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EDITORIAL

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Digital In- and Exclusion in Everyday Life: Practices and Literacies Across the Lifespan

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Abstract

In this thematic issue of *Media and Communication* titled Practices of Digital In- and Exclusion in Everyday Life, we bring together insights from around the world to offer a diverse set of perspectives on digital practices and digital literacies across the lifespan. Moreover, emphasizing the development of digital literacies as a situated social practice, this thematic issue provides insights into the social contexts through which people develop digital literacy practices, how they construct and integrate social norms around technologies, and the links between digital literacies and (digital) citizenship. As concerns about digital in- and exclusion grow, this thematic issue hosts numerous relevant studies by academics that collectively help us gain insight into the impact of digital in- and exclusion in everyday life across the lifespan, gaining insight into the role of different contextual factors, including time, place, and social, economic, and political contexts in the ways in which citizens use digital media and develop digital literacies.

Keywords

citizenship; digital inclusion; digital exclusion; digital literacies; lifespan development; socio-digital inequalities

1. Introduction

In this thematic issue of *Media and Communication*, Practices of Digital In- and Exclusion in Everyday Life, we bring together insights from around the world to offer a diverse set of perspectives on digital practices and digital literacies across the lifespan. Over the past decades, scholars from various academic disciplines have researched digital inequalities and digital literacies from pedagogical, sociological, post-colonial, gender,

socio-economic, political, technical and many other scientific paradigms. This has led to a broad range of conceptual frameworks for digital literacies, as well as explorations of the various "new" literacies that are necessary for participation in digital societies. However, these literacies are not static. Instead, different life stages necessitate varying digital literacies, and these also differ globally. How citizens use digital media is dependent on the contexts they are in (Snyder & Prinsloo, 2007). By approaching this development through the lens of citizens' lifespan, we try to gain an understanding of how different contextual factors, including time, place, and social, economic, and political contexts impact the ways in which people use digital media and develop digital literacies.

In the first article of this thematic issue (Mensonides et al., 2024), we propose to conceptualize these digital literacies as personalized pedagogical processes aimed at the way citizens use, misuse, intertwine, and appropriate digital practices within their daily practices. We focus on how people experience digital in- and exclusion in different temporal, personal, and spatial contexts across the lifespan, what methodological frameworks are best suited to study digital inequalities, and how digital literacies and digital skills are embedded in everyday digital practices. Drawing from this understanding, we seek to gain insights into the social, civic, and political implications of digital in- and exclusion in people's everyday life. This thematic issue analyzes citizens' experiences in different stages of their lives, including childhood and adolescence, adulthood, parenthood, and old age. By adopting a user-centric perspective, this thematic issue contributes to an understanding of the factors that enable or hinder individuals' participation in a digital society and underscores the value and impact of these skills throughout various stages of people's daily lives.

2. Developing Digital Literacies Across the Lifespan

From the moment children are born, their lives are saturated with (digital) media. As media have become integrated into the varying social contexts of children's everyday lives, they have become a prime source of entertainment, social interaction, and play (Ito et al., 2010). Despite the persistent belief that children raised in a digitalized society automatically come to possess technological skills, an increasing amount of research indicates that there is variability in both the skills and media usage of these so-called "digital natives" (Bennett et al., 2008). For example, children from lower socioeconomic backgrounds are more likely to be exposed to TV, electronic games, and non-informational computer activities as opposed to their peers from higher socioeconomic backgrounds (Harris et al., 2017). In addition, vulnerable young people and children from lower socioeconomic backgrounds are less likely to translate their digital media use into digital skills (Livingstone et al., 2023).

In this thematic issue, Vermeire and Van den Broeck (2024) scrutinize the digital inclusion of socially vulnerable youth by focusing on digital youth work initiatives that use and discuss digital media and technology. Based on their analysis of 14 digital youth work best practices, they identify four success factors to include young people who might be digitally excluded in digital initiatives. Considering the importance of young people's diverse social backgrounds, the contribution of Oliveira et al. (2024) examines young people's engagement with news and digital citizenship dynamics through a systematic literature review. They find that disparities in media participation practices among minority groups point to digital exclusion and explore the changing, multifaceted, and differing nature of youth's political participation across varying cultural settings. Lastly, Boulianne and Hoffmann (2024), and Brites et al. (2024), study different aspects of the development of digital literacies during childhood and adolescence. The former examines young adults'

active and passive curation practices on Instagram to acquire news, civic, and political information, while the latter explores young people's understanding of algorithms. Boulianne and Hoffmann's (2024) exploration of curation practices offers new insights into the ways in which citizens consume news across generations and life stages. Brites et al. (2024) contextualize their findings within the everyday lives of participants and argue that learning processes about algorithms are connected to their experiences in formal learning environments and related to the educational, social, political, and economic contexts in which young people live. These studies collectively enhance our understanding of how children and young individuals from diverse social backgrounds acquire the skills and attitudes necessary to act as informed citizens in an increasingly digital society.

Adulthood requires autonomy and self-reliance when it comes to media use, fostering a broad array of opportunities and risks that affect how potential resources are acquired from digital media. These opportunities and risks are largely dependent upon pre-existing socio-digital inequalities, terms of access, support structures, and varying levels of digital literacy (Dezuanni et al., 2023; Helsper, 2021). Hence, digital literacies and digital inclusion in this life stage are particularly important to enable broader participation in society, especially now progressively more key societal processes are becoming digital by default. The study of Kappeler (2024) illuminates the role digital literacies have in digital in- and exclusion rooted in everyday life, comparing a self-reported digital skills measure with an evaluation-based knowledge measure. Faith and Hernandez (2024) add to these insights by exploring the first two levels of the digital divide in terms of the affordances and use of smartphones and tablets by disadvantaged adults experiencing limited connectivity and outcomes. Loukili et al. (2024) study how access and digital inclusion within e-health contexts are situated in regard to the capabilities and barriers vulnerable adults face when having to rely on self-check-in kiosks to ensure effective health care. Lastly, the study of Priyadharma (2024) gives a contrasting perspective from the Global South, showing how digital in- and exclusion is shaped in local communities in Indonesia by exploring case studies through a "periphery-centric approach." These studies offer different perspectives on how adulthood in regard to capabilities and limitations entails a wide range of possibilities to appropriate affordances of digital media to personal and situated circumstances. However, they also show how everyday realities of digital in- and exclusion are underpinned by complex interrelated dynamics of socio-digital inequalities rooted in asymmetric power structures, fostering diverse barriers in relation to access, usage, and the possibility of experiencing positive outcomes from digital participation.

Understanding experiences with digital in- and exclusion of parents becomes increasingly paramount in fostering supportive and inclusive digital environments both in- and outside of the home. Parents play an important role in mediating their children's media use (Dedkova & Mýlek, 2022) and serve as important role models for shaping children's media use (Nikken & Schols, 2015). As parenthood represents a life stage during which responsibilities and priorities shift, the integration of digital media further shapes the landscape of parental experience. The work of Robbeets et al. (2024) in this thematic issue highlights the contextualized, nuanced, and multifaceted dimensions of parents' experiences with digital media, which go beyond access and usage. Their exploration of the uses of digital media in parenting sheds light on four dialectical dimensions: the role of digital media in supporting or challenging parents informationally, emotionally, socially, and organizationally. The role of digital skills during parenthood is also explored in the contribution of Ragnedda et al. (2024), who explore what sociodemographic and sociotechnical aspects shape the digital skills of users with school-aged children. Their study contributes to a body of knowledge on parental digital competencies and shows that parents' use of media is dependent on their social, cultural,

and economic contexts. These factors furthermore play a role in how parents can derive opportunities and benefits from their media use to navigate the complexities of modern parenthood.

In late adulthood, seniors become more dependent upon social support structures for digital inclusion. Studies show that they experience more barriers towards access and digital media usage, stemming from a lack of social resources, declining physical abilities, and different accompanying intersectional factors (Gellner et al., 2021; Oh et al., 2021). Additionally, the digitalisation of societies necessitates constantly adapting to novel digital technologies and developing digital literacies. However, seniors largely struggle with these dynamics, underpinned by differences in access, resources, and capabilities to learn and act. This fosters digital inequality, as more seniors are unable to adapt to key societal processes becoming digital. In their contribution, Zhu et al. (2024) highlight how elderly people in rural China are digitally excluded from digital healthcare systems by limited access and digital skills. Pasitselska (2024) adds to these insights by exploring the challenges and compensation strategies tied to the digital literacies of older adults in Ukraine during the (digital) war. These studies illustrate that identity formation, agency and self-(in)efficacy are paramount when it comes to fostering resilience, empowerment, and digital inclusion in late adulthood.

3. Conclusion

The studies in this thematic issue afford an in-depth understanding of how people from various socioeconomic backgrounds, ages, different levels of education, and in different cultural and national contexts develop digital literacies throughout their lives, and under what circumstances these become valuable for their participation and inclusion. This helps to advance knowledge about how digital literacies are developed from young towards older age, the various social contexts in which these processes take place, and how such knowledge is appropriated, shaped, and employed within informal and formal everyday practices and settings. Moreover, emphasizing the development of digital literacies as a situated social practice gives insights into the social contexts through which people develop digital literacy practices, how they construct and integrate social norms around technologies, and the links between digital literacies and (digital) citizenship. As concerns about digital in- and exclusion grow, this thematic issue hosts numerous relevant studies by academics that collectively help us gain insight into the impact of digital in- and exclusion in everyday life across the lifespan.

Hence, this thematic issue argues for the importance of developing digital literacies not only in early life stages, but in a polemical and holistic manner across the lifespan. Consequently, we understand lifelong learning as an essential underpinning of developing and appropriating digital literacies to fluid personal needs, capable of reflexively adjusting the preferences of diverse publics in ever-changing digital societies.

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Conflict of Interests

The authors declare no conflict of interests.

