Concept Paper

Conditions Contributing to Positive and Negative Outcomes of Children's ICT Use: Protocol for a Scoping Review

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Abstract: Children and young people are often labelled the "digital generation", naturally equipped with the skills to reap the benefits of digitised education, working life and communication through social media now and in the future. However, this age group's use of information and communication technology (ICT) is not uniform, nor are the outcomes of their adaption to ICT. Shaped by their social environment and socioeconomic conditions, the potential benefits of children's and young people's ICT use may vary greatly, contributing to increased inequalities that exacerbate vulnerability for some while promoting health and well-being for others. This paper presents a protocol for conceptualising, systematically identifying and synthesising the literature on which conditions contribute to children and young people being negatively or positively impacted by their use of ICT. Here, children and young people are seen as social actors in four domains of their everyday lives illustrated through the digital ecosystem: family, leisure, education and civic participation. This protocol's overview of the actors' navigation within and across the different domains and potential for studying the interactions between the different spheres of the ecosystem may advance the understanding of both the risks and benefits facing children and young people in their digital lives.

1. Introduction

The perception of children and young people as a digital generation and the role of information and communication technology (ICT) and digital media in young people's lives have dominated the public discourse to an increasing extent over the past two decades [1–3]. The term "digital generation" is often applied to young people growing up in the digital age and relates to the debates on what it means to be digitally competent [4–6]. Thus, there is a tendency to assume that children born in the digital era will be digital natives by default and will, in turn, possess digital skills and knowledge. As the use of digital technologies, including the internet, is extended to younger children in critical phases of their early development, there is an increasing need for empirical research to expand the knowledge on children's and young people's use and experience of these technologies and to develop an understanding of how ICT impacts their daily lives. In academic research, there has recently been an increasing interest in which emerging ICTs are changing family practices and relations [7], focusing on one central system in which children and young people live. This paper presents a protocol for conceptualising, systematically identifying and synthesising the literature on the conditions that contribute to positive and negative outcomes of children's and young people's use of ICT in four domains of their everyday lives: (1) family, (2) leisure, (3) education and (4) civic participation.

The idea of the digital generation is intertwined with the discourse of risk [8,9], such as those related to well-being and health [10–12] and online safety and security [9,13–15]. Nonetheless, there are also advantages to media culture for children and young people [6,16], such as those related to learning, the development of cognitive skills, awareness of social issues, social interaction, civic participation and entertainment [17]. Strongly related to well-being and health is the concept of resilience, a process by which individuals can positively adapt to substantial difficulties, adversity, hardships or other situations and challenges [18]. In the digital age, resilient outcomes, such as effective self-management or self-regulation, strong relationship skills and developing social awareness, seem to be of growing importance.

2. Children in the Fourth Industrial Revolution

The Fourth Industrial Revolution [19] can be described as the advent of "cyber-physical systems" involving entirely new capabilities for people and machines, here representing new ways in which technology has become embedded within societies and even human bodies [20]. According to the European Commission [21], the Fourth Industrial Revolution can potentially raise global income levels and improve the quality of life of populations around the world.

One of the greatest challenges of the Fourth Industrial Revolution to humans is privacy, here specifically related to the notion of ownership, consumer patterns and how we devote time to developing skills. For instance, the growth of the Internet of things has made it possible to create toys or other household devices that are connected to the internet, so-called smart toys or smart home devices. These devices collect a wide range of data through the use of location-based services, microphones, speech recognition ability and/or digital cameras [22]. Moreover, to operate these devices often requires users to provide an e-mail ID, home address, username, password and even date of birth. Despite growing concern over privacy, parents increasingly invest in such devices [23]. Yet, questions remain about how we can educate parents and families in developing the skills and competencies needed to ensure safety, security and privacy when these devices are being used by various family members, including children. People need skills and competencies (i.e., digital and media literacy, digital citizenship, innovation and creativity, learning skills and socio-emotional competencies and more specific labour-market skills) that will enable them to navigate and live with the ubiquitous technology permeating the fabric of their everyday lives [24,25]. The ability of young people to engage with and use ICT will be critical for their future, both for leisure and work. It is argued that children and young people must not only be adept at using ICT but must also understand the changes brought on by ICT as part of the Fourth Industrial Revolution and be able to build on the digital opportunities it offers [26].

