation and politicisation are triggered by personal experiences linked to the ways in which (multiple) gender identities are treated in a specific social context but also in society at large. In the United Kingdom, there is adoption of new and more effective approaches to environmental activism, anger about police brutality and fight for equal rights because of widespread inequality: "people relying on handouts to feed their children in a rich country".

The following table provides a summarised view of the countries, cases and the comparison that we shall engage with below.

Table 7.1: Comparing young people's participation in the three countries (Karatzogianni et al., 2021)

Estonia			
Estonia LGBTQ+ BLM General	• Speaking out for the marginalised as a matter of responsibility and an only way forward to a better society • Leading to other people becoming more informed and changing their minds • Linked to personal experience of discrimination that informs a person's capacity for empathy, as well as cultural discourses surrounding social justice	• Facebook, Instagram, Twitter, YouTube, Reddit, VKontakte and TikTok • Not preoccupied with questions of surveillance and took no extra steps to protect themselves • International (English speaking) accounts were much better for informational purposes than local Estonian ones, that were often accused of being ill informed, narrow minded, even racist and homophobic	**Compared with Greece and UK** **Differences** • Speaking out for the marginalized. • Less worried about issues of privacy and surveillance **Similarities** • Linked to personal experience of discrimination and injustice. • Some use of similar platforms
Greece Anti-police violence Anti-gender violence General	• Mistrust of political parties and organisations • Interest to do some things, not to change the world, but first to change our everyday life • Activation and politicisation are triggered by personal experiences linked to the ways (multiple) gender are treated in a specific social context but also in society at large	• Facebook, Instagram, YouTubeMessaging apps, as well as video conferencing platforms • Reluctance, distrust and criticism towards platforms and apps – preference for open source • A means of (counter) information diffusion and less as a meaningful space where political strategies can be deployed	**Compared with Estonia and UK** **Differences** • More distrust to political parties and commercial platforms. • ICT less a space for organisation and strategy **Similarities** • Politicisation is triggered by personal experiences. • Some use of similar platforms
United Kingdom XR local, national, global BLM Leicester General	• Adopting new and more effective approach to environmental activism • Anger about police brutality and fight for equal rights • Inequality: people relying on handouts to feed their children in a rich country	• Innovation in organization and communication in XR (holocracy model, carbon neutral cloud, glassfrog, basecamp, mattermost) • BLM Leicester: pre-existing networks supporting very social media savvy young people • Adolescents don't use Facebook but use Twitter and Instagram a lot for their political participation	**Compared with Greece and Estonia** **Differences** • In XR there is organisational and communication innovation. • In BLM there is reliance on pre-existing networks. • There is mentoring for the younger activists **Similarities** • With Estonia: anger about inequality, racial and social injustice • With Greece: distrust of police and government

In terms of organisational and communication aspects, in Estonia, there is use of Facebook, Instagram, Twitter, YouTube, Reddit, VKontakte and Tiktok, with participants not preoccupied with questions of surveillance and taking no extra steps to protect themselves. For these young people, international (English speaking) accounts are seen as much better for informational purposes than local Estonian ones, which are often accused of being ill informed, narrow minded, even racist and homophobic. In Greece, there is use of Facebook, Instagram, YouTube and

messaging apps, as well as video conferencing platforms. Among these young people, there is reluctance, distrust and criticism towards platforms and apps and preference for open-source software. Digital networks are seen more as a means of (counter)information diffusion and less as a meaningful space where political strategies can be deployed. In the United Kingdom, there is innovation in organisation and communication, for example, in XR and XR Youth (holacracy model [see Karatzogianni et al., 2021], carbon neutral cloud, use of glassfrog, basecamp and mattermost), while at BLM (United Kingdom), we see pre-existing networks supporting very social media-savvy young people. Adolescents tend to not use Facebook unless they want to reach parents, but use Twitter and Instagram a lot for their information, coordination and publicisation of political participation.

Youth in Estonia are different from their peers in Greece and the United Kingdom because participants speak out for the marginalised but might not themselves be marginalised and are less worried about issues of privacy and surveillance. Similar to their peers in Greece and the United Kingdom, their civic participation is linked to personal experiences of discrimination and injustice and similarities in the use of commercial platforms. Youth in Greece are different from their peers in Estonia and the United Kingdom, as they have far more distrust of political parties and commercial platforms, and ICT is seen as less of a space for organisation and strategy. A similarity here is that politicisation may be triggered by personal experiences. Youth in the United Kingdom are different from peers in Greece and Estonia in that there is organisational and communication innovation, there is heavy reliance on pre-existing networks, and there is more systematic mentoring for the younger activists. The United Kingdom is similar to Estonia in that there is anger about inequality, racial and social injustice and Greece in terms of a certain level of distrust of police and government.

Overall, we found that participants who are active members of civic society organisations that are robustly organised (decentralised or hierarchical) utilise specialised types of platforms for different activities and are mindful of internet safety and surveillance issues, while those who are members of less organised movements rely on more commercial and general platforms to organise, communicate, coordinate and publicise their activities.

Digital Storytelling Study

This section presents the key findings from the second phase of co-researching with 12 young people between the ages of 15–18, using the technique of DSWs conducted between September 2021 and January 2022 in Estonia, Greece and the United Kingdom. The aim was to compare the visual and discursive content produced by the participants and their interactions on the topic of what inspires and challenges their civic participation when they use DT.

In Estonia, the participants who self-identified as activists had a much clearer vision from the start of what they wanted to focus their stories on, while the youth who were interested in politics and considered activism important tended to stick more strictly to the two suggested themes of inspirations or motivators vs. challenges. A participant who was involved in an LGBTQ+ organisation talked about her inner need to do something about the inequalities in the world using images that were either photographs taken by the participant or illustrations from the organisation's Facebook page. In contrast, the stories from the other young people were less coherent narratives and more presentations of things that made them want to be politically active and things that deter them from doing so or made political engagement challenging. This is because during the workshop, what the participants wished to explore during the session was left completely open. The overarching rhetoric was that of positioning political participation as very important, even morally imperative, then confessing to not being as active as one would like and offering reasons and justification for what was presented as 'not enough' participation. The participants spoke of the feeling that one has a choice to support local initiatives that one holds dear and to 'speak with' others about important problems, such as climate change. All the non-activist participants listed lack of time as their predominant challenge when it came to political participation, while fear of judgement or politics as such and lack of self-confidence were also mentioned as challenges to their civic participation. Motivation for political participation was also linked to self-improvement: "being knowledgeable of the political situation and feeling as if I am included" and the need to "do something about it". In terms of similarities across activist and non-activist stories, they spoke of the desire for a better world and political participation as something that is edifying. They all talked about DT as enabling their civic participation

and being able to speak up and make their voices heard as motivating; however, one of the participants in their story placed importance on doing so anonymously, preferring to speak up as part of a crowd and not being among the few in the foreground.

In Greece, all participants chose issues that marked Greek society during the last decade—issues that revolved around violence. Three of the participants chose the topic of fascist violence as it was manifested by the neo-Nazi political party Golden Dawn, while one built his story on sexist violence that occurred in the killing of LGBTQ activist Zak Kostopoulos/Zackie Oh by two men and several policemen. In all the stories, the role of mainstream media was discussed in a critical way, while coverage of the facts in social media was also part of each story presented by the participants. The first story focuses on the Golden Dawn trial, which lasted five years. Details were provided through the narrative on the investigation of whether Golden Dawn constituted a criminal organisation and the three specific crimes that members of the organisation were accused of. The second story focuses on one of the crimes of the Golden Dawn: the assassination of Pavlos Fyssas, a rapper with an anti-racist and activist background. The participant insisted on immediate coverage by the mass media, which was significantly slow in presenting the assassination as a political assassination and underestimated it by portraying it as a fight around football. The third story focuses on the history of the Golden Dawn since the early 1980s. The participant showed the Neo-Nazi roots of the organisation and its gradual steps towards its consolidation as a parliamentary party in 2012. The fourth story focused on the killing of the gay activist Zak Kostopoulos/Zackie Oh and particularly on the media coverage, together with reactions of the LGBTQ+ community and other citizens who have been protesting against homophobic reactions by sociopolitical and media actors in Greece. These story choices do not seem to follow theoretical or abstract ideological interests, but they seem to be based on extraordinary events that have marked the collective memory of Greek society and of these young people. Their stories reflect on the quality of democracy and its institutions in a society scattered by social and political unrest, where young people grow up encountering severe cases of racist and sexist violence, and their political participation is clearly influenced by the resulting polarised political culture. In this way, their choice of stories tells us not only about what goes on in (youth) culture at a given point in time but also what it really means to be young in a specific national, social and political context. This context is of crucial importance.