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ARTICLE

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Digital Literacies as Socially Situated Pedagogical Processes: Genealogically Understanding Media, Information, and Digital Literacies

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Abstract

Despite the increasing importance of digital literacies for citizens to be able to participate in society, there is little scholarly agreement over what digital literacies entail. This conceptual ambiguity hinders the translation of digital literacies into educational programs and policies that foster citizens' digital literacies and inclusion. While various authors have attempted to define *digital* literacy separately and in relation to other concepts, such as *information* literacy and *media* literacy, little attention has been paid to the historical backdrop of these concepts. By tracing the historical development of three literacies (media-, information-, and digital literacy), we reflect on how societal demands shaped conceptual frameworks of these literacies and how these conceptualizations are situated within the broader pedagogical systems that aim to enable participation in digital societies. Using a genealogical approach, we explore and describe the changes in definition, understanding, and enactment of the three literacies, which illustrate how these concepts have developed towards the conceptual frameworks we employ today. Based on this analysis, we argue that digital literacies must be flexible to anticipate challenges that result from the rise of new technologies and need to be appropriated within different socio-cultural contexts. We pledge for an understanding of digital literacies as socially situated pedagogical processes aimed at the way citizens appropriate digital practices within their daily lives. This implies shifting away from formulating one-size-fits-all understandings based upon generic uses of digital technologies. Instead, we must appropriate the understandings of digital literacies based upon their socio-technical, cultural, political, economic, and material dimensions.

Keywords

21st century skills; digital inclusion; digital literacy; information literacy; media literacy

1. Introduction

In the past decades, media technologies have affected all aspects of everyday life. Life has become information- and technology-saturated, and citizens are increasingly expected to use digital platforms to participate in society. The rapidly changing technological landscape requires conceptual flexibility of related literacies. They must be capable of evolving along with societal, technological, democratic, and educational developments while at the same time remaining practically applicable by institutions, such as libraries, schools, and other practitioners. Over the last decades, "new" literacies have emerged while others dissolved or have been forgotten, and the ones becoming more relevant within digital societies have changed in definition, enactment, and understanding (Bruce, 1994).

Especially "digital literacy" has seen a fast rise in conceptual frameworks that seek to understand how citizens can be included in an ever-growing digital society. It is a key concept in debates about what skills and attitudes are necessary for citizens to participate in the knowledge society (van Laar et al., 2017) and is often used as an umbrella term for a myriad of other new literacies. However, there is no widespread consensus on how to define digital literacy. Such conceptual ambiguity complicates its use in practice and the development of adequate interventions, as both "digital" and "literacy" can be defined in many ways, depending on the context of use (Belshaw & Higgins, 2011). Moreover, although the term was coined in academic research, it is now also used by educational specialists, policymakers, and other interested parties, resulting in an abundance of different definitions in everyday practice. Subsequently, conceptualizations of digital literacy have further diverged in the past years.

This article analyses how the concept of digital literacy has evolved from 1970 to 2020 and how it relates to the preceding concepts of information- and media literacy. Tracing how these three concepts developed over time and indicating the key determining moments in their development helps explain their status within current academic and public discourse. Although various authors have attempted to define these concepts (Nichols & Stornaiuolo, 2019; Wuyckens et al., 2021), little attention has been paid to their historical backdrop. Based on an in-depth genealogical analysis rooted in a systematic literature review, we analyse the discursive genesis of media-, information-, and digital literacy. We show how technological and societal developments shaped their conceptualizations and how these are situated within broader pedagogical systems that aim to enable participation in digital societies. This supports the development of interventions aimed at fostering digital literacies, empowering citizens to appropriate new technologies and find their way in an ever-changing digital society.

First, this article gives a brief overview of current conceptualizations of the relations between media-, information-, and digital literacy. We then discuss the historical and societal developments around each of the key concepts, followed by a discussion where the three concepts are brought together to understand how they interrelate over time and how these developments led to current conceptualizations. Finally, we conclude by arguing for an understanding of digital literacies as personalized pedagogical processes aimed at the way citizens use, misuse, intertwine, and appropriate digital practices within their daily practices.

2. A Genealogical Approach to "New" Literacies

With the rise of digital societies and the influence of digitalisation upon democratic and civic processes throughout the world, a myriad of "new" literacies rose to attention. Of those, information, media, and digital

literacy are consistently and prominently used in popular and academic discourse and are broadly considered key literacies in educational paradigms (Koltay, 2011; Nichols & Stornaiuolo, 2019; Wuyckens et al., 2021). They thus capture the main developments within literacy education in relation to technological innovations since the 1970s. To understand how these concepts have developed over time, we adopt a genealogical approach (Saukko, 2003) that explores and describes the technological and societal context of changes in their definition, understanding, and enactment. This illustrates the literacies' histories and how these concepts have developed towards the conceptual frameworks we know and use today. To understand the rise of information, media, and digital literacies in relation to one another, we start by depicting the uses of these terms in (academic) literature. While not without limitations, the Google Ngram visualization tool allows for visualizing the broader uses and frequencies of the terms within digitized English-language publications (see Figure 1).

The Ngram shows a rise in the usage of the term "digital literacy" in the last decade, especially in comparison with the period 1970–1990 after which the use of media and information literacy took off. It is consistent with the broader rise of digital literacy in popular discourse, first relatively small in comparison with its theoretical predecessors, and eventually outpacing them. This reflects the technological developments in digital societies as well as how policies tried to keep up with them. Between 1990–2010, a growing understanding emerged that the shifting technological landscape was reconfiguring and reappropriating the demands and frameworks of traditional reading and writing skills and competences, translating these to a new digital era (Bawden, 2008). Multiple scholars argued that computers and digital technologies were facilitating a "post-typographic world" in which novel manners of educational programs and pedagogies were needed (Behrens, 1994; Bruce, 1994; Lupton, 2008).

Next to technological innovations, the evolution of digital literacy was impacted by institutional actors and policy. Between 1970–2010, institutional actors (e.g., UNESCO) prioritized information and media literacy as

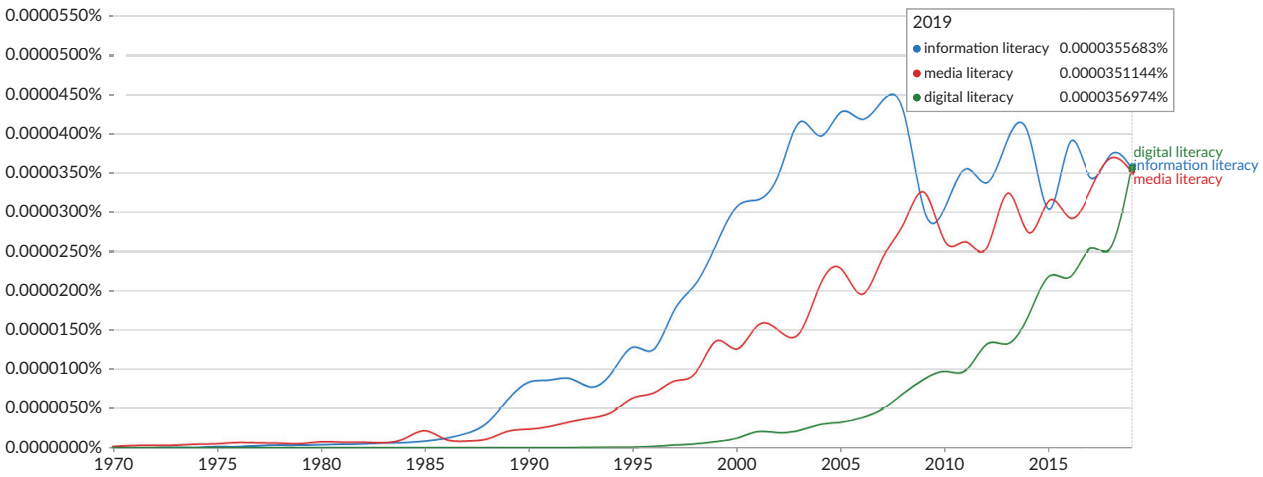

Figure 1. Ngram of digital, media, and information literacy in Google Books corpus (English, eight million books, 1970–2019). Ngrams are drawn from a text or speech corpus of more than eight million digitized books that shows how the frequency of a word or phrase changes over time; we understand the Google Ngram visualization tool as an instrument that provides an overview of the frequency and usage of terms within the Google search engine; the patterns should not be understood as reflective of all academic research, as Ngram is uncontrolled for bias, could potentially reflect skewed optical character recognition, and does not include metadata.

the key literacies within the notion of 21st-century skills facilitating the progression towards a digital society (Grizzle et al., 2014). For example, the UNESCO Global Framework for Literacy defines information and media literacy as follows:

> A set of competencies that empowers citizens to access, retrieve, understand, evaluate and use, create, as well as share information and media content in all formats, using various tools, in a critical, ethical and effective way, in order to participate and engage in personal, professional and societal activities (UNESCO, 2013, p. 17)

Digital literacy is not intertwined within this framework in the same manner as information and media literacy are (Carlsson, 2019). This shows how, initially, information and media literacy were prioritized.

However, from the 2010s, digital literacy gained more traction, bringing about novel competencies and conceptions of the digital. This can be understood as a precondition for the development of a unified literacy framework merging and translating components and competencies from multiple literacies (e.g., information, media, and digital literacies), to meet the needs and purposes of the future digital society. Drawing from this diachronic development, we refer to "digital literacies" in its plural form in relation to the contemporary understandings of digital pedagogies and the multidimensional underpinnings stemming from different literacy strands, and use "digital literacy" in its singular form to touch upon its historical unidimensional conception. In what follows, the genesis of each of the three literacies is analysed, focusing on their changing configurations and deployment throughout the years.

3. Method

Our research sample was compiled through a systematic search in Google Scholar on December 11th, 2020. Google Scholar is an academic search engine through which users can access a wide range of scholarly literature. To explore the most prominent literature in the field, we used the "most relevant" function. Google Scholar's ranking algorithm here uses citation count as the main factor, with papers that have been cited more often being ranked "more relevant" (Martín-Martín et al., 2015; Rovira et al., 2019), as well as the appearance of the chosen search terms as keywords in the title (Beel & Gipp, 2009). We selected Google Scholar because, in contrast to commercial bibliographic databases, such as Web of Science and Scopus, it provides a free service that gives a broad audience access to scholarly knowledge with a total corpus of over 8 million texts (see Figure 1). This includes scientific articles as well as books, conference papers, handbooks, and other sources across scientific disciplines. Thus, the database reflects contributions and perspectives of academic discourse at large, allowing us to analyse the most prominent literature and dominant discourses in the field.