Inequality represents the greatest societal concern associated with the Fourth Industrial Revolution. The evocative term *digital divide* denotes the gap between individuals, households, organisations and geographical areas at different socioeconomic levels regarding both their opportunities to access ICT and their use of the internet for a wide variety of activities [27]. The digital divide involves both access to ICT resources and the patterns of use demonstrated by different individuals and organisations, such as schools. The European Union and well-established scholarship since the 1990s have recognised the inequality and social disadvantages that occur because of a variety of digital divides that have emerged and separated those who have access to and the use of ICTs from those who do not [28–32]. Although the lack of access to ICT was not seen as a cause of social exclusion roughly 20 years ago [33], it is seen as a major cause of social exclusion today. Social exclusion exists when people "do not [or cannot] participate in key activities in society" [34] (p. 11). However, with an average of 98% of European households with children being connected to the internet [35,36], digital divides have moved from access to the question of competencies [37]. Research has shown that these digital divides have emerged in relation to geography, gender, disability, age and socioeconomic status, among others [30].

3. Understanding the Negative and Positive Impacts of ICT on Young People

The aim of the current scoping review was to explore how some children and young people benefit from the use of ICT while others are impacted negatively in terms of well-being, learning and coping. For this, we used a framework on vulnerability and autonomy developed by Lotz [38]. Here, *vulnerability* is seen as an intrinsic, enduring aspect of being human, and thus, universal. Lotz is in line with the understanding of vulnerabilities as a universal, inevitable aspect of the human condition [39–41]. Regardless of age or socioeconomic background, this vulnerability is inextricably linked to every human's dependence on others and the affective social nature of humans. While vulnerability is seen as universal, it is also particular through the recognition that "dependency is the result of universal vulnerability" ([42] (p. 88), meaning that vulnerability is also inherent). Fineman [43] (p. 35) points out that "all of us were dependent as children" and as such, children and young people are seen as vulnerable, but vulnerabilities differ over time [39,44]. This means that children and young people constitute a vulnerable group, as do adults and the elderly, though in different ways [44]. The vulnerability of children and young people can be characterised by the life phase—being dependent for a period of time—of growing up and finding one's own place in the world, where overcoming challenges depends on support from others and human beings depending on care and social contacts. At the same time, young people's need to free themselves from their 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 [38] identifies two additional states 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 the personal, social, economic or environmental conditions in one's life. Here, we find the 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 and family breakdown [45].

The third state of vulnerability described by Lotz [38] is *pathogenic vulnerability*. This state should be understood as compounding the existing vulnerabilities (see above) that 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" [38] (p. 47). Here, we find the risks or threats to well-being and health exemplified in children and young people's use of ICT, such as cyberbullying, internet addiction, relational problems and personal security and safety issues that may coexist and amplify with situational and inherent vulnerability.

According to Lotz [38], vulnerability has often been conceptualised as the opposite of autonomy. *Autonomy* should be understood as "a suite of rational, affective, deliberative and self-interpretative skills and competencies that enable a person to make choices and act in line with their reflectively endorsed beliefs, values, goals, wants and self-identity" [38] (p. 53). However, because humans will always be embedded in social relations and conditions, vulnerability is a constant state and, thus, cannot be totally eliminated. Therefore, Lotz's [38] point is 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 competencies supported by the right kind of social relationships and institutions, thus gaining access to a decent range and quality of options, resources and opportunities. Like vulnerability, autonomy is understood as being socially and intersubjectively constituted, not an individualistic trait. In contrast to vulnerability, we recognise autonomy in the ideas of personal well-being and growth such as friendship, social support, learning, acquisition of skills and knowledge, societal participation and personal development that may follow children 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).