In the United Kingdom, the three stories focused on racism, hate speech and police violence. The first story was about the wedding of Megan Merkle and Prince Harry, where the participant narrated how important it was that a person who looked like herself *(as in a Black woman)* would become a princess. She also pointed out examples of racist posts attacking Megan Merkle by a well-known journalist and included in her story a picture depicting the royal offspring as a monkey on social media. In this first story, the participant pointed to comments on social media being made about the royal family and references to how dark the baby would be and she also talked about a later Oprah Winfrey interview with the royal couple. Other participants also reflected on what they saw as widespread racism across society in the United Kingdom and in the media environment. The second story was about the tragic killing of a young person, George Nkencho, in Ireland, the protests after his death, as well as false information circulating about him on social media. The participant identified that event as "the key factor in me speaking about the rights of black people and what really got me engaging within the online community and talking about problems within our community". He also pointed to the false information "spread by people who wanted to justify his killing, which caused me to speak out and speak against all of this information". The third story was about the #EndSARS protests in Nigeria, which triggered the participant's political engagement due to photos of casualties of police brutality on Twitter and Instagram. She also talked about Aisha Yusuf, a co-founder of the BringBackOurGirls movement, as one of the main reasons for inspiration. She pointed out that the event was not visible in the UK media or talked about by the UK government. She also felt that there was misinformation and nevertheless that this event helped her connect to her homeland, as well as other people from the Nigerian diaspora. "I didn't feel that a lot was being done on this side of the world. I felt like a lot of the education of the situation had to be done by myself."

There are clearly common political concerns among the 12 young people who participated in the DSWs. These concerns included political polarisation, violence and securitisation, be it racist (United Kingdom and Greece), gender-related (Greece and Estonia) or emerging environmental consciousness (Estonia). These issues echo the topics discussed during the

previous research phase (see Karatzogianni et al., 2021). The Estonian participants identified challenges, such as time constraints, fear and lack of confidence, focusing more on themselves and their motivations and having their voices heard to improve society in the fight for more justice and against LGBT and racial discrimination, while in Greece and the United Kingdom, they chose to speak about violent events involving structural, institutional racism, gender-based violence and problems relating to media visibility, misinformation and police violence. This is in continuation with findings from the first phase, where Estonian participants are less mistrustful of government and the media establishment in general, in comparison to the Greek participants and participants from the United Kingdom, who perceive that they live in a much more polarised political environment, where misinformation, hate speech and securitisation are more widespread.

Digital Citizenship Study

Demos, a cross-party think tank in the United Kingdom, defines digital citizenship as consisting of "the civil, political and social rights of a citizen in their online activities, their political engagement and action through digital means, and their membership of an online community that is a distinct source of identity" (Reynolds & Scott, 2016, p. 19). The report explained that digital citizenship comprises the effective informed engagement of people within their local or digital environment on public issues in an educational context. Their definition encompasses both young people, children and adults. Whether political or civic, engagement appears to be a core element of digital citizenship. The use of digital citizenship as a thematic concept is closely associated with the work and intervention of non-governmental organisations and other third-party organisations working alongside other actors in the education domain.

In the last phase of the DigiGen study of digital technology and civic participation, we critically assessed over 40 policy documents relating to digital citizenship from Estonia, Greece and the United Kingdom (Karatzogianni, Tiidenberg, Parsanoglou, Olabode, & Ostashow, 2022). The analysis was conducted in three countries focusing on the inclusion and promotion of digital citizenship. The focus is on policy documents by government bodies, educational organisations and civil society actors where these are available.

We found that overall, there is a tendency to reduce digital citizenship to technical ICT competencies or, at best, digital competencies that focus primarily on using e-governance and other digital services as part of one's everyday life as a citizen. We recommend a more involved definition of digital citizenship competencies that focus on the use of digital services, the internet, ICT tools and social media as part of not only living one's life as a citizen but also as part of political participation, civic engagement and expression of personal political agency. Ideally, digital citizenship competencies should be more than the sum of their parts (e.g. more than digital competencies plus ICT skills plus media literacy) (Karatzogianni, Tiidenberg, Parsanoglou, Olabode, & Ostashow, 2022).

Concluding Remarks

First, what is common in Estonia, Greece and the United Kingdom is that young people are angry about issues surrounding inequality and injustices of various forms: racial, social and environmental. Therefore, politically active young people are engaged due to specific grievances within the *specific structural conditions* of their countries. However, we see that these issues are not specific to national political cultures, and there is transmutation that is of a global nature. For instance, Estonian youth are following the global trend of BLM because the issue relates to the situation of ethnic Russians in their own country.

Second, we have seen that if there is good *digital governance*, young people feel safer in digital citizenship (Estonia), and if the government is unstable and there are exceptional events (Greek crisis, Brexit), they have less trust in politics and experience far more polarisation.

Third, when there is less *digital development*, we see that digital networks are seen as having less space for coordination, organisation and protest and that there is more emphasis on physical participation (Greece). By contrast, when there is more digital development, we have more innovation (Xtinction Rebellion in the United Kingdom) and more jump-scaling of youth into global concerns (BLM in Estonia).

In conclusion, the political cultures influenced (from local to global) and the context structural conditions created, as well as triggering events, are all motivating factors for the children and youth we co-researched with, observed and interviewed. However, digital governance and the level of digital development in the national context may also significantly influence the level of participation, as more advanced digital governance regimes create more trust and safety, while more advanced digital development means more innovation in organisation, communication and mobilisation and more jump-scaling of this empowerment through ICT for civic participation.

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Part III

Integration and synthetisation
of literature and empirical research
results, policy recommendations

8. Synthesis: Towards a new understanding of children's and young people's use of digital technologies

This chapter brings together insights from the literature reviews and the empirical research results across the DigiGen project that have been presented separately in Chapters 4-7: Family; Leisure; Education and Civic Participation. We have presented these four domains of children's and young people's use of digital technology in their everyday life as microsystems in the conceptual model for DigiGen, derived from the seminal work of Bronfenbrenner (1977; 1979) and modified to a networked display of such microsystems by Neal and Neal (2013). This has inspired our illustration of the conceptual model as in Figure 8.1 (also presented in Chapter 1).
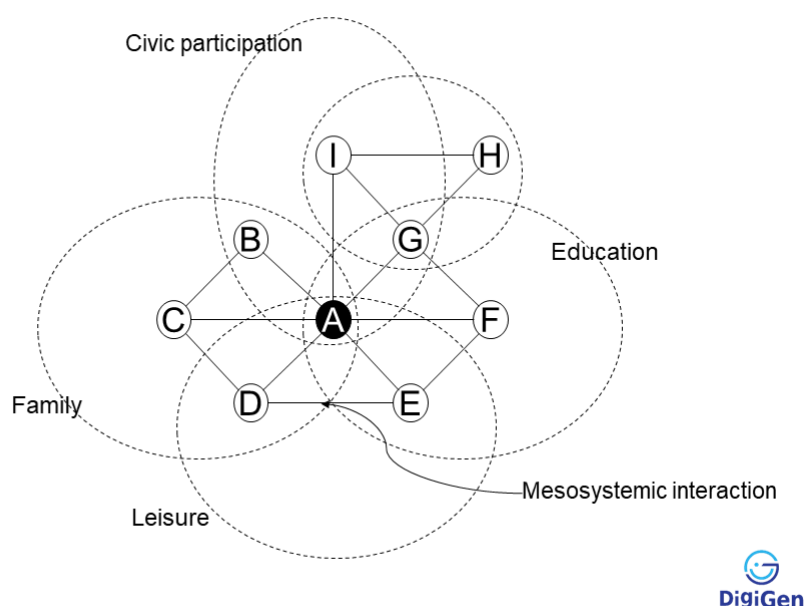

Figure 8.1. (same as Figure 1.3). Conceptual model for DigiGen displaying four microsystems where children's and young people's use of digital technology takes place

The starting point of the following synthesis is the overarching research question for DigiGen: *Why do some children and young people benefit from using digital technology while others seem to be impacted negatively?* Answers to this question will necessarily have to be complex, and we believe they are best understood in layers of understanding built from the following operational analytical questions:

1. What is meaningful use of digital technology within and across the microsystems?

2. What is the role of digital technology for social relationships within and across the microsystems?

3. What are the enabling or problematic aspects of digital technology within the different microsystems?

Whereas the above questions 1-2 adhere to the perspective of social shaping of (digital) technology (Baym, 2010), question 3 incorporates the dimension of digital divides (Helsper, 2021; van Dijk, 2020; Paus-Hasebrink et al., 2014) and of the conceptualisations of vulnerability, resilience and autonomy (Lotz, 2016), presented in Chapter 1. In the following, we present answers to the analytical questions 1-3 for each microsystem in the DigiGen project

8.1. Integration of literature and DigiGen research results: Family

Author: Olaf Kapella

Meaningful use of digital technology in the family

Technology is quickly becoming a part of our daily lives, and technological progress is rapidly transforming the everyday lives of children and their families. This is even more true for digital technology (DT) in recent decades. ICT has also entered the family sphere and other systems in which children and young people live and are raised (e.g. educational and care institutions). Nowadays, families and individuals are constantly surrounded by (digital) technologies and continuously interact with them. They, therefore, can be described as mediatised, and, particularly for children, digital technology has become a central part of their own and their families' everyday lives. ICT has penetrated families in various ways, for example, how they spend their free time as individuals and/or as a family in the organisation of households and family life, in the area of education or further personal training and in the reconciliation of work and family and regarding communication processes within the family. In general, our data and the literature reviewed for the domain 'Family' in this report confirm that children and young people today live in media-rich households with access to various devices and that ICT is part of children's everyday lives.