The search strings were "digital literacy," "information literacy," and "media literacy." Every search enquiry was sorted by "relevance" and restricted to consecutive five-year periods of publication to gain a broad understanding of the development of the concepts. There were no other restrictions placed. For every five years, the first five sources in the "most relevant" search results were examined. The five-year periods started in 1970 for information literacy and media literacy and in 1990 for digital literacy, as this concept was only coined in the 1990s. In the body of literature, there were two duplicate articles that had been republished. Furthermore, four sources had been removed and could not be accessed. The search strategies and the results of the search enquiries are presented in Figure 2.

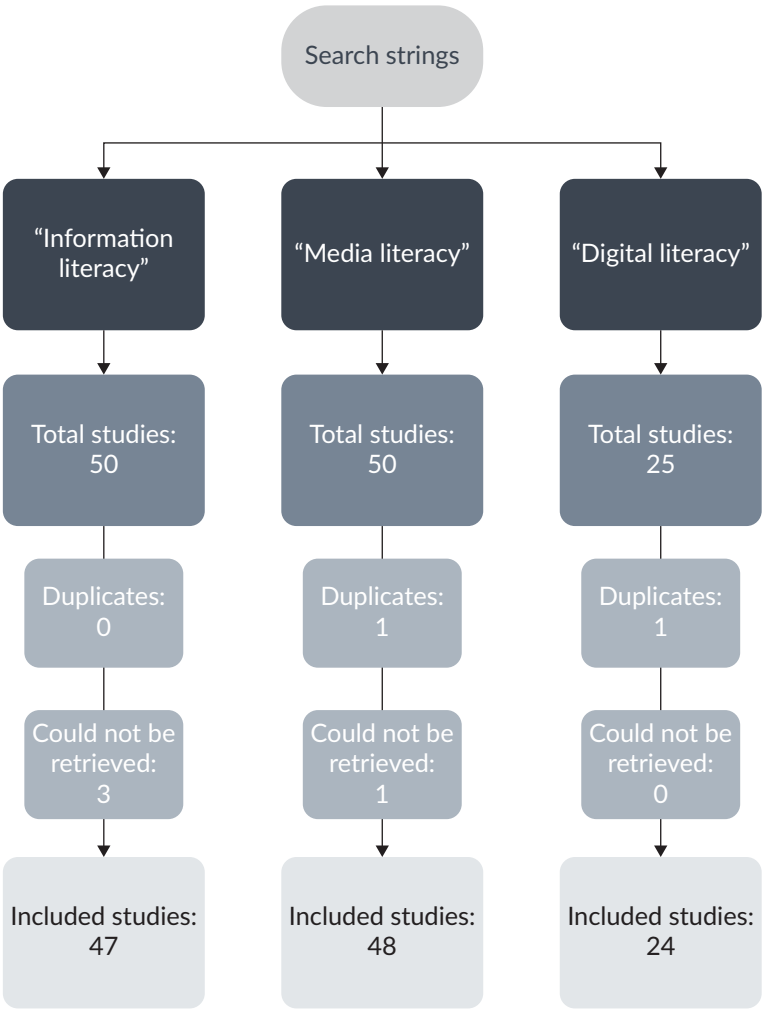

Figure 2. Flowchart of the selection process.

To analyse the documents in the selected corpus, we used a hybrid approach of inductive and deductive coding (Fereday & Muir-Cochrane, 2006). To do this, the authors first developed a code manual, consisting of five overarching categories determined by the research questions posed in this study. We analysed how definitions were used, the research field from which the source originated, if the source drew any relations with other types of literacies, which societal issues were addressed, and through which case these issues were examined. These coding categories ensured the authors answered the leading questions (see Table 1) developed to comparatively analyse the three concepts during specific periods of time. Within these five overarching code categories, the authors added new focused codes for all documents in the corpus. While

Table 1. Coding scheme.

Code	Leading question
"Definition"	How do conceptualizations develop over time?
"Research field"	How do research fields develop conceptualizations of the literacies?
"Relation"	How are conceptualizations related to other literacies?
"Case/example"	What is the social and temporal context of the conceptualization?
"Problem/argument"	What was the societal/technological need for this conceptualization?

each of the authors coded the literature regarding one concept individually, the coders had weekly meetings to ensure a coherent coding strategy. In the final step, a timeline was composed to reflect the significant developments of the researched concepts.

While Google Scholar provides an overview of the dominant discourses surrounding the three literacies, using it comes with several limitations. First, even though previous work has explored the ranking algorithm (Beel & Gipp, 2009; Martín-Martín et al., 2015; Rovira et al., 2019), it is not fully clear how it operates, and consequently, what texts may have been left out from its search results. Second, we used English search strings, thus our findings only incorporate English written texts and reflect a Western-centred approach to understanding the development of information, media, and digital literacy. Finally, selecting only the top five texts per time frame of five years could have skewed our interpretations of theoretical frameworks and understandings, leaving out other possible discourses that may have influenced the concepts over time.

4. Results

4.1. Information Literacy

First entering academic and professional discourse in the 1970s, information literacy is defined as a way of learning through engaging with and enacting information for various purposes (Bruce, 1994). The concept developed largely in the fields of library- and information science and became prominent in the 1980s and 1990s. It took shape in parallel with computer literacy, which was regarded as its predecessor and foundation. Information literacy, however, is less concerned with the use, control, or economics of computer technology than with the competencies required to make use of information in computer-based environments. Behrens (1994) emphasizes that information literacy bypassed purely technical concerns to focus on the production and organization of information itself, while recognizing that these demands were heavily inflected by the changing landscape of digital media (see Figure 3 for an overview of developments throughout the past five decades).

Zurkowski (1975) is credited with coining the term "information literacy" in his proposal to the US National Commission on Libraries and Information Science in the early 1970s. He advocated that the US Government should establish a national program aimed at achieving widespread, work-related, literacy practices. Initially, it primarily focused on providing technical skills, including information skills and instructions within—analogue and offline—library settings. These foremost focused on adults through a top-down approach and secondarily engaged students within higher education. At the end of the 1970s, moving towards the 1980s, this focus on finding and using information within professional contexts progressed towards the educational domain. The target audience shifted to a younger public, first specifically focusing on higher education students, and later, high school students and children (Eshpeter & Gray, 1989).

With the rise of digital technologies in the 1980s, progressively more information literacy frameworks became focused on digital practices. Data repositories and digital databases with related information services were brought to attention, whereas the focus began shifting from primarily individual information needs in the analogue and offline world to a more networked, connected, and digital society (Demo, 1986). It digressed from its traditional technical focus on searching and using information and moved towards a broader understanding of learning (Kuhlthau, 1987). In this period, the American Library Association, for

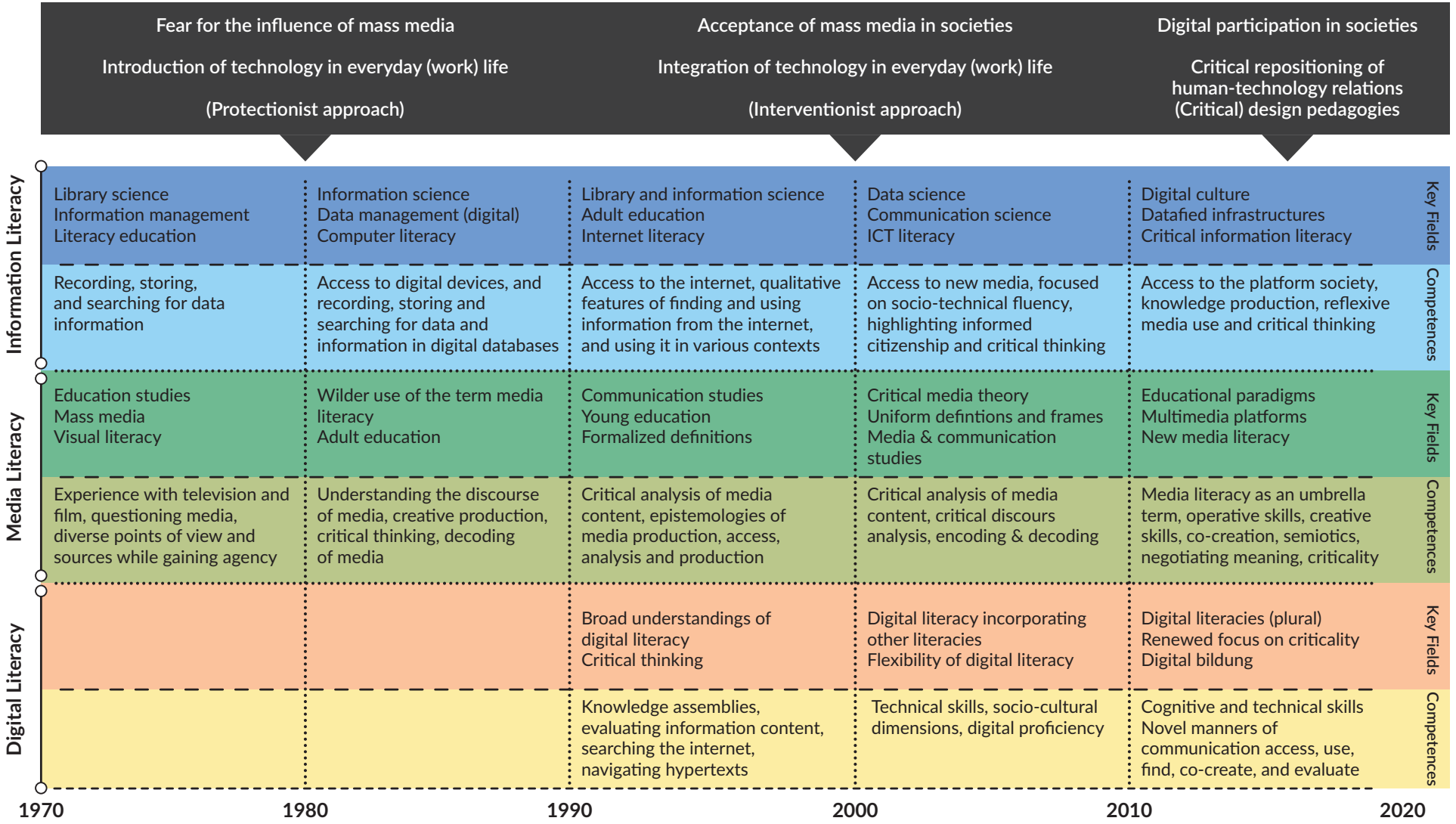

Figure 3. Literacy timeline.

example, defined the key components of information literacy as: (a) recognizing the need for information; (b) identifying what information would address a particular problem; (c) finding the information needed; (d) evaluating the information found; (e) organizing the information; and (f) using the information effectively in addressing the specific problem (Bruce, 1994).