4. Contexts for Children's and Young People's Use of ICT

Ecological systems theory (EST), originally formulated by Bronfenbrenner [46], provides a comprehensive framework for identifying environmental influences on a child's development by situating the child within a system of relationships affected by multiple levels of interactions with the surrounding contexts. Bronfenbrenner [46] has organised the contexts of children's development into four nested environmental systems, with bidirectional influences within and between the systems. Figure 1 gives an overview of the ecological systems described by Bronfenbrenner, with the *microsystem* being closest to the child. A child may be part of several microsystems, such as family and school. Parents and teachers, representing different microsystems, may thus interact through the *mesosystem* in EST, with direct impact on the child. The *exosystem* denotes the indirect impact on a child's development exercised by, for example, the school board or child welfare services. Finally, at the *macrosystem* level, we find the impact that policy, culture and media exercise on the other contexts or ecological systems surrounding a child.
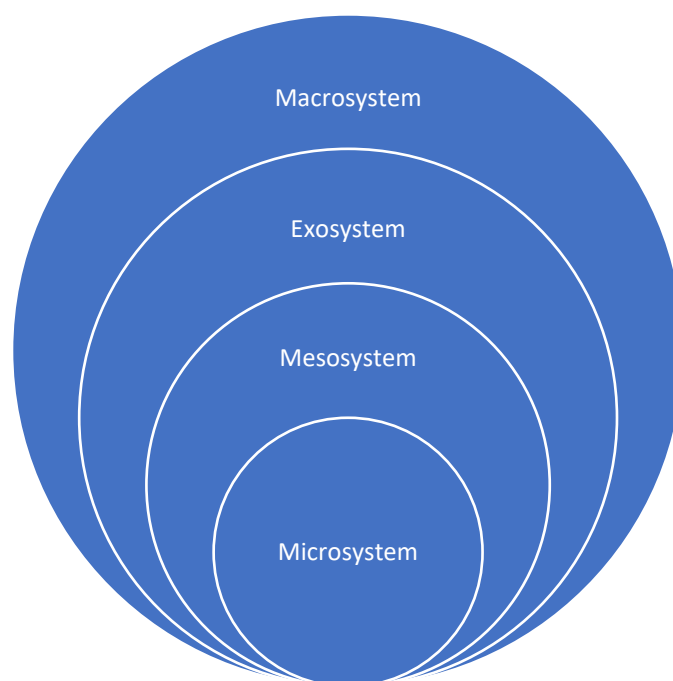

Figure 1. The features of the original ecological systems theory (EST) model formulated by Bronfenbrenner (1979).

Building on the EST formulated by Bronfenbrenner [46], we propose that the contexts surrounding children's and young people's use of ICT may be seen as *digital ecosystems*. In the scoping review described in this protocol, we started at the microsystem level, investigating the literature on children's and young people's use of ICT in four different domains of their everyday life: (1) the family, (2) leisure time, (3) education and (4) civic participation. At the end of this paper, we return to the potential of using the interpretation of EST as digital ecosystems for broader investigations into children's and young people's use of ICT that extend beyond their everyday experiences.

4.1. Family

The home is the primary place where children and young people live, grow up and use personal digital devices. Family is understood as an exclusive solidarity unit—a social–relational structure or network of two or more people—designed for a relatively long duration. Its members share goals and values, have a long-term commitment to one another, take responsibility for each other and often reside in the same household. Family is not only understood in the sense of the nuclear family, consisting of biological parents

and their children but also in the sense of other family forms and living arrangements, such as same-sex parents and significant others, single-parent families, families that come about with the help of reproductive medicine, foster families and multiple parenthood families [47–50].

Moreover, family is understood as a daily practice that shapes family dynamics and the social interactions taking place among family members; this is understood in the concept of "doing family" [51–53]. A range of parents' practices for mediating their children's ICT use is known from previous research, from restrictive and regulating strategies over monitoring to parental advice and co-use [54,55]. Children's use of ICT is often the object of negotiation or conflict and may be handled differently among families with different socioeconomic backgrounds. Parents' mediation strategies are typically the strongest with younger children and then decrease as the children grow older. Yet, research focusing on other types of family forms, such as children in foster care, showed that social interactions vary, and those young people are not passive recipients of their familial and friendship networks and did 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 [56]. However, foster carers or social work practitioners tend to view many of the communication possibilities through for example social media, as a nuisance and as such provide little or no mediating strategies [56]. Further research shows that young people living in foster or residential care can use previously experienced relationships cultivated through online connections as helpful in transitioning beyond care [57].