As our research and the scoping review show, the most available and accessible digital devices for children and young people are smartphones, tablets, smart TV sets, video game consoles (e.g. PlayStation, Xbox, Nintendo Switch), smart speakers, laptops and desktop computers. Children and young people use ICT primarily to play games, consume video and audio content, seek all kinds of information, communicate and assist parents in everyday family lives. In the literature, for example, video games are described as sources of family interaction and are suggested to be one of children's and young people's means of deploying power within the family context, as they are utilised as a source of family socialisation or withdrawal from it. A shared interest in games also seems to assist in bonding and cooperation among siblings. Moreover, the literature and our empirical data show that ICT provides opportunities for learning and socialisation, self-disclosure and safe identity experimentation. Our empirical data confirm the high importance of ICT in the daily production of family and relationships at different levels.

Empirical data from DigiGen further show that the use of ICT by children **aged 5 to 6 years** is strongly related to other family members. Data and studies with children in this age group are rare, so the DigiGen data are quite unique in this regard. Regardless of whether kindergarten children have their own digital devices, the data of all countries reveals that they are familiar with many terms, technologies and functionalities of different devices. Even if they might not fully understand its use, meaning or functionality, they are fascinated by the digital world and interested in it. Children of this age group gain large parts of their knowledge predominantly by watching other family members using devices, talking with other family members about the devices and functionalities and borrowing and being allowed to use others' devices. Generally, ICTs are widely integrated into children's daily lives at the **ages of 8 to 10 years**. They are used to using ICTs, which makes life without ICTs almost unthinkable for them. For children in this age group, it is common to have a device of their own. Furthermore, there is a clear difference between the knowledge and use of digital technology and whether or not a child owns a device. If children have their own devices, their access is limited to a lesser degree, and their knowledge is based on their own practical experiences and less through observing others. Their digital activities are increasingly focused on educational purposes, for example, searching the internet for specific information, gaining new knowledge and, of course, obtaining education at school. Compared to kindergarten children, the knowledge about ICT of 8- to 10-year-old children seems to be much more based on real experiences and is thus more important for them to share. They have increased skills regarding ICT and more detailed knowledge, and compared to kindergarten children, primary school children start to question the rules and the ways in which ICTs are integrated into daily family life and are involved in the co-creation of rules. **Children in secondary school and young people** also use ICTs to be politically and socially active, shaping and building up their own ideology and interests and being able to connect with specific communities they are interested in. The scoping review shows that adolescents

living in households with high parental warmth and authoritative and authoritarian parenting styles when it comes to the use of the internet had lower levels of, for example, online game dependency. Similar findings were found with regard to the balance of emotional warmth and protection, which was deemed the strongest protective factor in terms of excessive internet use. In contrast, other risk factors, such as the lower SES of the family and increased time spent at home, were seen as minimal.

As our empirical data and the scoping review show further, the perspective on ICT of children and young people is markedly shaped by parents' assessment and the family context but also by their peers' attitudes and their interactions with friends. Their access to and use of ICTs highly depends on the rules in their families, even though in some families, there are no strict rules and they can use ICTs independently and whenever they like. In the literature, there seems to be strong evidence of the influence of family relationships on young people's internet use or internet addiction. Several studies have investigated how parents' mental health and parents' ability to connect to their children affect children's internet use. In the field of extensive internet use amongst children and young adolescents, the scoping review reveals that a communicative climate within the family seems to work protectively. Inconsistent parenting, inter-parental conflicts and lack of parental control seem to negatively affect internet use, while warm and close relations combined with an authoritative parenting style seem to regulate internet use in beneficial ways. Socioeconomic background, different disabilities, children with few friends and fear of isolation in real life seem to contribute to a higher risk of extensive internet use. Interparental conflicts increase the risk of internet addiction by weakening the parent–adolescent attachment pathway.

Parents are also affected by ICT on a wide spectrum, as the scoping review and empirical data reveal. On the one hand, parents use ICTs for individual purposes (e.g. for music, for fitness, for home office, to stay in contact with friends and family members and to find recipes for cooking), and on the other hand, parents make use of ICTs to mediate and control children's and young people's online activities as well as to reproduce family and family relations in several dimensions (e.g. managing balance in the family; see more under the aspect of doing family). As our empirical data reveal, several roles regarding DT are relegated to parents and children. Parents, for example, function as role models, guides and supervisors of online activities, home teachers and filters of content that should not reach the child. Children also have the role of teachers or instructors for DT in the family: they help to shape the digital competences of other family members across generations, and they have the role of companion and playmate and controller of use of DT and activities of siblings but also of parents and other family members. The literature points out that parents are seen as important role models through their own use of digital technology. For example, that preschool children think their parents spend too much time on the internet at home, and that they use the internet mainly for entertainment. In addition, the literature shows that the attachment of adolescents to parents has a significant effect on adolescents' internet use. When adolescents live in households with high parental warmth, authoritative and authoritarian parenting styles correlate with lower levels of youth's online game dependency.

As the DigiGen data and scoping review reveal, depending on the context, parental monitoring acts as a mediator variable between online risks and active or restrictive mediation strategies and functions in different ways depending on the mediation strategies. Our empirical data further show that parents put different mediation styles into practices to regulate the use and integration of ICTs in daily family life, from very precise and clear rules (e.g. limiting screen time, limiting access to certain digital areas and regulation of the content) to other mediation styles, which focus less on rules. Rules sometimes do not exist at all or are rather vague and changeable. In these families, parents often decide on the individual child or the individual situation, very much based on the needs of different family members. Parents are challenged by the mediation of ICTs in the family, and parental mediation is often limited to screen-time issues. This is also shown in the scoping review, where it seems there is a rich body and focus on screen time issues and the danger of internet addictions. Other topics and parental mediation styles have been less researched. In our data and in the literature, it is clear that children cited parental rules as an important factor in limiting screen time.

The body of research and DigiGen data point in the direction of the great importance of parental involvement in the lives of young children and adolescents. The research also indicates a need

for digital competence amongst parents and areas where they can acquire such knowledge. It also seems important to develop areas where parents and children can discuss the balance between monitoring and respecting their children's right to privacy. There also appears to be a lack of knowledge about how and why parental style and contextual factors interact in creating negative or positive impacts on children's use of ICTs.

The role of digital technology for social relationships in the family

To understand the effect of ICTs on families and on interactions between different family members and in the family system, we applied the socioconstructivist and praxeological concepts of the doing family approach. There is comprehensive evidence in our DigiGen data and the scoping review that ICT contributes to 'doing family' in several dimensions; for example, experiencing ICT actively together can shape family identity and create a feeling of we-ness, and the co-use of ICT can also serve as a springboard for conversations regarding (sensitive) topics and can also strengthen children's and young people's resilience. ICT supports the building up and maintaining of 'we-ness' and family identity, especially to maintain communication. The management of balance within the family and its members is also supported by ICT, for example, in balancing various emotions and conflicts and in managing a balance between different attitudes and views. With our empirical data from DigiGen, we could also show that care as a multidimensional concept and as a central function of 'doing family' is supported by ICT in the sense of caring about, caring for, care-giving and care-receiving, as well as caring with. ICT supports the family care aspect, for example, by obtaining and maintaining digital and media competences and supporting others' well-being, staying in contact and connected with each other, contributing to a feeling of security and being cared for and supporting the deconstruction of care in terms of a physical co-presence. These aspects become especially true for transnational families or for families with members who are not co-present.

In particular, the scoping review points out potential positive effects of ICT for a diversity of different groups of families, children and adolescents, for example, in making, maintaining and building upon family relationships by more possibilities, as our empirical data also shows. However, aspects such as the number and quality of connections established through social networking can become a much-needed social lubricant in adolescence. Research on children in foster care has shown that young people are not passive recipients of their familial and friendship networks and do not deem their interactions through social media as 'contact'. Instead, these young people perceived these networks more as 'staying in touch', allowing them to control the 'who, how and when' of their relationships. Young people and families that belong, for example, to a sexual minority can link up and network, share experiences with other people belonging to this minority group and, by that, further develop individual or family identity. Online support groups for adolescence may be particularly suited to the psychological needs of young people who self-harm and experience suicidal crises compared to face-to-face help. The DigiGen data also show that family and ICT serve as political socialisers for individuals but also for families.