When the internet and the World Wide Web came to the forefront in the 1990s, information literacy slowly transformed from a technical-skills based field towards a multi-dimensional mould. Bawden's (2008) survey of the field found more than a dozen information literacy definitions in circulation by the 1990s. Each definition diverged in specificity and emphasis, but a broad consensus remained that information literacy was concerned with assembling knowledge by retrieving, organizing, and evaluating information (Bawden, 2008). This contrasted with a societal perspective where computers and digital devices were not merely seen as technologies for professional and educational purposes but were particularly well suited for entertainment purposes. In the period 1990–2000, this duality of informing versus entertaining grew even more, resulting in more attention to the critical components of digital texts and information sources (Behrens, 1994).

In the 2000s, a plethora of information infrastructures and platforms emerged with the help of the internet, constructing new ways of communication, connectivity, connectedness, and community-building. A socio-technical and socio-cultural turn was seen within information literacy discourse throughout the 2010s (Bruce, 2003), when scholars increasingly focused on the everyday uses of information and media from an emic perspective (Lloyd, 2005). Within the last decade, information literacy progressively employed a bottom-up approach, centred around the users of information and their informational needs and norms.

Critical information literacy was at the forefront of this shift towards a more critical disposition of the role technology, information, and data have in societies, and ongoing debates about misinformation and personalisation (Tewell, 2015). This framework acknowledges and fosters the learner's agency in the educational process (Tewell, 2015). It is positioned as an addition to traditional instances of information literacy, whereas the attention is shifted towards discursive practices which focus on users developing proficiency with information through the seeking, interrogation, and evaluation of information sources and the appropriate and ethical use of information (Lloyd, 2005). It is a teaching perspective that does not focus on student acquisition of skills, as information literacy definitions and standards consistently do, and instead encourages a critical and discursive approach towards information practices. This also offers a more flexible and situated appropriation of information literacy, better suited to evolve alongside rapid technological innovations. This approach is key in the translation of information literacy towards digital literacy, as digital literacy embeds this critical approach towards broader affordances of digital media in different socio-technical and socio-cultural contexts.

4.2. Media Literacy

Opposed to information literacy, media literacy originates from a critical stance towards mass media. It is commonly described as a skill set that promotes critical engagement with messages produced by the media (Bulger & Davison, 2018). The development of the concept stems from concerns about the influence of mass media on individuals that originated in the period after World War I. Prevalent theories during this time include hypodermic needle theory and theories focusing on the effects of propaganda (Borah, 2016).

As television and film became more accessible in the 1970s, so grew concerns about the intrusion of mass media in the home (Houk & Bogart, 1974). Citizens were seen as passive consumers and receivers of information, as opposed to active, critical media users. Researchers argued that the development of media literacy was necessary to protect the public against the growing influence of mass media. Kirkton (1971, p. 831), for instance, stated that the media were "subtly influencing what we are and what we are in the process of becoming." In response to the concerns about mass media, the term "media literacy" was coined by educational studies (see Figure 3). The primary goal of media literacy was to understand how mass media controlled the public and how the public could take back control (Houk & Bogart, 1974). Although the concept of media literacy was mainly used in educational sciences, it has since been applied to and practiced by a diverse group of individuals including children, adults, and global citizens.

While researchers prioritized the development of media literacy as an important issue, there was little consensus about what skills citizens should have to be considered "media literate." Much of the literature from the 1970s and 1980s emphasizes the importance of the development of media literacy through top-down instruction, both in and outside the classroom (Forsdale & Forsdale, 1970; Levie, 1978; Levison, 1973; Lloyd-Kolkin & Tyner, 1988; O'Rourke, 1981). Literature on necessary skills can broadly be divided into two categories. The first focuses on the development of knowledge about the organization and production of media (Graham, 1989; Masley Kirkton, 1971; Messaris, 1998). This aspect was mostly approached through instruction (Graham, 1989) and by encouraging people to create their own content (Masley Kirkton, 1971). The other strand of media literacy skills is concerned with the ability to critically judge media content. Karl (1974) states that the goal of media literacy is to raise questions regarding the meaning of media content and how it affects human behaviour.

Although this critical aspect has been included in the development of media literacy since its beginning, it has been conceptualized in various ways. It was coined as "the ability to raise questions" and later transformed into critical viewing skills (O'Rourke, 1981), media grammar (Gumpert & Cathcart, 1983), producing a more critically aware citizenry (Graham, 1989), critical decoding (Brookfield, 1986), critical evaluation (Cortés, 1992), and ultimately, critical thinking (Buckingham, 1993). However, all strands have generally focused on the deconstruction of ideologies in mass media. During the second half of the 1990s, research on media literacy shifted from educational studies to media and communication studies. While the practical implications in classrooms were still being researched, theorizing media literacy became prevalent. This becomes clear from the report of the National Leadership Conference on Media Literacy in 1992. During this conference, researchers gathered to construct a "common vision, framework and understanding" of media literacy that each of them could use within their own niche (Aufderheide & Firestone, 1993, p. 6). They defined media literacy as "the ability to access, analyse and produce information for specific outcomes." This broad definition allows various media to be included within the framework and brings a strong sense of unity through various disciplines dealing with media literacy.

Although this definition of media literacy was used frequently in the 1990s and early 2000s as the main understanding of what media literacy is and should be (Hobbs & Frost, 2003; Livingstone, 2003, 2004), around 2010 scholars started to specify the various skills and attitudes needed to be considered media literate (Bulger & Davison, 2018; Pérez Tornero & Varis, 2010; Potter, 2016). Potter (2016) focuses on three broad aspects of media literacy: skills, knowledge structures, and personal locus. This approach leaves room for interpretation by various professionals concerned with media literacy, while also fostering a more fluid

and situated conception. Pérez Tornero and Varis (2010), in contrast, developed a set of specific competences (availability, environmental factors, use, critical understanding, and communication) and further divided these into sub-competences (operative, creative, communicative, semiotic, and cultural skills).

While definitions of media literacy differ between authors, there seems to be consensus on its goals. Authors stress the importance of taking control over the influence of mass media and the ability to participate in a society where media is omnipresent (Koltay, 2011; Lee et al., 2015; Pérez Tornero & Varis, 2010; Potter, 2016). More recent, however, is the growing importance of critical thinking within the concept. Researchers argued for a focus on critical thinking as this allows people to become active critics of media, and empowers and liberates them from the ideologies that are pushed upon them through media (Buckingham, 1993). While critical thinking in one form or another had been an aspect of media literacy since the 1970s, it got an even bigger role in later conceptualizations. In line with specifying the concept "media literacy" into "critical media literacy," concepts like "news (media) literacy" that specifically focus on intrinsic motivation, knowledge, and skills to consume news and "new media literacy" that stresses the influence of new media platforms have been developed (Lee et al., 2015; Maksl et al., 2015).

The introduction of new media platforms brought new possibilities and challenges to the development of media literacy. It has become easier to produce media and to participate through online platforms. Therefore, the creation of and active engagement with content have gained importance. As a result, the trustworthiness of information has become harder to determine as everyone can participate in publishing content (Bulger & Davison, 2018; Lee et al., 2015). Broad-based issues like recognizing misinformation have increased the importance of media literacy even more, and even though scholars have not yet reached a common definition, the need for media literacy is recognized now more than ever. However, this need is now often conceptualized as a need for "digital literacy."

4.3. Digital Literacy

With the introduction of the internet in the everyday lives of the public, the concept of digital literacy emerged. It was popularized by Paul Gilster in 1997 as the ability to understand, use, evaluate, and integrate digitized information (Gilster, 1997, as cited in Pool, 1997). Before Gilster, several authors used the term digital literacy in the 1990s. Among them is Lanham (as cited in Bawden, 2008), who referred to digital literacy as a type of multimedia literacy. He considered digital literacy to be quite different from traditional literacy because it can encompass diverse forms of information. Therefore, a new type of literacy had to be created (see Figure 3).

While Gilster stresses that digital literacy must be understood as a life skill as opposed to a collection of skills and competences, he distinguishes four key competencies, namely knowledge assembly, evaluating information, searching the internet, and navigating hypertext (Gilster, 1997; Martin & Grudziecki, 2006). In all these competencies, critical thinking skills are considered a core component. While other authors follow Gilster in his reasoning and employ the concept of digital literacy to describe the ability to recognize, interpret, and evaluate differing types of data, the majority of literature focuses on adequate use of digital and online sources (Gilster, 1997; cf. Bawden, 2008). While Gilster emphasizes that digital literacy is a life skill, not inherently tied to formal education, the late 1990s saw a predominant focus on education (Burke, 1999; Faigley, 1999; Labbo et al., 1998; Pool, 1997). The surge in the need for employees capable of gathering and analysing digital information furthermore led to the application of digital literacy in the

workplace. Labbo et al. (1998) present five key elements in this context: digital literacy (a) produces the ability for lifelong learning, (b) often occurs in pursuit of other goals, (c) occurs in a social context, (d) requires strategic competencies, and (e) requires critical knowledge of assembly and production (cf. Pianfetti, 2001).

Due to the scholarly enthusiasm for information literacy and media literacy, digital literacy received little attention in the late 1990s and early 2000s. Nevertheless, as accessibility of digital media grew, the interest in Gilster's conceptualization rose again. It was perceived as having considerable advantages as it could incorporate several different literacies, such as information- and ICT literacy, as well as being applicable to different personal situations. Furthermore, it was deemed a concept that could be easily developed and changed over time (Bawden, 2008). This line of reasoning is consistent with the views of Martin and Grudziecki (2006) and of Eshet-Alkalai (2004). The first comprehend digital literacy as "an element in the ongoing construction of individual identity" (Martin & Grudziecki, 2006, p. 265). Eshet-Alkalai (2004) proposes a broad concept of digital literacy, in which a range of cognitive, motor, sociological, and emotional skills are included. A different, but evenly broad conceptualization was established by the American Library Association in 2013, which defines digital literacy as "the ability to use information and communication technologies to find, evaluate, create, and communicate information, requiring both cognitive and technical skills" (Loewus, 2016).