4.2. Leisure

The literature on online communication in general and on the online communication of children and young people in particular has pointed to the dubious nature of ICTs and their potential impact. On the one hand, these technologies have a growing appeal for children and adolescents and can provide several benefits for personal growth, 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 [58].

Screen time has been among the most frequent measures for investigating the relationship between children's health and well-being and their use of ICT [36]. Along with parental mediation strategies, screen time studies bridge the family and leisure context for children and young people's use of ICT, while correlations have been found between parental mediation styles and acceptance of parental authority [59]. However, this age group's digital practices for entertainment, socialising, communicating, content creation, information seeking and identity construction may exceed the simple notion of "screen time" [60]. Thus, ICT use, as seen within the context of leisure, may also address what children and young people do and experience on their screens, expanding the research on what they gain from it in both positive and negative terms [61,62].

4.3. Education

ICT has been widely expected to improve children's motivation, enhance their learning and facilitate more effective teaching practices [63,64]. However, the connection between learning as a social process and the use of technology is not straightforward, and it is a common finding that the attempts to establish causal relationships between students' use of ICT in the classroom and their learning achievement produce a null effect [65]. This may have to do with a lack of knowledge on how ICT is implemented to help students' learning [66], but also with the factors in students' backgrounds that are known to influence their learning results.

A widely used proxy for learning through ICT in school is measuring ICT competency or students' computer and information literacy (CIL). Tests of students' CIL show that only a minority of students in primary and secondary school score at the highest level [36,37].

A well-established finding has been that girls do better than boys on CIL tests and that students from families with high socioeconomic status have better CIL results than students with low socioeconomic status [67]. On the other hand, studies have found positive results from using computer-assisted technology to teach skills to students with specific learning disabilities [68].

4.4. Civic Participation

ICT and social media transgress the traditional opportunities for communicating, being exposed to media, participating in public debate and forming networks, which holds true for young people as well [69]. The fact that young people, who are the most technologically engaged age group, are the ones who are least civically engaged represents a striking paradox [70]. Instead of looking at participation in mainstream politics, young people's civic participation through new media and digital platforms should be sought regarding how they act on what they perceive as political issues in relation to their everyday lives [71–73] and how this affects their experience of digital citizenship as belonging to both local and global communities [36].

5. Review Question

Using the digital ecosystems model, we conducted a 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?

6. Methods

6.1. Design

The scoping review belongs to the multifaceted family of techniques for systematically searching and assessing literature within a given research field [74]. The idea common to these methodological approaches is to present the research front in a systematic, transparent and replicable manner, though the specific aims of the different review techniques may be more varied. It follows from this incremental development that the definitions of different literature search techniques are not exact and that the empirical use of such techniques demonstrates overlap. Since Grant and Booth [74] published their overview of 14 different literature search approaches in 2009, 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. [75] and Peters et al. [76]:

1. Identification of keywords;
2. Use identified keywords across all databases;
3. Study selection;
4. Extracting and charting results;
5. Synthesis.

6.2. Identification of Keywords

For the initial identification of keywords, researchers are advised to conduct a limited search of relevant databases and extract words from titles and abstracts [75,76]. As a rule of thumb, scoping reviews should have expansive inclusion criteria [77]. This has relevance to the initial phase of setting up the database search for the scoping review, where the idea is to *broaden* the search [75,76]. However, in the current scoping review, we started by extracting relevant keywords first from literature reviews by Ayllón et al. [36] and Lorenz and Kapella [54] and then inserting these keywords into a template. We subsequently asked the researchers in the project team to review and expand the list of keywords for each of the four digital microsystems. The results of this process are comprehensive lists

of keywords both common to the four different contexts and keywords that are specific to those domains.