Enabling or problematic aspects of digital technology in the family context

In addition to all the benefits, ICT, of course, holds a range of potential risks and harmful experiences. In particular, the scoping review provides a great overview of the range of potential risks, such as exposure to harmful or sexual content and material, addictive behaviour, loneliness, antisocial online behaviour, FOMO and cyberbullying. Some studies also focus on vulnerable groups of children and young people, for example, studies that examine how children with some types of disability are vulnerable. Specific challenges in the digital era emerge for parenting children with intellectual disabilities when their children seek participation in online communities. According to parents, these young people encounter barriers due to their lack of reading skills, and they have difficulties generalising from one situation to another, so they might need support every time they enter, for example, an official website.

The scoping review clearly shows that extensive internet use and internet addiction is a well-researched topic. Globally, there is a relatively high focus on research investigating the

relationship between parental mediation originating from concepts like internet addiction, extensive internet use or problematic internet use. For example, studies show that in adolescents' lives, parents' and adolescents' mental health, attachment to parents, strong emotional family connections and parental style have an influence on the development of internet and gaming addiction. Optimal parenting (i.e. the balance of emotional warmth and protection) and the adolescent's autonomy lower the risk of excessive internet use. Being supportive as a family and/or parent, parental social support, as well as the social environment have a significant influence on children's digital activities and their life satisfaction overall. To sum up the results of the scoping review, a communicative climate within the family seems to work protectively. Inconsistent parenting, interparental conflicts and lack of parental control seem to negatively affect internet use, while warm and close relations combined with an authoritative parenting style seem to regulate internet use in beneficial ways. Socioeconomic background, different disabilities, children with few friends and fear of isolation in real life seem to contribute to a higher risk of extensive internet use.

In our empirical DigiGen data, we reflected on how ICT use can potentially affect the vulnerability of children and young people in different ways. To grasp the vulnerability of children and families, we employed a conceptualisation that comprises different but partly overlapping types of vulnerabilities, including inherent, situational and pathogenic vulnerabilities (see Chapter 1 for further description of types of vulnerability applied for this project). Vulnerability in DigiGen is not understood as an exceptional or even problematic status of being a child; rather, it is comprehended as a universal, inevitable and enduring aspect of the human condition, as every human being is social and depends on care. On the one hand, ICT can contribute to exacerbating children's vulnerability or the emergence of new vulnerabilities. This might occur when, for example, children lack digital competences, parents are overprotecting, children act as the main instructors and mediators on ICT in the family, children are exposed to specific content or digital experiences or if a child is excluded by other family members from their digital activities. On the other hand, children's use of ICT can also help to reduce children's vulnerability. This occurs when, for example, ICT contributes to the feeling of solidarity within the family, as ICT enables one to stay in contact and care for one another (e.g. through a shared device) or when ICT has a positive impact on health and well-being when digital competences function as a resilience-enhancing factor. In general, DigiGen data clearly show that children and young people and their families are aware of multiple beneficial and harmful effects of ICT in diverse areas, such as effects on health, social effects and effects for their family, effects on emotions, safety aspects and effects, educational effects and effects on the development of children and young people.

8.2. Integration of literature and DigiGen research results: Leisure

Author: Dimitris Parsanoglou

Meaningful use of digital technology for leisure

The definition of meaningful ICT use seems to be one of the most controversial issues, both in the literature and in our findings. Particularly when it comes to leisure activities, such as gaming or content consumption for ludicrous purposes, perspectives among different actors seem to diverge significantly. As reported by children and young people, most often they do not share similar perspectives either on the types of activities that can be considered useful or creative or on the adequate distribution of time between specific (learning and leisure) activities. Parents and teachers do not seem to be willing to see and accept that ICT use in leisure can have any positive impact on children's and young people's lives and well-being, apart from providing them with the opportunity to relax.

Gaming, for example, is mostly considered by parents as a 'necessary evil', accepted or, more accurately, tolerated as a way of decompressing from pressure imposed from everyday tasks and obligations. For children and young people, however, gaming and, in general, 'screen time' helps to enhance one's digital competences. According to DigiGen participants, online activities, gaming and/or social media content do have a positive impact on practicing and enhancing

their skills in a foreign language (English). Moreover, interesting linguistic innovations take place by combining English and local languages and enriching everyday gaming vocabulary accordingly. To give two illustrative examples, among many others, in Norway, it is very common to use the terms 'jeg leaver and jeg joiner', signifying those who enter or leave the game, while in Greece, the terms 'newbie' and 'pro' have been totally adapted in the everyday gaming language as 'νουμπάς' (noubas) and 'προίλας' (proilas). Apart from language skills, several other competences, including logical thinking, hand-brain coordination skills and the possibility to read and get a better perception of geographical space, are reported.

Another aspect that renders ICT useful in general, and not only from gaming, is the fact that ICT can provide children and young people with the possibility of combining leisure and 'useful' or mandatory activities. In many cases, online platforms of communication are used to do homework together or to help each other with school assignments, while children can still—or after they finish their work—hang out and share their news. In this sense, ludic and useful are combined, challenging well-established preconceptions about what is meaningful and what is less meaningful. This happens in a variety of activities, devices and platforms, where the boundaries between 'useful' and 'necessary' activities can be blurred.

Finally, gaming itself can be perceived as meaningful, and it is used many times as a motivation to meet obligations. There are several cases, particularly at earlier ages, in which parents and children agree on finishing their homework or other tasks in order to deserve playtime.

To sum up, different perspectives on what is considered meaningful or not seem to exist between children or young people and parents and teachers. In addition, despite the fact that ICT use and screen time in general are one of the most basic—if not *the* basic—points of negotiation within families, carrying out substantial dialogue on the content of activities and, more importantly, undertaking common online activities is missing. This is not necessarily because parents are not active in the 'digital world', but mostly because parents' and children's and young people's digital worlds rarely meet each other.

The role of digital technology in social relationships in leisure

As our research has shown, a significant part of ICT use by children and young people is everyday communication with others (Parsanoglou et al., 2022). A great part of everyday communication with friends takes place through digital media, particularly on weekdays. In extraordinary circumstances, such as the COVID-19 pandemic (which is much of the time span of our fieldwork research), online communication proved to be the only way to communicate, providing the possibility of maintaining contact and relationships.

Children and young people communicate with their friends every day through chatting or calling, using Snapchat, messenger, WhatsApp, facetime, Skype, Zoom, Microsoft teams, Apple music, Amazon prime, TikTok, Discord, Pinterest, Instagram, Twitter, Facebook and Reddit. Generally, children and young people reported preferring to chat rather than call or video call.

There are a variety of purposes for communication, ranging from practical to personal reasons. As mentioned above, school-related communication, involving the exchange of information about school or doing homework together, is a very common pattern that is easily approved by parents. Apart from this, social needs, involving arranging meetings or just hanging out or kidding around and staying connected with friends, seem to be of great importance.

Despite the unprecedented possibilities of interactions and the limitless pool of potential acquaintances, children and young people who are active on social media platforms and gaming seem reluctant to meet new people without any prior references. Games and social media are also conceived of as socialisation mechanisms and a way to stay in touch with friends and meet new people. This seems, however, to be determined to a certain degree by self-discipline and reservation. New acquaintances usually occur through common friends and do not necessarily lead to offline encounters.

As far as the ways of interaction with each other are concerned, an additional element that goes beyond mere communication or sharing information on existing content is that of creating and sharing strictly, among friends, their own content, such as memes or funny videos. This

practice adds a nuance of creativity and the active engagement of children and young people, which could open up further discussion and research that combines the forms and content of interactions.

To sum up, DigiGen research is consistent with what research in other settings has highlighted (i.e., the increasing role of ICT in the everyday communication of children and young people). Digital platforms in general and social media platforms in particular are fundamental spaces of interaction among children and young people and shape, to a significant extent, their socialisation patterns. In this sense, ICT and digital spaces constitute basic components of how children's and young people's social lives are structured within and beyond digital spaces.

Enabling or problematic aspects of digital technology in the leisure context

The question of whether ICT use and digital interaction can be enabling or problematic to children and young people lies behind much of the research conducted with this target group. It is also dominant in public discourse and debates around digital literacy, digital competences and potential risks arising from the increasingly significant role of DT. This dichotomic view between positive or enabling and negative or harmful aspects of ICT use seems to be dominant in parents', teachers' and policymakers' concerns.