Recently (2015–2020), there has been a renewed focus on the critical component of digital literacy in education. As a growing number of people are more comfortable with the basic technological skills of carrying out online searches, authors focus on how citizens develop skills to evaluate and use digital sources critically (Buckingham, 2010, 2015; Loewus, 2016). This suggests a rounded conception of digital literacy which is integrated in the development of a person. Related to the German term *Bildung*, this ongoing process refers to one's development as both an individual and as a member of a culture (Buckingham, 2010, 2015; Martin & Grudziecki, 2006). Søby (as cited in Martin & Grudziecki, 2006) uses the term "digital Bildung" to indicate "an integrated, holistic approach that enables reflection on the effects that ICT has on different aspects of human development: communicative competence, critical thinking skills, and enculturation processes, among others" (Martin & Grudziecki, 2006, p. 255). This holistic approach constructs a more flexible disposition, enabling an understanding of digital literacy better suited to tackle barriers arising from the proliferation and rapid advancement of digital technologies in relation to socio-cultural contexts.

In the last decade, terms such as "new literacies," "multiliteracies," and "21st-century literacies" emerged (Loewus, 2016). These new terms reflect changing and emerging technologies such as mobile phones and computer games, and skills such as sharing and creating videos online, and other new ways of communication. Researchers argue that educators should help students understand their experiences with digital media both inside and outside the classroom (Alvermann & Kaminski Sanders, 2019; Buckingham, 2010, 2015). Such a broad, critical, and personal understanding of digital literacy involves (a) the ability to recognize the construction of digital media, (b) an awareness of the ways media approach the public, and (c) an understanding of how the public handles and reacts to the media (Buckingham, 2015). This broad critical understanding of digital literacy is strongly related to the previously discussed concepts of information literacy and media literacy, where the measure and depth of criticality and a critical disposition towards the position of media in our societies is the primary point of departure for different approaches of media education and digital literacy pedagogies.

5. Discussion

While our analysis shows how information, media, and digital literacy all have different starting points, purposes, and components throughout their development, they also share multiple skills, competences, and perspectives. Over time, the three literacies moved closer together and partly converged, not only in the frequency by which these concepts are mentioned, but also in their understanding, enactment, and appropriation. Three approaches are extracted from this process, highlighting shifts in education, policy, and pedagogies. The first one is a protectionist approach, seen within all three literacies, which relates to mass media being present within the 1970s towards the 1980s. Driven by concerns about the intrusion of mass media in the home, it constructed media education from a protectionist point of view to protect citizens from the power of mass media. This progressed towards an interventionist approach within the 1990s into the new century when more personalized media came to the forefront, focusing on individuals' media use for leisure instead of in professional and educational domains. Moreover, it foregrounded users' agency in relation to media and technology. This in turn inspired critical (design) pedagogies in educational programs in 2010–2020, focusing on the maker-movement and design features. The argument that, by making and/or creating, a critical understanding within multiple layers of the digital could be learned and appropriated within personal contexts took a primary spot on the literacy stage.

Information literacy predominantly facilitates (top-down) technology-mediated pedagogies, while media literacy facilitates more (bottom-up) media-focused pedagogies. Digital literacy here could be positioned as a middle-ground, where the prioritized understanding entails that digital media are used to accomplish specific goals, for and by certain individuals, in diverse settings and situations. It is heterogeneous, more flexible, and inclusive. Moreover, digital literacy frameworks translated these features within broader civic and democratic concepts such as digital citizenship, digital exclusion, the digital divide, and digital inequalities, with critical thinking and empowerment as key shared components (Buckingham, 2015). Information and media literacy can be divided on a spectrum of determinism, ranging from technology- to socially-driven viewpoints. Within the context of media literacy, this means exploring how media messages are constructed by particular actors, while information literacy focuses on more technical proficiency within more technical and computational communicative processes. Digital literacy provides insight in both situations, though broadly not as critical as media literacy, and not as technical as information literacy.

Second, a key difference between the literacies stems from how they are applied and understood in practice. Information literacy is mostly applied and practiced as a discipline targeting older educated (Western) audiences with a broad spectrum of technical skills and competences. Media literacy is applied and practised by more diverse audiences (children, seniors, global citizens, etc.), meeting differentiated norms with and around media, and targeting a more general and reflexive disposition towards media in diverse societies. Digital literacy is applied in a more nuanced sense, more flexible, situated, and socially constructed, which allows its frameworks to be used for diverse audiences ranging from elementary school to seniors, from disadvantaged communities to more generic publics.

Finally, there is empirical evidence that media literacy can improve fundamental components of literacy education—such as reading and writing—while information literacy cannot, and rather draws upon them to develop information literacy (Bulger & Davison, 2018; Koltay, 2011). Without being able to read correctly, it is simply impossible to understand and apply information literacy and essentially become information literate

(Koltay, 2011). This difference stems from traditional disciplines and purposes from which the literacies are constructed. For example, information literacy inherits its technology-mediated pedagogies from library and information science, predominantly prioritizing the effective use of information for decision-making on an individual level, especially focusing on educating (adult) users of libraries on various information and documentary resources. It stresses the technological skills needed to use the library as a gateway to information. In comparison, media literacy focuses more on media in a collective sense, building upon mass media theories, media studies, and educational paradigms and a protectionist approach fearing the effects of media on societies at large. Digital literacy, finally, started as a broad, collective, interdisciplinary framework encompassing a broad spectrum of digital skills and competences necessary for the 21st-century digital age. However, later it developed into a more technical skills-based framework focused on individuals.

Across various perspectives, scholars have consistently pointed to media education as a potential strategy for stimulating people's engagement with varied media content and increased critical thinking in relation to novel socio-cultural and political norms posed by digital technologies (Buckingham, 2015; Eshet-Alkalai, 2004; Lloyd, 2005). Following this line of thought, it is notable, while also disputed by some scholarly paradigms, that digital literacy partially consumed information and media literacy. It translated and reframed core components such as information (content) retrieval, use, understanding, reflexivity, and criticality towards an understanding of the digital, where socio-cultural and socio-technical contexts largely affect how media are used and intertwined into the fabric of daily lives.

With each new medium comes a new need, a new skill set to learn, and a novel conceptualization of existing literacies to align them with the contemporary challenges posed by the digital society. Hence, digital literacies must be flexible to anticipate challenges that result from the rise of new technologies and to be appropriated within different socio-cultural contexts. However, while the development of new media technologies may have resulted in novel types of literacies, and have broadened definitions of more traditional ones, the goals and premises of these literacies have remained remarkably stable. While media platforms may be "new," cycles of concern about their threat to safety, culture, and well-being repeat across the decades.

6. Conclusion

Our genealogy of media-, information-, and digital literacy explores the boundaries of where one type of literacy begins and another ends. This genealogical approach enables us to perceive these three concepts in relation to one another and explore the focal points and paradigms on which either were built, and how this progressed over time. This contributes to existing literature reviews of the three concepts individually (Bawden, 2008; Behrens, 1994; Buckingham, 2015) and in parallel (Koltay, 2011; Nichols & Stornaiuolo, 2019; Wuyckens et al., 2021). Tracing the genealogy of information-, media-, and digital literacy, we recognize that literacies are not siloed entities, but instead overlap and impact each other in profound ways. This approach furthermore enables us to observe their progression over time. This longitudinal perspective is crucial for discerning trends, shifts, and emerging challenges. Finally, by scrutinizing diverse appropriations of the concepts while not prioritizing one over the other, following their lineage throughout the decades to understand how perspectives changed from a top-down towards a bottom-up contextualization, we showed the implications this shift had for the enactment of each concept in practice. As such, this study contextualizes existing understandings of the three concepts in relation to historical and societal discourses surrounding technologies and media and the disposition of citizens within technologically mediated societies.

We have shown that digital literacy is an interdisciplinary, socially constructed, and boundary-crossing concept that assembles critical components from information and media literacy and translates these towards the digital realm in the 21st century. Understanding and bridging the differences within the three literacies is crucial to illustrate how they can answer important questions regarding the power and politics of digital technologies in (future) societies. Despite their own epistemological foundations, they share many underlying commonalities that allow for relating the three literacy concepts to one another and improving them in light of their publics.

The emphasis in current understandings of the three concepts lies on empowerment, providing agency, critical capabilities, and skills to publics to co-create, design, make, and use technologies within their own socio-cultural contexts, resulting in authentic learning outcomes. As such, we suggest that digital literacy is not a natural successor to media- and information literacy, but has developed as a mixture of skills, components, competences, and understandings originating from them and their predecessors. As an assemblage, digital literacy can condition our modes of knowing and modes of being regarding the digital. It can bridge digital inequalities and foster digital inclusion within a more situated configuration of human–technology relations.

In future research, it would be valuable to move beyond Google Scholar's search recommendations and explore additional databases to compare their results. In addition, as our analysis entails a dominant Western approach, a multilingual research design would foster a more diverse understanding of the genealogies of literacies. This would enable the exploration of the cultural components and features of different literacies that may be neglected in Western contexts. Diverse media publics will consistently need to educate themselves and translate such new understandings into their personal enactment of digital literacies. Gaining insight into these processes of appropriating new understandings of technology could be valuable to realize future interventions for promoting digital literacies that will aid citizens in finding their way in an ever-growing digital society. It is important to study how our discursive understanding and appropriation of such literacies affect the way digital literacies are merged into daily practices and meet societal demands. In context, our analysis provides limited insights into how digital literacies contribute to participatory acts, as our findings illuminate the genealogical conceptualization of digital literacies rather than the outcomes they enable.

Building upon this study, we argue that digital literacies must be flexible to anticipate challenges that result from the rise of new technologies and to be appropriated within different socio-cultural contexts. We pledge for understanding digital literacies as personalized pedagogical processes aimed at the way citizens use, misuse, intertwine, and appropriate digital practices within their daily practices. This implies shifting away from conceptualisations based upon generic uses of digital technologies. Instead, understandings of digital literacies need to be appropriated based upon their multiple socio-technical, cultural, political, economic, and material dimensions, which can differ from person to person.

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Conflict of Interests

The authors declare no conflict of interests.