The keywords were then tested in three to five preliminary searches per domain in four EBSCOhost databases: Academic Search Ultimate, Education Source, ERIC and SocINDEX. The reason for these test searches was to see whether the suggested keywords yielded relevant results. Relevance was assessed by browsing the first 30–50 titles and abstracts produced by the test search, keeping the keywords and phrases that yielded the most significant descriptions and deleting the keywords that showed no significant results. Table 1 presents the keywords resulting from this initial test phase forming the basis for the search strings described in step 2. The keywords in Table 1 also represent our initial inclusion criteria for the current scoping review.

Table 1. Identification of the keywords across four domains of children's and young people's ICT use in their everyday lives.

	All Domains	Family	Leisure	Education	Democratic 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; coparenting; 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.

6.3. Use of Identified Keywords across All Databases

The second step of the literature search is to use all identified keywords across all databases. In the present scoping review, the search was divided into four separate search strings targeted to each of the four domains or digital microsystems in Table 1. Two examples of search strings, for the domains of "Family" and "Democratic participation", are presented in Table 2.

Table 2. Example of search strings: "Family" and "Civic Participation" with Boolean operators.

	Family	Democratic 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 *)	(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 rura l *)	(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 *)

"*" indicates truncation. Truncation means to let the database search for the word with all its possible endings. (https://blogs.qut.edu.au/library/2016/10/03/search-tips-wildcards-truncation-and-boolean-what-do-they-all-mean/) (accessed on 1 September 2022).

The search was conducted on the following databases:
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)

The database search was set up with a time span from 2011 to 2021. For the database search for the domain "Family", which was the first search conducted in this scoping review, we also searched the databases 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, so no additional searches in these databases were added for the other domains. For the domain "Education", an additional database search was set up in Science Direct, as recommended by the project team responsible for this domain in DigiGen. However, Science Direct demands less complex search strings (fewer Boolean operators) than the EBSCOhost, Web of Science and ASSIA databases, making the results less refined.

6.4. Study Selection

Selecting studies from the search results begins with a screening process. The reliability of this process can be strengthened by using two reviewers [76]. In the current review, we facilitated study selection reliability using two reviewers and the web-based review tool Rayyan (https://www.rayyan.ai/) (accessed on 1 September 2022). This application, which can 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). In a tidy and structured manner,

this procedure reveals if the reviewers agree on whether to include or exclude the article in question and where further discussion or even if a third reviewer is necessary to reach an agreement. Colquhoun et al. [75] suggested that reviewers meet at the beginning, at the midpoint and at the final stage of the screening process and refine the search criteria, if needed.

In Rayyan, the two reviewers read the titles, abstracts and keywords of each result from the literature search. They used the specified inclusion/exclusion criteria (see Table 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 because it involved post-hoc inclusion/exclusion criteria based on the specificities of the review question combined with new familiarity from reading about the studies [75].

Table 3. Inclusion/exclusion criteria for all domains, screening stage.

	All Domains	Family	Leisure	Education	Democratic Participation
Inclusion	Children and young people	Age: 0–10	Age: 10–15	Age: 7–16	Age: 16–30 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, studies on parents only	–	Studies on teachers or teacher students	–
	Online tools, interventions or programmes to help parents deal with situations concerning their children or family. Study protocols or reports from testing digital research instruments for research, such as surveys				

6.5. Extracting and Charting Results

The review team for each domain charted the studies that resulted from the screening process by using a spreadsheet in Excel. For this purpose, only a cursory reading of studies in full text is required. The spreadsheet can both give an overview of the research and be used for records on the characteristics of the included studies with key information relevant to the review question. Colquhoun et al. [75] recommended that the data chart be first piloted on five to ten 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 this scoping review in one spreadsheet for each domain:

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, i.e., age, gender, socioeconomic status, ethnic minority status, parents' marital status, disability, having an LGBTQ+ identity, living in foster care, being adopted or homeless and 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 the 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 (see Step 5). Also at this stage, studies may have ended up being excluded, following the iterative rationale of the scoping review [75]. At this stage, we carried out the following:

- 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. [75] and Peters et al. [76] have stated that this phase should include a manual 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 [74], meaning that the comprehensiveness and breadth must be kept in accordance with time and personnel resources [75]. The time and personnel resources of this scoping review demanded that only the literature turning up in the initial database search/screening process (see Step 2) were assessed for inclusion, and no hand search of reference lists of included studies was then conducted.