Children and young people themselves also reflect upon their use of ICT and assess the risks and potential that their use entails. We cannot distinguish to what extent these assessments reflect their own perceptions or to what extent they reproduce parental and/or societal concerns and judgements. However, it can be said with some certainty that children and young people can and do understand ICT use and digital interaction as a (potential) source of empowerment and as a (potential) source of risk.

Addiction or 'overdoing' seems to be one of the concerns that children and young people share among them and—implicitly—with their parents. Therefore, methods of self-discipline are invented (setting a timer, setting some goals in homework completion before gaming, etc.). However, the definition of addiction does not seem to be clear or common in each case. Some acknowledged that they might have overdone in the past, but they could easily reduce their gaming time or quit gaming overall because they got bored.

They also acknowledge, echoing their parents' concerns and remarks, that ICT use might prevent them from doing physical activities, board games and other seemingly less addictive or harmful activities. Here, one can find some hints of links between ICT use and physical and mental health. It is also one of the points mentioned when the impact of the pandemic was discussed (i.e. the violent rupture with offline activities due to the confinement imposed by the lockdowns).

Regarding well-being, it is important to note that almost all participants in the DigiGen research came across in one way or another with some kind of scary material or unwanted contact by strangers. Even children of young age (i.e. 9-years-olds) have mentioned that they had witnessed audio-visual material that made them uncomfortable.

In a similar vein, messages from unknown persons or players in a game that made them uncomfortable or suspicious have been reported. In this sense, socialisation facilitated by video games may present greater risks than other forms of socialisation and communication. For this purpose, some children and young people play from a server of their own or create a closed room on game platforms where no third person can enter.

Another significant problematic aspect of ICT use is that the latter can lead to loneliness or keep children and young people in the virtual space for too long, with potentially harmful effects. Losing contact with people in physical spaces and having difficulties developing social skills are some of the potential harms that excessive digitisation of sociality can generate without neglecting the fact that online behaviours, if not social identities as such, seem to differ from how a person constructs her/his identity and interacts with others in everyday offline circumstances. Examples of inappropriate behaviour or additional aggressivity of some persons while gaming or on social media were reported in comparison to their overall social selves.

The other side of the coin, however, illustrates several forms of enabling practices. Children and young people seem to be able to find ways to protect themselves, especially regarding online safety and privacy. Either convinced by their parents or their schools, where safety and privacy cover a major part of discussions on ICT use and the internet, children and young people seem to be aware of risks and dangers. They are usually cautious about sharing personal information or audio-visual material involving them or even personal opinions on social or political issues.

On the other hand, they develop strategies to deal with unwanted encounters or behaviours online. This becomes possible by setting strict criteria for admission from the beginning (playing on their own server, filtering friend requests in social media, etc.). Moreover, some children and young people set the rules of acceptable behaviour during a game session from the beginning (e.g. no name-calling or aggressive gaming). There have been cases in which incidents of unwanted behaviour were dealt with unanimously by others with the expulsion of the gamer/perpetrator.

Speaking of gaming and coming back to the fear that gaming and ICT use might prevent someone from physical activities, the analysis we conducted with the data from the Children's World database had some interesting findings. According to them, there is no evidence that children who use ICT more intensively spend less time on other activities. For both, time spent relaxing, talking or having fun with their families and seeing their friends, there is a significantly positive association. The more intense the use of new technologies, the more time children spend with their families or seeing friends.

It seems, therefore, that despite widespread concern, ICT use can sometimes help to avoid loneliness. This can be possible, particularly in difficult or challenging circumstances, such as in the COVID-19 pandemic, where ICT and online digital media were the only means of staying in touch with others.

To sum up, from what our research has highlighted, it is quite difficult to reach firm conclusions regarding the impact of ICT use and digital interactions on children and young people. Speaking on behalf, or more accurately, presenting children's and young people's views on the matter, we cannot but admit that ICT use has ambivalent effects on users' social interactions and lives. Sometimes, one can detect even contradictory patterns (e.g. loneliness linked to excessive use vs. ICT as an enabler of socialisation). What can be suggested in a clear and less ambiguous way is that children and young people reflect upon the impact that ICT use has on their lives. Therefore, they should be asked not only to actively participate in relevant discussions at home, at school and in other social settings; they should be asked to set items on the agenda and to formulate new questions or reformulate the old ones regarding the potentially harmful or beneficial aspects of ICT use.

8.3. Integration of literature and DigiGen research results: Education

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Meaningful use of digital technology in education

The scoping review summarises the state of research on how the ongoing digital transformation poses the risk of widening the digital divide in education between children and young people who not only have access to ICT but also seem to enjoy advantageous settings for beneficial ICT use and those who do not. Research across Europe has revealed inequalities between children and young people with regard to ICT in education, primarily closely related to individual (age, gender and disability) and structural (socioeconomic background and ethnic minority) characteristics of children and young people's backgrounds, as summed up in the scoping review, following the typology from Talaee and Noroozi (2019).

The above-mentioned inequalities were further highlighted with the outbreak of the COVID-19 pandemic and the associated increase in ICT use in schools, bringing into focus the relevance of

general educational settings that can promote learning with ICT to strengthen competences and promote beneficial ways of use. While existing research on the above-mentioned inequalities is mainly conducted quantitatively, focusing on children and young people rather than attending higher grades, DigiGen's qualitative research in the microsystem or domain 'ICT in education' address the identified lack of research on younger children and young people in school. The findings provide the perspective of the children and young people themselves, not just as those being researched but also as co-researchers, complemented by the perspectives of teachers and stakeholders relevant to school, contributing to exploring the main conditions contributing to children and young people being either negatively or positively impacted by ICT use in education, considering educational transition phases.

However, what the research on ICT in education in this project points out in particular is the need for a three-level approach (children and young people, teacher and school), which also makes it clear that individual and structural characteristics of children and young people may not be considered separately from school settings but that these school settings should be seen and used as opportunities to overcome potential disparities resulting from individual background characteristics to address the risk of widening educational and digital gaps.

The findings presented as follows are part of the more holistic and extended report by Eickelmann et al. (2022), which shows central findings on the European level across all five participating countries (Estonia, Germany, Greece, Norway and Romania). Findings on ICT integration in education as a social practice provide various ways of meaningful ICT use, following the three-level approach.

Children and young people attributed positive meaning to ICT use, especially with regard to internet research, as they feel more independent and as it can facilitate school work to have direct access to information via the internet. In addition to freedom and independence, the internet also offers children and young people across all five European countries individual support through video tutorials on a wide variety of topics, recommended by teachers or researched by themselves. Thus, the aspect of individual assistance and individualised learning is of great importance when using ICT in education, not only through online tutorials but also using learning apps, revealing strengths and areas to be further developed, including gaming elements for motivation. Nevertheless, not all children and young people can equally benefit from meaningful ICT use, as from the perspective of children and young people, experiences were described of how classmates were more disadvantaged in their use of ICT than others as a result of COVID-19-related online learning formats caused by a lack of their own devices and, above all, a lack of a stable internet connection. In this context, the results in the overlapping areas of ICT in education and family life should also be highlighted. For example, during the COVID-19-induced lockdown and the associated online learning, there was a major relationship between successful learning and family life (e.g. how digitally competent parents and siblings were and how they were able to support the children and young people in their learning).

At the teacher level, motivational aspects of ICT use in teaching and learning are also considered meaningful. Furthermore, wide ranges of teaching material that are easily and flexibly accessible through the internet, as well as ICT as tools to support in teachers' organisation and classroom management, are reported to contribute to teaching and learning quality. Factors such as the pedagogical added value of the use of ICT for which subject and for which children and young people have to be considered, as well as whether the teacher's competences are sufficient to really exploit the potential of ICT in a beneficial way and whether technical requirements are given. The close correlation between socioeconomic background, educational performance and ICT competences among children and young people, which has also been shown in previous research, is also reflected in the research data of the teacher interviews. The teachers reported that those who were familiar with ICT from home were more likely to be able to use it in class than those who did not have any equipment or support at home. However, such disparities were primarily related to COVID-19-induced online learning formats, in which, according to teacher reports, not all children and young people were able to participate equally due to lack of equipment, lack of internet connection or appropriate learning environment at home.

At the school level, requirements have to be established to enable meaningful and pedagogically beneficial use of ICT. In addition to technical equipment, the promotion of teachers' ICT competences is also necessary, aiming to develop digital competences. Our findings still indicate

differences in terms of school's digitalisation level, not only between European countries but also major differences within individual European countries, which was highlighted by the outbreak of the COVID-19 pandemic. The data show different actions taken at the school level to avoid widening educational gaps and to prevent children from being left behind due to their socioeconomic background in terms of their ability to participate in ICT-based learning formats.