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Young People Learning About Algorithms: Five Profiles Spanning From Ineptitude to Enchantment

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Abstract

This article focuses on young people's understanding of algorithms and their learning methods. While many younger individuals are deeply familiar with digital media, it is erroneous to assume that this familiarity is equivalent to operational or critical knowledge. Given that algorithm awareness has only recently become a topic of debate, daily life practices and knowledge processes need further study, particularly through the lens of audiences. The analysis is based on 42 interviews carried out as part of a project on young people, news, and digital citizenship in Portugal. From the analysis, we came up with five profiles that include different ways of understanding and learning about algorithms: ethereal, ambivalent, unfamiliar, negative, and positive perspectives. Preliminary findings reveal strategies youth employ to bypass the influence of algorithms, with a dominant perspective of learning through the proximity contexts: alone, with social media (TikTok and Instagram), with peers/family, and few cases mentioning school, that surprisingly, is almost absent as a learning atmosphere. Given the newness of the collective awareness of the power of algorithms, the presented scenario claims that we need for a more structural and institutional learning context and response, which could help prevent recurring scenarios akin to digital "bowling alone."

Keywords

algorithms; digital inclusion; digital natives; digital rights; learning processes; young people

1. Introduction

This article reflects on how young audiences acquire knowledge about algorithms and their understanding of them. Given the awareness around the algorithmisation of life, it has recently become a topic of debate. Practices and the knowledge processes of daily life need further study, particularly through the lens of

audiences, focusing on how young people regard and deal with algorithms (Mathieu & Pruulmann-Vengerfeldt, 2020; Swart, 2021). While algorithms are commonly understood as a set of step-by-step instructions to accomplish a task or solve a problem based on past data, it is also true that socially and from the point of view of audiences, this definition might be considered simplistic.

Swart (2021, p. 3) pinpoints that "algorithms are understood through use" and that it is somewhat more relevant to explore citizens' algorithmic experiences instead of what citizens "should know about algorithms….The concept of experience helps us to conceptualise algorithmic literacy as a form of knowledge that is not just rational, but also tacit, intuitive, situated, and lived." Schwartz and Mahnke (2021) emphasised the continuous and dynamic interaction between algorithmic tools and human agency, pointing to the active role of citizens concerning the effects of algorithms. Therefore, audiences' experiences of algorithms must be better understood (Lomborg & Kapsch, 2020; Swart, 2021) to overcome digital inequalities and create conditions for citizens to benefit from digital advances. The current media-saturated environment demands that citizens process a critical understanding of the digital and, particularly, of algorithmic contexts engrained in daily life (despite its prevalence since the previous century).

This is particularly difficult to understand if we agree that media options imply non-linear negotiations between media power and everyday life (Mathieu & Møller Hartley, 2021). Thus, cross-referencing artificial intelligence (AI) with audiences must go beyond the enchanted vision of AI's potential (which we do not ignore). However, it is relevant to reflect on the socio-political challenges, the ramifications for people, educational policy, and power (Lindgren, 2024). That said, although AI may be developed under ethical principles, these may lose importance when production and economic pressures come into play, disregarding adverse effects (Lindgren, 2024). So, when avoiding a media-centric view, people cannot excuse themselves by blaming technology itself (Bruns, 2019). Algorithms, "those esoteric computational structures," exert daily their power over users (Terranova, 2022, p. 126) who "consciously or unconsciously follow their instructions," recommendations, and content (Gran et al., 2020, p. 1).

1.1. Learning Opportunities and Challenges, Socialisation, and Digital Rights

Many of the younger population are intimately familiar with digital media, seeing it as a tool for interaction with peers, identity building and expression, finding information, and having other social relationships. For example, Amaral et al. (2023) point out that 9 out of 10 young Portuguese adults (18–30 years) use mobile apps daily, and their usage involves personal context. However, it is a fallacy to consider familiarity equivalent to operational or critical knowledge or digital and social integration. Increasing digital presence in daily activities does not necessarily mean digital inclusion, algorithmic knowledge, or awareness (Gran et al., 2020). Inequalities, including digital, are structural (Brites & Castro, 2022; Helsper, 2021; Kennedy et al., 2021); they have hidden digital deserted environments (Brites & Castro, 2022) that challenge the erroneous—digitally enthusiastic—idea of the existence of digital natives (Brites & Castro, 2022; Helsper, 2021; Helsper & Eynon, 2013). This idea that youths are digital natives overlooks their varied social, educational, and cultural backgrounds, which have to be studied and analysed when considering their relationship with digital media.

When we consider young people and their use of technology, it "requires users to engage critically with the information they're seeing" (boyd, 2014, p. 180). However, "when we assume that youth will just absorb all

things digital through exposure, we absolve ourselves of our responsibility to help teenagers develop the necessary skills" (boyd, 2014, pp. 180–181). The argument is valid regarding challenges posed by algorithms, which are not neutral (boyd, 2014). We are now at a stage characterised by the recovery of "bowling alone" (Putnam, 2000), in our era centred not on TV but on the vast, fragmented, omnipresent, and algorithmised digital media and associated self-learning processes. Given the complexity of digital structures/platforms, the proposition that self-learning is sufficient and the only valued item must be considered with caution. Perhaps, more than ever, the perspective of bowling alone should be reconsidered to a demand for bowling with others in the online sphere (with equals and with more skilled mediators).

Ideally, a self-regulated learner starts by establishing goals and an action plan to achieve learning objectives (Schloemer & Brenan, 2006). Self-regulated learning theory (Zimmerman, 2002) is associated with the last decade's lifelong learning discourse (Steffens, 2008). This is an important premise for living in our ever-changing world. However, it is insufficient to ensure that citizens can access knowledge to thrive in this ever-complex information society. The introduction of information and communications technologies at school and home brought to light the role adults and youngsters have in society (Steffens, 2008), namely for social participation and democracy (Gran et al., 2020). Bearing this in a media-saturated society, why are there so few learning opportunities on how to deal with its emerging changes and complexities?

Given that the discussion about the algorithm and its implications for audiences is so recent, it is also relevant to question learning methods identified and used by young people. The expression "do it yourself" (DIY) and the promotion of a "maker culture" (Marsh et al., 2018, p. 1) have gained prominence through the impact that digital technologies have on our lives and the opening up of new means of empowerment (Gibbons & Snake-Beings, 2018). More than 20 years from the start of this millennium, the question is no longer just centred on the enthusiasm for what digital gives us as a value. Instead, it concerns whether this side of DIY remains sufficiently empowering or if it cements unregulated and unsupported processes of self-education. Above all, it delves into the perspectives of considering algorithmic processes more as friends or human-like entities (with greater emotional involvement) or as tools in relations between a servant and a master (Jang et al., 2023). Thus, the authors point out that it is important to know more about anthropomorphism's role and the differences people reveal in their relationship with machines. Learning opportunities are fundamental, especially on emerging topics with a huge presence, impact, and influence on citizens' everyday lives. Topics such as AI and algorithms remain unclear outside the "expert system" (de Bruijn et al., 2022, p. 1). Therefore, in this pressing subject, it is crucial to better understand how algorithmic contexts are identified, used, and learnt.

Oswell (2013) considers family, peer group, and school as the main socialisation institutions. Nevertheless, with the increasing presence of media in everyday life, media has become a key socialisation structure. Bronfenbrenner's (1979) suggestions about four interrelational structures are still relevant and challenged by the exponential of the media systems. In this century, the microsystem (specific environments, such as school); mesosystem (comprising relationships between environments, for example, school and family); exosystem (bringing together one or more environments that are not in direct relations with the affected individual, but still affect them, such as the political system); and the macrosystem (having to do with different cultures or subcultures and made up of the other systems, the previous ones) are increasingly intersecting with and influenced by digital-based media systems, which are becoming more dominant.

Today, the family environment is still a central institution through which young people socialise, meaning that these spaces are also spaces for informal learning, including about technology (Oswell, 2013; Seddighi et al., 2022). As the family environment and socialisation intersect with the digital innovation used at home when parents use and share technologies with their children, these are influenced by parents' algorithms (and vice-versa), namely when they use the same devices (Edgerly et al., 2018). This implies that learning contexts can be diverse, according to the family's educational and social contexts, along with individual skills. Schools are likewise facing considerable challenges in the digital age. In any case, the school has been a space for facilitating student pro-activity (Tomé, 2016) and backing knowledge demands not provided by other structures. Still, schools face difficulties with the increasing digital impacts and generational gaps. Often, school curricula disregard algorithms from core educational subjects, contributing to digital inequality.

To achieve digital inclusion, media literacy is essential; we need to leave behind the idea of digital natives and consider the varying levels of access that people have to technology (Brites & Castro, 2022; Helsper, 2021; Helsper & Eynon, 2013). Understanding the contexts in which people use algorithms is crucial, as is examining prebunking and debunking processes and their implications for diversity, especially considering that algorithms often limit diversity. This view is not unrelated to the fact that "literacy is a [digital] right. It is implicit in the right to education. It is recognised as a right, explicitly for both children and adults…included in key international declarations" (UNESCO, 2006, p. 136). These foundations are not possible to consider without further self-regulation ideas. Digital rights include access, use, content creation, protection, and participation in the digital sphere. In the algorithm era, these can be deeply compromised if we ignore or devalue the need for support through the creation of opportunities.

2. Methodological Design and Context

The article stems from the project YouNDigital–Youth, News and Digital Citizenship (https://youndigital.com), where 42 online semi-structured interviews were applied to young people (aged between 15–24; M = 21 and F = 21) living in Portugal. The interviewees were recruited through 94 institutions, associations, collectives, political parties, and NGOs, and through the non-probabilistic snowball sampling technique referred by other participants or contacts close to the research team. This qualitative and non-representative sample was structured to ensure a diverse set of interviewees, not only in terms of age and gender but also in terms of nationality and socio-economic origin. We intended precisely to capture different forms and profiles of (dis)engagement with news and algorithms in vivid and diverse life contexts. Additionally, the project team has a high record of experience working with children and young people and is familiar with ethical procedures. This project was submitted to the university's ethics committee. It is also supported by a document elaborated by the research team with the ethical standards for the entire research process of the project, including informed consents, which cover procedures so that the young people interviewed would be aware of what their participation involved for them when agreeing to be interviewed. The consent forms were signed by the guardians of the young people up to the age of 18 and by all the young people (aged 18–24). Before the interview began, the content of the consent forms was discussed with them. Furthermore, the questions and follow-ups were conducted carefully, avoiding stigmatising the young people. Names and information capable of identifying the interviewees were concealed. No personal pictures or video recordings were collected.