6.6. Synthesis

"To review" is defined by Grant and Booth as "To view, inspect, or examine a second time or again" [74] (p. 92). The report from the scoping review should include a narrative or descriptive summary of the results that aligns with (a) the objective and (b) the question of the review [69]. This is equal to what Colquhoun et al. [75] called a qualitative content analysis approach to the studies included; these researchers also proposed using an analytical framework to show an 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 and then be in-depth, here with relevance to the review question and objective. The 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 the implications for future research.

The final reporting from a scoping review includes accounting for the number of studies that are (a) *identified* and (b) the number of studies that are *included* through the screening process. It is common to illustrate this process by using a flow chart [76], which has been adapted to this scoping review in Figure 2.

In the review report, the flow chart in Figure 2 should be accompanied by a narrative description of each search decision process [76]. The justification of these decisions is also used to acknowledge and substantiate the limitations in the review results [75].
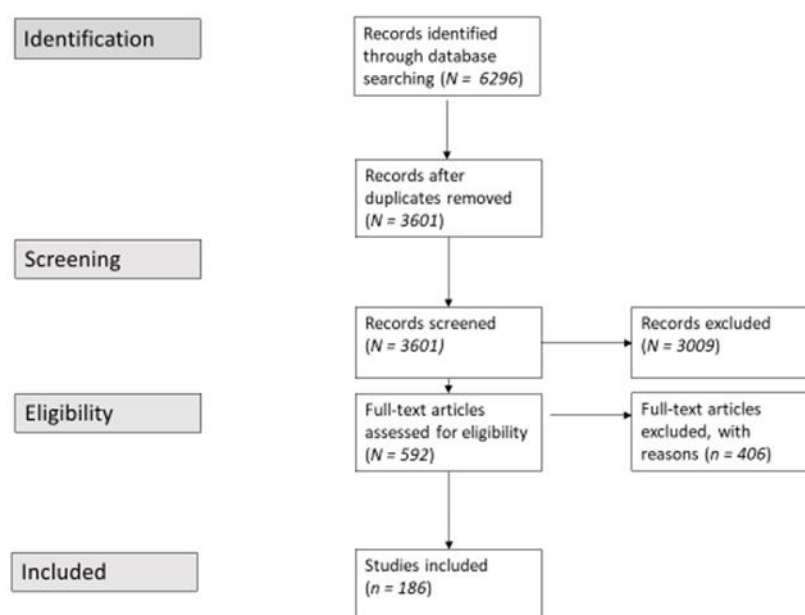
Figure 2. Flow chart for reporting the results of scoping review (derived from Peters et al., 2015, p. 144). N equals the sum of the results from four separate search strings adhering to the four domains of children's and young people's ICT use: family, leisure, education and civic participation.

7. Conclusions

In this protocol, we have described the framework and method for a scoping review on children's and young people's use of ICT in four different contexts of their everyday lives. Applying a framework derived from ecological systems theory (EST) [46], we have proposed seeing the contexts surrounding the digital lives of children and young people as *the digital ecosystem.* Following this framework, our review of the literature on the use of ICT within the family for leisure, education and civic participation takes place at the microsystem level. However, when we analysed the literature identified from this scoping review, we expected to see that children's and young people's use of ICT within each microsystem was integrated at the mesosystem level, indicating the role of ICT in making the borders between the different microsystems porous and fluid [78].

The scoping review described in this protocol is delineated against practitioners helping children or families dealing with issues concerning ICT use, such as therapists or social workers. These practitioners belong to the exosystem level of the digital ecosystem. Following the logic of the digital ecosystem, children's and young people's use of ICT in the microsystems is also affected by cultural trends and political decisions at the macrosystem level. Researchers conducting future literature reviews or empirical research on children's and young people's use of ICT may find it helpful to distinguish between the influence from different actors at different levels, i.e., by using the digital ecosystems for the development of EST when designing their study.

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