Furthermore, referring to all three levels, the meaningful use of ICT revealed in this project's research has the potential for support in the transition phase. It has become apparent that, especially in participating countries where children and young people change educational institutions, there is a lack of coordination between the two school levels. From the child's perspective, for some in one class, it was perceived as a happy coincidence that they were already familiar with the platform used, which in turn made it easier for them to keep up compared to other children and young people.

The results indicate that **the levels should not be considered separately from each other** but as dependent on each other. It is essential for teachers to teach ICT use in a meaningful way, which in turn demands prerequisites and support for teachers at the school level. Once this is given, decisions can be made as to which lessons and for which learners the use of ICT offers added value and when it should or should not be implemented. Currently, however, as the data show, decisions tend to depend on inadequate conditions; thus, the well-being of the learners is not the only focus when it comes to the meaningful integration of ICT.

The role of digital technologies in social relationships in education

In terms of social relationships, ICT use is of great importance in the educational context, not only inside but especially outside school for school-related purposes about homework or learning content. As reported by children and young people in transition phases in five European countries, ICT allows them to network with each other, which accounts for a large proportion of the total use of ICT. Not only are messenger chat groups reported by children and young people engaging whole classes but also open as well as private chats provided on the school's learning management systems and platform serve to exchange information.

Furthermore, children and young people use ICT to get in contact with teachers, asking for help or submitting tasks online. For children and young people, the relationship between digital and social exclusion emerges from reports on being included or excluded in class chats on messengers. This can also lead to social exclusion up to and including ghosting. Moreover, associated with COVID-19-induced online learning platforms, various video conference tools emerged from the data across all five countries as an important way of interacting.

Enabling or problematic aspects of digital technology in education

Deriving from the findings of this project, ICT use and digital interaction can be understood as enabling education, particularly in terms of the following aspects:

1. Prevent gaps in learning by enabling online participation and providing materials online in case of school closures or illnesses.
2. Individualised learning
3. Increasing motivation
4. In terms of personality development, working with ICT in class allows for
   a. Independence,
   b. Flexibility
   c. The possibility of promoting collaborative skills
5. Internet research enabling the assessment of information and individual support (tutorials)
6. Bringing learning and leisure together through learning apps with gamification elements

From the interviews with **children and young people**, several positive and enabling aspects of ICT use but also negative aspects considered challenging or problematic emerged. ICT use is frequently attributed to its potential to motivate children and young people in terms of learning, particularly by referring to learning apps, including gamification elements. ICT, and particularly the use of the internet, is associated with independence as well as increased comfort due to the easily accessible information, which is immediately retrievable.

At the **teacher level**, ICT can also improve the classroom atmosphere and enable teachers to make lessons, especially in primary schools, more playful to increase children's and young people's motivation. Further, teachers report on ICT enabling more individualised learning, as the application can monitor children's and young people's learning progress and point out the areas to be studied further. They can learn at their own pace and level.

In this regard, children and young people who are unable to participate in the classroom can join online while at home. If there are questions or problems, children and young people can communicate more easily and faster with classmates or their teachers. In terms of personality development, children and young people can gain more independence and flexibility, and it promotes collaborative skills, particularly when referring to collaborative online editing tools. In addition to the positive enabling aspects of using ICT in education, challenging and problematic aspects emerged, as follows:

1. Risk of widening educational gaps:

    a. Children and young people from challenging socioeconomic backgrounds often do not have access to devices and software appropriate for schoolwork. In addition, there are inequalities in parents' digital competences and time to support ICT use for learning, both of which are especially important for younger children.

    b. Differences not only in access but also in knowledge or digital competences between children and young people pose challenges to designing teaching and learning with ICT that is equally appropriate for all children and young people. This is particularly important when referring to transition phases where children and young people change schools and no common standards and strategies are provided before transition and no cooperation between both school levels is taking place. This may lead to an interruption in the digital educational biography of children and young people.

2. Risk of excessive use of ICT

3. Risk of well-being (eyesight, concentration and attention might deteriorate)

4. Fake news and inappropriate websites can easily be accessed by children and young people who do not reflect critically

5. Online spaces as potential grounds for cyberbullying

8.4. Integration of literature and DigiGen research results: Civic participation

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Meaningful use of digital technology for civic participation

Across the most recent studies on democratic citizenship identified in our scoping review, a strong positive connection was made between the availability and access to ICTs and young people's civic engagement and political participation within their immediate societies. The corpus of the studies in our scoping review identifies young people's portrayal of ICTs as creating agency by serving as platforms of empowerment, self-efficacy and information and as alternative avenues for civic engagement and political participation.

In our empirical research we uncovered that speaking out for the marginalised is seen as a matter of responsibility and the only way forward to a better society, leading to other people becoming more informed and changing their minds. Reasons for political engagement are linked to the personal experience of discrimination that informs a person's capacity for empathy, as well as cultural discourses surrounding social justice. Our scoping review shows that DT creates agency for young people leading to empowerment and self-efficacy in developing alternative forms for civic engagement and political participation.

We find in our research results and the scoping review that there is mistrust of political parties and governmental organisations, but also in the digital media platforms themselves. Thus, as some of our data and scoping review suggests the mediating algorithmic influence exerted through platforms can be linked to a form of censorship and a closing off of alternative voices and certain content. Yet, for the young people in our research it is still seen as important to doing something, albeit not to change the world, but first to change everyday life.

Technology exerts agentic powers, and with regard to algorithmic literacy, algorithmic systems shape user experience in social and online media spaces. Because of young people's online dependence, media organisations are exploring platforms and adapting to the changing phenomenon to encourage young people to participate more in news consumption and sustain their interests (Swart, 2021, p. 1). However, the mediating influence of algorithmic systems, although beneficial for curating news and influencing how young people develop an understanding of their society, can also produce a negative effect. Young people also link algorithms to censorship, given that the design automatically excludes certain content, and in doing so, young people miss out on other content.

The role of digital technology in social relationships in civic participation

The support systems available to adolescents and children are another dynamic that influences young people's ICT use as democratic citizens. Psychosocial influences include the support of family members, teachers and members of society in general, peer-to-peer support and social networks. Other influences include contextual factors, such as the country's political, cultural and economic climate and demographic characteristics, including age, gender, socioeconomic factors and psychological and psychosocial factors, which could range from attitude, self-efficacy and social norms. Crucially, these dynamics provide a double-edged sword effect, on the one hand, serving to provide agency for adolescents and children to acquire the competence and confidence to participate as democratic citizens where the facilities are available and, on the other hand, serving as constraints where absent or challenged.

While the scoping review points to these challenges and suggests that families have a mediating influence, the avoidance of conflict is a factor for young people that can further discourage their participation. Our research results show that for young people in Estonia this can be a challenge as some of them have discovered they have very different views compared to their parents as result of their digital activism and they appeared to be less worried about issues of privacy and surveillance, but more concerned with avoiding conflicts within their family. Yet, our participants in Greece display far more distrust of political parties and commercial platforms, and DT is seen as less of a space for organisation and strategy. Consequently young people participating in our research from the United Kingdom are different from peers in Greece and Estonia in that there is organisational and communication innovation, there is heavy reliance on pre-existing networks, and there is more systematic mentoring for the younger activists. The scoping review suggests that a lack of digital media literacy is linked to shortfalls in young people's understanding of civic engagement and that such mentoring as we find in the case of the United Kingdom support young people in understanding the core tenants of activities related to participation and in avoiding some of the pitfalls pointed out by the results of our scoping review. Further as our scoping review points out the support systems available such as those found through pre-existing networks and mentoring in the case of the United Kingdom can influence young people's use of DT as active democratic citizens and help to develop their self-efficacy and agency.

Enabling or problematic aspects of digital technology in civic participation

From our empirical results we have seen that DT enables young people's civic participation and provide means for speaking up and make their voices heard. In addition, we have seen that the potential anonymity of digital civic participation may enable young voices to speak up as part of a crowd without being among the few in the foreground.

Digital literacy or deficits thereof have positive or downside implications for young people's use of ICTs as democratic citizens. For lack of digital media literacy, the literature has demonstrated that shortfalls in young people's understanding of civic engagement, political participation and roles affect their capacities to effectively participate as democratic citizens, especially in their use of ICTs. Besides SES and political interest, studies have shown that inequalities in online political participation may emerge due to disparities in digital literacy. The inability to discern the core tenants of activities related to participation and pitfalls in young people's technical and cognitive skills could impair the efficacy of political participation and socialisation in online spaces. For instance, digital literacy is crucial for news consumption, a core aspect of contemporary civic and political engagement, but it is also a predictor of political interest and participation. However, for news consumption, being critical and able to discern information online is crucial for self-efficacy. However, these skills are inadequate among young people, as demonstrated in some of the literature. According to this interpretation, young people belonging to marginalised groups are most disadvantaged in expressive forms of democratic citizenship.