The interviews were supported by Zoom and lasted between 60 and 120 minutes. With one interview per participant, and to capture the audience's views within the context of the interview (Mathieu & Brites, 2014), we included in the script an activity inspired by Q-sort methodology (Schrøder, 2012), centred on influences (people, events, and contexts) that stimulate news consumption, and a second part dedicated to AI algorithms, datafication, and filter bubbles. The Q-sort-inspired activity (Figure 1) had 11 cards, of which only three were prefilled. However, their use was not mandatory as we wanted to ensure interviewees had a completely bottom-up and reflexive experience.

With a think-aloud protocol, the interviewees were asked to identify and classify people, themes, and subjects that played a role in their information-seeking routines, rating them as very important, indifferent, and not very important. The analyses presented in this article are focused on the results of part of the interview with questions based on concrete exercises and illustrative visual materials (e.g., Figure 2). Some of these were created by the team specially for use in the interview, drawing from real experiences of such arid topics.

For this article, we focused on data related to three exercises/questions: (a) A set of three print screens that reproduce Google search findings on the keyword "Marvel," carried out by a man and a woman in their 50s, and a young woman in her 20s (Figure 2); (b) an internet cartoon in which a daughter explains to the father that what he is reading on the computer is false information, with the father doubting that because the information corroborates his perspectives, about a post-truth circumstance; and (c) starting from the metaphoric example of comparing always eating the same meal or diversifying meal choices, as a point of departure for reflecting on diversity subjects and the algorithms. The interviewees answered follow-up questions such as: Have you ever heard of algorithms? In what context? Who told you about them? And, can you explain what an algorithm is to you?

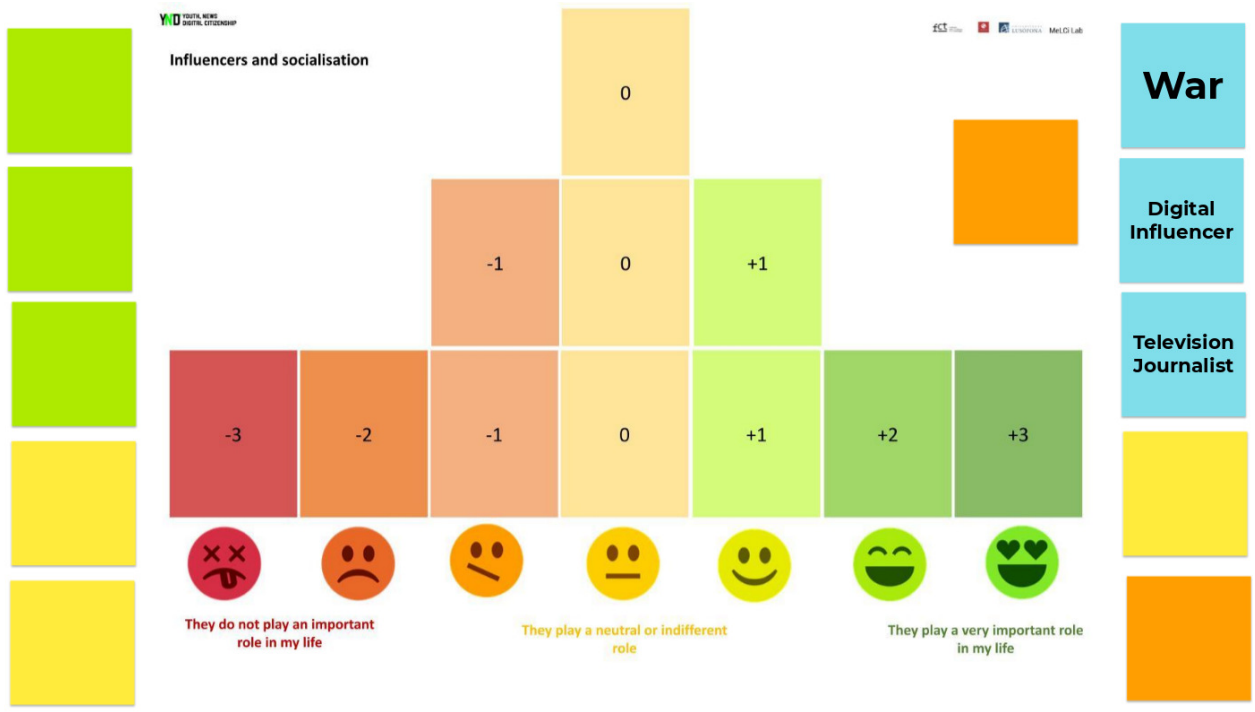

Figure 1. The Q-sort-inspired initial exercise, with prefilled cards with war, digital influencer, and TV journalist. Note: An original version of the figure was shown to interviewees in Portuguese.

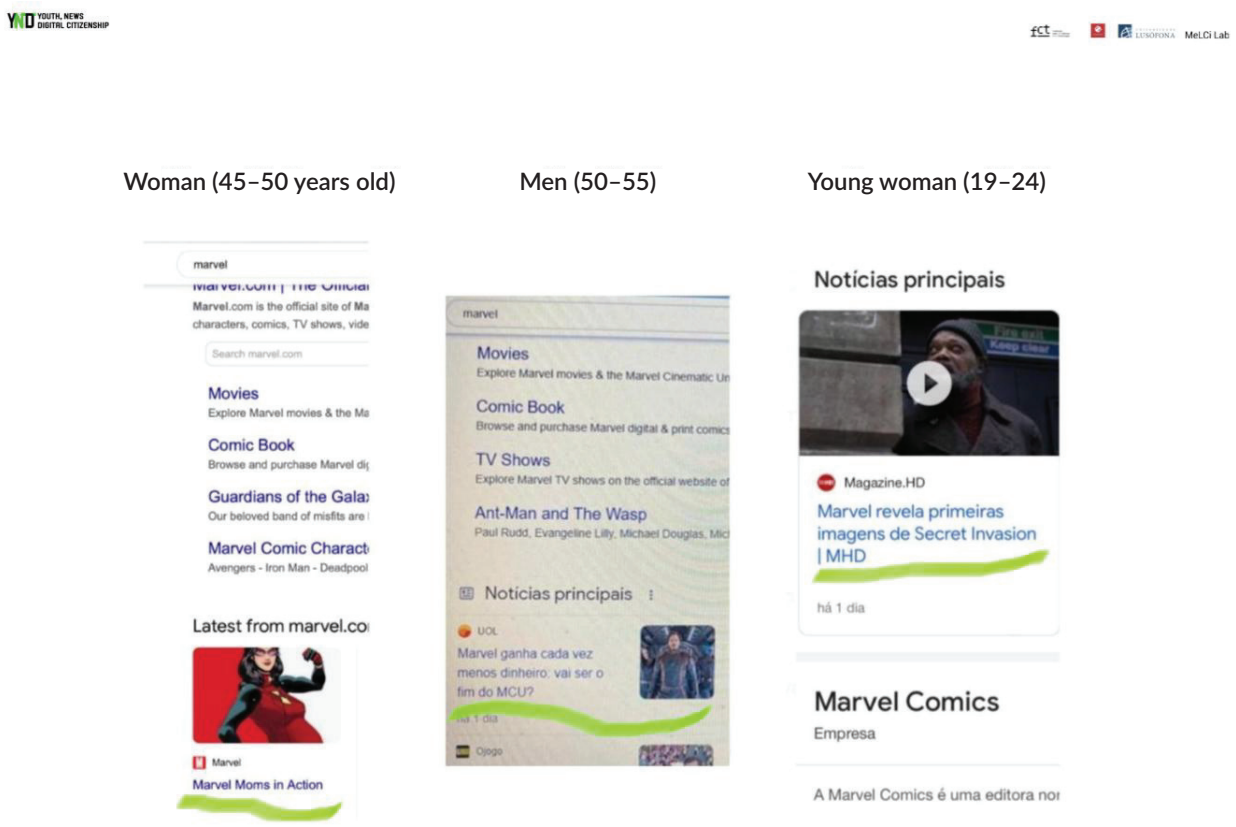

Figure 2. An example of one of the visual exercises used during the interview: Three print screens that reproduce Google search findings on the keyword "Marvel." Note: An original version of the figure was shown to interviewees in Portuguese.

Bearing in mind that we wanted to identify profiles based on their interaction with algorithms, which, to our knowledge, had not yet been empirically explored, we followed a set of procedures inspired by Stokes' (2003) proposal. We looked for patterns to arrive at profiles with similar practices and attitudes towards algorithms, including learning processes. We first analysed at a micro-level, looking at each interview and which categories emerged, making it possible to systematise what each person expressed. Then, we combined the individual elements in the collective, drawing up profiles (Ganito, 2010). Instead of considering the traditional model of drawing up profiles according to predetermined variables such as gender, age, and schooling, we started with their testimonials. The typologies were, therefore, created and emerged from the data. Afterwards, because contexts are significant, we proceeded to typify the groups by looking at their family, school, and cultural backgrounds (Brites, 2015).

In the following sections, we try to capture daily contexts with algorithms and self-learning processes among young audiences. We reflect on the following research questions:

RQ1: What is the youth's knowledge about algorithms?

RQ2: How are algorithms learned?

3. From Awkward to Enchanting

First-hand results show how young people employ strategies to bypass the influence and power of algorithms. The analyses point to five profiles that intersect knowledge of algorithms, learning contexts, and, finally, the implications these dynamics have, precisely, on the diversity exercised in these young people's day-to-day lives. Table 1 summarises the profiles and their participants.

Table 1. Five profiles and their participants.