Similarly, age emerged as a factor in people's use of ICTs as democratic citizens. The disparities in young people's skills and access from children and adolescents to young adults play a role. These different stages impact young people's understanding and appreciation of ICTs and the political issues that affect them. This also has consequences for political self-efficacy, confidence and participation using digital tools. At this stage, they take an interest in ICTs offering a window of opportunity and level playing ground for young people, especially those excluded from mainstream media, due to economic and sociodemographic factors.

One of the key studies in our scoping review tested the hypothesis that adolescents with greater political interest are often more likely to use ICTs for political purposes, including civic engagement. ICTs are mainly instrumental tools, while existing political interests drive young people's democratic citizenship.

It might be that such young people see the larger picture whereas our own participants were more interested in having an influence on issues that are closer to their daily lives. Thus, activation and politicisation are triggered by personal experiences linked to the ways in which (multiple) gender identities are treated in a specific social context but also in society at large, this is especially true for our participants from Greece and to some degree Estonia. In the United Kingdom, there is adoption of new and more effective approaches to environmental activism, anger about police brutality and fight for equal rights because of widespread inequality: "people relying on handouts to feed their children in a rich country".

Our scoping review also found that an important consideration for young people using digital technology for activism includes issues of privacy, surveillance and incivilities common in offline spaces. These mediations affect young people's agentic power and self-efficacy in online spaces. The threat is when they feel the platforms they use are regulated or their liberty to express their thoughts will be challenged by institutional, organisational, government or family. The mediating influence of family and the avoidance of conflict is a factor that discourages young people's from participating in their use of platforms. Young people are also critical of surveillance by state and technology companies. Young people expressed concern about their knowledge of being monitored and increasing anticipation of drawing between giving up data privacy and ease of use (Swart, 2021, p. 6). Algorithmic systems and other applications referenced earlier raise concerns about being exploited and targeted by authorities.

In terms of outcomes from integrating the literature from the scoping review and the project's research findings, our results agree with the scoping review as we found that overall, there is a tendency to reduce digital citizenship to technical ICT competencies or, at best, digital competencies that focus primarily on using e-governance and other digital services as part

of one's everyday life as a citizen. We recommend a more involved definition of digital citizenship competencies that focuses on the use of digital services, the internet, ICT tools and social media as part of not only living one's life as a citizen but also as part of political participation, civic engagement and expression of individual and collective political agency of young people.

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9. DigiGen recommendations for review of policy and practice to support children's and young people's agency as digital citizens

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DigiGen is one of the most extensive qualitative research projects ever conducted on the impact of digital transformations on children and youth, known as the "Digital Generation". DigiGen has developed recommendations for policy and practice, acknowledging the need for proper governance distribution to support children in the digital era: through regulation, industry self-regulation, and awareness raising. This chapter highlights the findings of different working papers to articulate for policy and practice what has been observed about children and young people's everyday digital realities. Clearly, the digital generation are agentic digital citizens who can be resilient and responsible participants in the digital civic space if adequately supported and recognised accordingly across their ecosystems: through schools, families, and other civic spaces. This can be done by employing a more holistic approach to digital access and competency, as highlighted in this chapter. Indeed, Europe's digital generation are creating new spaces and exciting opportunities in unexpected ways.

9.1. DigiGen's understanding of digital access

The *European Pillar of Social Rights Action Plan* defines access to digital communications as an essential service in the same sense as nutrition and sanitation (European Commission, 2022). This definition is traditionally used to denote access to internet connectivity and digital devices but there is a shift towards extending this definition to include access to digital services and tools which work for digital citizenship. The European Commission underlines this in the *2030 Digital Compass: the European way for the Digital Decade* where it emphasises that "to be fully empowered, people should first have access to affordable, secure and high-quality connectivity, be able to learn basic digital skills –which should become a right for all- and be equipped with other means which together allow them to fully participate in economic and societal activities of today and the future" (European Commission, 2022, p. 12). Access to the economic and societal activities of our contemporary world is reliant on fostering the digital civic space. This sentiment is reflected in *the draft European Declaration on Digital Rights and Principles for the Digital Decade* which asserts that "Everyone should have access to a trustworthy, diverse, and multilingual online environment. Access to diverse content contributes to a pluralistic public debate and should allow everyone to participate in democracy" (European Commission, 2022, p. 4). This moves digital access beyond just internet connectivity and digital devices to a more holistic conceptualisation including access to platforms that enable individuals to participate in the civic space. DigiGen welcomes this progression since the data highlights how the concept of digital citizenship is often constrained to e-government in national policy documents rather than adopting a more holistic approach encapsulating political participation, civic engagement, and development of political agency (Karatzogianni et al, 2022).

The general policy discourse may be moving towards a more holistic definition of digital access, but it has not fully diffused into key policy frameworks concerning children and young people's digital access. The recently updated *Better Internet for Kids + strategy* asserts that "The COVID-19 pandemic highlighted the benefits of digital technology but also the crucial need for **equal access to technology (devices and network)**, digital skills and competences including media literacy for all children" (European Commission, 2022, p. 1). DigiGen findings show the need for greater clarity about how a more holistic form of access applies to children. Actors across the child's digital ecosystem are struggling to balance children's rights to participate in the digital civic space with their responsibilities to protect the child from potential risks. In

the education domain, children described how their teachers took away their access to class chats which they had been using to exchange with their peers during the COVID-19 lockdowns (Eickelmann et al, 2022). Children and young people also reported witnessing hateful or discriminatory language or behaviour when gaming (Parsanoglou et al, 2022). This highlights the need to ensure that digital spaces are designed in a way that supports children and young people in having as positive experience as possible. Risk can never be fully eliminated but at present DigiGen data shows that this generation is relying on self-made strategies to fill in support gaps left by technology designers. From another angle, research in the family domain shows that parents are under pressure to mitigate their children's ICT use, in particular their screen time (Kapella et al, 2022). For some families, this manifests in restrictive mediation strategies which heavily limit children and young people's access to the digital world. Such strategies lead to negative outcomes for the child and the family, including unnecessary and avoidable conflicts between family members.

DigiGen's approach to developing policy recommendations acknowledges the need for proper governance distribution to support children and young people in the digital era: through regulation, industry self-regulation, and awareness raising. Concerning a holistic approach to digital access, policy makers can ensure that children are not regulated out of the digital civic space by obligations set out in online safety or data protection legislation. As architects of digital spaces, technology companies can ensure that their platforms and services allow for children and young people's meaningful participation and develop features which support parents and teachers in guiding their use of digital technologies. Civil society and educators have a role to play in supporting families in balancing the rights of the child.

9.2. DigiGen's understanding of digital competences

The focus of digital competences has shifted over time from acquiring technical computing skills, to cyber safety, and most contemporarily media literacy (See Selwyn, 2022). The EU reflects this evolution through defining digital competences as "…the confident, critical, and responsible use of, and engagement with, digital technologies for learning, at work, and for participation in society. It includes information and data literacy, communication and collaboration, media literacy, digital content creation (including programming), safety (including digital well-being and competences related to cybersecurity), intellectual property related questions, problem solving and critical thinking" (Council of the European Union, 2018, p. 9). The European Commission applies this definition to children and young people through the *Better Internet for Kids + Strateg*y where it acknowledges that "Digital skills and competences, including digital literacy and an understanding of the use made of personal data, are essential for today's children, allowing them to learn, connect and be active and informed contributors in shaping the world around them" (European Commission, 2022, p. 8). DigiGen findings show how developing children and young people's broader social competences can contribute to supporting their development and agency as digital citizens. For example, research in the family domain explores ICT mediation strategies. DigiGen finds that developing social competences such as negotiation, mediation, problem solving, and communication skills allows families to maximise the benefits of digitalisation and acts as a resilience enhancing factor against potential risks (Kapella et al, 2022). The burden of responsibility for developing social competences should not be placed solely on the child. The DigiGen approach makes clear that the child does not exist in a silo and as a result the development of social digital competences must take place across the child's ecosystems: through their schools, families, leisure time and other civic spaces. This puts a focus on empathy and mutual respect between children and adults to realise the full potential of digitalisation.

9.3. DigiGen policy recommendations

Access

Ensure that all children and young people have access to digital devices, connectivity, and to a digital environment that enables their active participation as digital citizens.

How can EU and national legislators and policy makers implement this recommendation?

Mapping and reducing digital divides

DigiGen findings highlight the extent of Europe's digital divide with many children and young people across Europe unable to access digital devices and internet connectivity. These digital inequalities in access are particularly prominent in low-income families, families experiencing severe material deprivation, and families with low educated parents (Ayllón et al, 2021). Member States should prioritise measures to ensure that children and young people in vulnerable situations have access to digital devices and connectivity as an essential service as laid out in the *European Pillar of Social Rights* when re-evaluating their National Action Plans under the *European Child Guarantee*. DigiGen makes progress in understanding the extents of Europe's digital divides and how social inequalities impact children and young people's digital access, but further support is needed to observe the status quo more concretely to design targeted interventions (in EU and national policies) directed towards those at risk of social exclusion. This can be achieved through expanding digital indicators in key EU statistical databases such as the EU Statistics on Income and Living Conditions (EU-SILC) and in national authorities' United Nations Sustainable Development Goal (SDG) monitoring.

Ensuring children's and young people's rights to participate in the digital environment are approroately balanced with protection obligations

Issues of access are not only linked to children and young people in vulnerable situations. DigiGen unpacks the valuable contribution access to the digital environment can make to the wellbeing and development of all children and young people regarding their family life, education, civic participation, and leisure time. To be able to make the most of these opportunities, regulators must ensure that children and young people's access to the digital environment is not unduly limited when initiating online safety or data protection legislation. Regulators must be supported in balancing children and young people's right to participate even from an early age in the digital environment as active digital citizens with protection obligations under international, EU, and national law.

Across the board, efforts to ensure children and young people's digital access (to devices, connectivity, and to digital spaces which enable their rights to participate in the digital environment) must be supported by learning from and transferring successful measures across Member States.

How can technology industries implement this recommendation?

Digital opportunities for all children, not just those who have access to new/less affordable digital devices

Technology companies offer many opportunities to enhance children and young people's family life, leisure, civic participation, and education through the services and platforms they provide. DigiGen data shows that not all children can reap the rewards of these tools since their schools, or their families, only have access to more affordable or older devices (Eickelmann et al, 2022). To lessen this divide, technology companies should ensure that children and young people can access digital services and platforms across a variety of different devices including more affordable and accessible products.

Creating safe digital spaces which allow children to participate as digital citizens by design

Industry can also ensure that they design services and platforms which allow children and young people to participate actively in the digital civic space. DigiGen welcomes the European Commission's commitment to facilitate an EU Code of Conduct on Age-Appropriate Design which will be co-regulatory with industry (European Commission, 2022). When developing the Code, industry must be careful to not put children in walled environments which may unduly limit their civic participatory rights (freedom of expression, freedom of association, and access to information), something that can occur if these matters are not balanced proportionately. In addition, this initiative should be used as an opportunity for industry to take the lead on their own innovations which support children and young people in developing as digital citizens.

How can awareness raising contribute to this recommendation?

Integrating the voices of the Digital generation

DigiGen puts a spotlight on the realities of hundreds of children and young people across Europe through ascertaining their thoughts and experiences of growing up in the digital era. Our research shows the differences that there can be between adults and children's views of the impacts of technological transformations on our everyday lives. Children and young people may be at the forefront of creating and morphing digital media, but adults hold the keys to ensuring access to the digital environment through resource distribution (devices, connectivity) and platform and service design. Developing and ensuring children and young people's access to the digital environment must be undertaken with due regard to the opinions of children and young people on the matter. For example, at the school level, teachers and school leaders should discuss and decide with students on how digital technologies are integrated into their learning. What kinds of devices, services, and tools work best for their needs and when and how should they be implemented? Integrating students' voices in their use of digital devices for school learning will require support for teachers in facilitating this increased sense of reciprocity or shared responsibility for learning through digital media in the classroom.

Civil society can support families in taking a whole-family approach to digital access through co-creating digital technology mediation strategies. DigiGen research highlights how overly restrictive or overly loose digital technology mediation practices can have negative effects for the child and family's wellbeing (Kapella et al, 2022). It is crucial to foster strong parent-child relationships through discussing together how the family will integrate digital devices and tools into their everyday reality. Giving a space for children and young people's perspectives here is crucial since the research shows that parents often are unaware of their children's digital experiences and how access to digital technologies can contribute to their holistic development. For example, DigiGen data shows that children and young people are gaining social skills, language capacities and other benefits from engaging in gaming which often challenges parents' perceptions of gaming as an activity distracting children from more useful activities (Parsanoglou et al, 2022). By co-creating mediation strategies together, parents will be able to take their children's perspectives into consideration rather than relying on narrow conceptions of what having access to technology entails.

As a whole, efforts to integrate the perspectives of the Digital Generation when discussing issues of digital access help to operationalise Pillar 3 'Active Participation' of the European Commission Better Internet for Kids Strategy (European Commission, 2022).

Competency

Ensure that all children and young people are supported in developing digital competences (digital skills, media literacy and social competences).

How can EU and national legislators and policy makers implement this recommendation?

Support children's and young people's development of digital competences (digital skills, media literacy skills and social competences) across their digital ecosystems

Policymakers must develop education policy which supports the development of children and young people's digital skills, media literacy, and social competences fit for their digital realities and futures. DigiGen highlights the need for these interventions not to be limited to the child only but also to work across the domains of the digital generation's everyday lives and beyond; it is important to achieve joined-up thinking and connect the different spheres of the child's digital ecosystems: from parents, and teachers, to whole school learning and into administrative and political institutions impacting on those spheres. The *EU Digital Education Action Plan* states in Strategic Priority 2 that developing social competences such as communication, collaboration, problem solving, and adaptability are essential for the digital economy (European Commission, 2020). This approach should also be reinforced when supporting families and teachers in their everyday digital realities through informal, non-formal, and formal educational means. Progress has been made to mainstream media literacy across EU and national education and digital policy but the need to ensure solid social competences should not be underestimated.

Recognise children's and young people's agency in developing their own and other's digital competences

It is important to embrace the exciting possibilities of our digital future. We can do this by developing encouraging environments across home and school that allow children and young people to become active and self-directed learners rather than simply recipients of knowledge and training (Eickelmann et al, 2022). This suggestion also recognises the valuable role that children and young people can play in guiding the development of digital competences for older family members or teachers. Children and young people as digital natives may have digital skills that they can pass up to their teachers or family members, but they may have gaps in their ability to understand how to cope with certain social scenarios due to their ongoing social and emotional development. Digitalisation is a transformative process for all members of society and thus it is important for families and school to support each other as a team. This premise of mutual learning should be solidified across education, social, family, and digital policy.

How can technology industries implement this recommendation?

Develop interactive tools to support parents in digital technology mediation that support the development of social digital competences through operationalising co-creation, negotiation and co-activity

Technology companies can create mediation tools which move beyond screentime or application restriction and instead support families in developing social competences for the digital world. For example, solutions which help children and parents negotiate how they integrate digital technologies into family life or allow different generations to engage in a digital activity together such as gaming. DigiGen research shows how stressed parents are about their children's screentime (Kapella et al, 2022). Continuing to focus exclusively on screentime solutions feeds this stress rather than examining what other kinds of mediation tools can positively influence family life. These innovative mediation tools must take into consideration the evolving capacities of the child by offering flexible supports that can grow with the child rather than applying a one-size-fits-all approach to different families' needs.

Offer opportunities to bridge the worlds of school and home, education and play to create positive and inclusive environments for children's and young people's development as digital citizens

DigiGen research highlights how the borders between areas of children and young people's lives are becoming increasingly porous and interconnected in the digital era such as school and home, education, and play. Thereby, digitalisation offers possibilities for a more holistic approach to supporting children and young people's development of digital competences rather than digital as a siloed 'digital skills' box. This presents us with intriguing challenges in terms of connected policy, but the new spaces that are appearing also offer exciting opportunities. By nature, industry offers children and young people, their families, and teachers the ability to merge these aspects of their everyday lives but this can be further developed with the intent to hone social digital competences.

How can awareness raising contribute to this recommendation?

Foster enabling environments for the development of digital competences (digital skills, media literacy and social competences) across children's and young people's digital ecosystems

DigiGen findings highlight the importance of healthy and sustainable relationships between children and young people and those who care for them (teachers, parents, and others) to support them through the ups and downs of a childhood increasingly influenced by technological transformation. These healthy relationships can thereby create enabling environments for the development of social digital competences by promoting a positive attitude to digital skills, competence, and engagement across the child's digital ecosystems. Taking a social approach to the digital allows for digital competences to become more integrated and mainstreamed across the child or young person's life rather than being seen as an isolated set of competences such as digital skills. DigiGen's toolkit embodies this approach by developing conversation cards to bring teachers, parents, youth workers and others into dialogue with the digital realities of the children and young people that they support. Existing family and child support services across all Member States, provided by public and non-profit service providers, can benefit from the new insights of DigiGen research to review their existing approaches to digital education, digital citizenship, media literacy and digital parenting. This is considered central as a means to boost the social competences of children to harness and shape digital transformations as agentic digital citizens.

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