Profile	Description	Participants' gender and nationality	Participants activity
The algorithm is an ethereal entity endowed with human faculties of action and decision (Profile 1)	This group has a broad understanding of algorithms. However, they are unfamiliar with the technical details. They learn in family and friend contexts and by themselves, namely through TikTok.	M = 3 and F = 6; Portuguese = 7 and Brazilians = 2	Diogo (18 years old) is taking a middle school vocational course in automotive mechatronics and doing an internship in the field. Carolina (15), Gabriel (17), and Filipa (17) are high school students. Samuel (17), Adriana (19), and Alice (21) are undergraduate students. Tamiris (24) has a degree and works in a digital nomad accommodation. Lara (21) is a master's student.
I am not sure I know how these things work (Profile 2)	This profile encompasses individuals who find algorithms challenging—revealing an ambivalent perspective. They mostly learn by themselves, through Instagram and TikTok, and with friends.	M = 7 and F = 8; 14 Portuguese = and Brazilian = 1	Rita (15), António (16), Madalena (16), Rita (16), and Sara (16) are high school students. Duarte (21) finished high school and works as a mechanic. Mário (24) finished high school and would like to work in IT. Martim (19), Catarina (20), Filipe (20), Laura (22), and Matilde (23) are undergraduate students. Manuel (22) has a degree and works as a physiotherapist. Luísa (24) has a degree and works as a journalist. Bernardo (23) is a master's student.
Never heard of it or do not know (Profile 3)	This group is not familiar with algorithms. Some have never heard of the algorithm.	M = 5 and F = 1; Bissau-Guineans = 2 and Portuguese = 4	Amadu (15) and Omar (16) are middle school students. Henrique (15) is a high school student. Lúcia (17) attends a high school vocational course, studying to be a hairdresser. André (20) finished high school, is unemployed, and doing voluntary work. Rafael (21) finished high school and works in a clothes shop.

Table 1. (Cont.) Five profiles and their participants.

Profile	Description	Participants' gender and nationality	Participants activity
The algorithm is essentially negative (Profile 4)	This profile encompasses young people who believe algorithms represent a danger to society. They learn about them at school, even if these learning processes are mostly technical, with family, friends, and on an individual basis.	M = 2 and F = 3; Brazilian = 1 and Portuguese = 4	Pedro (18) and Pilar (19) are undergraduate students. Joana (22), Bruna (23), and João (23) are master's students.
There is no problem if the algorithm gives us what we want (Profile 5)	This group points to the advantages of the algorithm. For them, the problem is not the algorithm but people who do not try to understand it and prefer to keep complaining about it.	M = 4 and F = 3; Portuguese = 7	Raquel (18) finished high school and did not know what she was going to do next. Sofia (18), Luís (19), Gonçalo (19), Ana (20), and Alexandre (22) are undergraduate students. José (24) is a master's student.

3.1. Profile 1: The Algorithm Is an Ethereal Entity Endowed With Human Faculties of Action and Decision

Overall, this group seems to have a basic understanding of algorithms but is unfamiliar with the core technical details. They see them as distant servant-to-master/human relations, similar to the findings of Jang et al. (2023). The interviewees point out that algorithms have unquestionable decision powers (as an ethereal entity, talented with human faculties) with the filtering and content personalisation delivered to each user based on previous searches and interests. Some mentioned that TikTok is particularly dependent on algorithms to personalise content for each user, disregarding this aspect in other platforms they also use:

> I think it's a tool produced by artificial intelligence, but of course, nowadays artificial intelligence is much more evolved and…it filters, it makes its bubble….It can generate prejudice because you don't know….You're afraid of the new because you don't have contact with the new. (Tamiris, F, 24, graduate, living and working in a digital nomads accommodation)

They mention fears and potential problems but distance themselves from them (the pronoun is used to reinforce the idea of distance), as Diogo points out. This profile positions the algorithm as something only understood by some persons (family and friends are essential models) and validated as reliable sources of knowledge:

> It was my brother who told me about them because my brother took a computer technician course. And he told me: "Be careful with algorithms; they can be good, but at the same time bad, depending on your point of view and the research you do." I never understood it, and I didn't look into it either,

> and as far as I know, from what I've learnt, the algorithm is something that is made, but which can be modified over time, for each user. (Diogo, M, 18, middle school mechanic)

As we have been pointing out, the contexts for learning about the algorithm are mainly found in spheres of proximity, such as family and friends, and on their own. In Tamiris's case, learning is mostly unidirectional, positioning herself as the recipient of information from family and friends:

> With my family and with my friends, because they're quite geeky. So they explained a lot to me about, I don't know...not, like, acronyms and how to make an algorithm, not like that. Because I wouldn't understand, because I'm a bit disconnected from technology. (F, 24, living and working in a digital nomad housing)

Despite claiming technological detachment (the distance factor), Tamiris mentioned using ChatGPT a lot in daily life and even showed the app's shortcut in her browser. When asked how she finds content that does not appear in her social media feed, she shows interest but lacks knowledge: "I don't know what to do. I don't know how to set myself up as an internet user, you know?" On the other hand, Carolina (F, 15, high school student) is not sure but states that she learnt on her own through social media as a self-taught learner: "I think I've heard more on social media explaining what it is."

While seeing algorithms as superior entities, this profile poses challenges for a deeper and daily learning process. It comprises mostly young people (with a wide age range) with an educational level in line with their ages, showing passive attitudes towards the challenges posed by the algorithm. Some interviewees expressed concern that algorithms can lead to an individualised, distanced, and hostile attitude toward diversity. They associate the algorithm with situations related to fake news and commercial purposes, such as targeting adverts based on users' interests and navigation.

3.2. Profile 2: I Am Not Sure I Know How These Things Work

Being dominant in terms of respondents, this ambivalent profile includes those who believe algorithms are not easy to understand and those who doubt their knowledge about them. Compared to Profile 1, they mostly rely on their self-learning processes (Instagram and TikTok), followed by friends' support, in a third level by family, and, at last, school. Diving deeper into their answers allows us to navigate their digital knowledge and examine their intergenerational relationships, as well as the daily implications of diversity. The answers reveal low levels of knowledge and internalised prejudices and stereotypes, particularly related to older generations. They consider people from older generations to have a lower understanding of technology and online information.

Their statements regarding the relevance of the algorithm were often ambivalent. Some think this is positive, while others believe it can limit exposure to different perspectives. Others do not have an opinion yet recognise the influence of algorithms but do not know exactly how they work: "A machine? I don't know what an algorithm is. Is it a number? A system? I can't even visualise what an algorithm would be" (Luísa, F, 24, journalist).

Despite lacking precise knowledge of how algorithms operate, young people in this profile mention actions taken to circumvent the algorithms and the information delivered to them. For example, Filipe (M, 20,

undergraduate student) stops visiting websites and unfollowing pages that portray fake news or irrelevant content, which happens mostly on Instagram. He believes this has to do with algorithms but does not recognise exactly why he correlates these two ideas. He does not know what an algorithm is but believes that his online navigation can influence it. He understands that algorithms collect information from users, tailoring their searches and narrowing them to what the algorithm thinks the user likes, which is also influenced by gender and age.

This group has different ways of learning, the most expressive is self-learning in digital spaces:

> I started to feel that a lot in TikTok. I started to realise that it was very refined to the point where what I wanted, I would receive. I'd have a conversation with someone, sometimes even in real life, which is still something that scares me to this day, and I still can't understand it 100%, or a message conversation, and suddenly a TikTok on the subject would appear. And then I began to realise the influence of the algorithm; at the time, on Twitter [now X] and Google, I didn't understand so much. Then, I started to do more research and realised what the algorithm was. Then there was also a documentary [*The Social Dilemma*]. (Martim, M, 19, undergraduate student)

Catarina (F, 20, undergraduate student) asserts that she does not talk to anyone about algorithms except when she has doubts. Still, clarifications offered by family or friends lack depth. Although the learning initiatives at school exist, they are limited, as António (M, 16, high school student) mentions: "Algorithms? I'm already learning that at school, but…we haven't learnt much yet."

As already mentioned, this group has an uncertain interpretation of algorithms, namely the possibilities in favour of the diversity of information and ways of overcoming the power of the algorithm. Their learning is centred on the process of conversation, bringing to light 20th-century conversational behaviours (Eliasoph, 1998, 2000; Jacobs et al., 2009) to the curation of news: "I don't think I ever access news with different perspectives, I just try to speak with people" (Madalena, F, 16, high school student).

Being the dominant group in quantitative terms, it can be of concern that their responses indicate that self-learning processes are dominant, above all on platforms and with friends. Though learning with family and at school is not absent, older people are seen as unskilled in these matters.

3.3. Profile 3: Never Heard of It or Do not Know

This is a coherent and differentiated group of young people who lack algorithmic competencies. Some have never heard of the algorithm (the interview was the first time they learnt about it, bringing out the educational value of this type of interview; Brites, 2015), while others had a very vague notion (they did not know or were not sure about it).

Due to this possibility, the interview included explanatory moments to proceed more adequately with the script. It was discussed how algorithms are affected and affect search results and social network feeds. For some interviewees, this is positive for finding relevant information, while others showed concerns about the lack of diversity of content. This profile includes young people with greater difficulties at school, school-year repeaters and early school leavers, and cases of those who started work early in less qualified

jobs. Lúcia (F, 17) attends a professional school, studying to be a hairdresser, and Rafael (M, 20) has finished high school and works in a clothes shop. André (M, 21), who is unemployed, doing voluntary work, and is involved with several NGOs, completed high school in the field of tourism and is looking for work. The same goes for Mário (M, 24), who is not working and would like to have a job in IT.

In this group, unlike others, the school is highlighted as the place where they talk about digital issues, very much from a technical perspective, disconnected from the social contexts related to the problems that may arise. Namely regarding diversity, as Omar (M, 16, middle school student) recalls:

> We [at school] talked a lot about the internet in those two years that I started studying ICT…a lot about online search, and the risks of the internet, which can lead you down bad paths, even to prison. Or…to a good life.

However, part of their learning is done with friends, including those who have the same level of difficulties (Brites & Castro, 2022), creating learning interactions:

> I have a friend, this was at the beginning of the war, who showed me a piece of news that I immediately realised was false. It was about the war, saying that Ukraine was bombing Russia. And that never happened. I immediately saw that it was false, so I went to see it. I went to ask my parents, and they knew it was false. And that it was Russia that had faked it, and he thought it was Ukraine. (Henrique, M, 15, high school student)

The algorithmic influence raises even more concern when decisions are based on Google's algorithm page ranking. "Whenever I don't see anything on social networks, my idea is always to search on Google until I find the thing I want to know about," says Lúcia. In her case, self-learning emphasises weak decisions as a means of learning something.

This profile, perhaps the most challenging for society and formal school contexts, also brings up the negative and unequal spiral in mixed educational, social, political, and economic extents in which some people live (Brites & Castro, 2022; Helsper, 2021; Kennedy et al., 2021). As inequalities become more evident and deeper, societies face structural, political, and social polarisation, which can be exacerbated in the digital context.

3.4. Profile 4: The Algorithm Is Essentially Negative

These young people learn about these matters equally at school, with family and friends, and individually. This profile includes more educated youth with secondary or university degrees who believe algorithms threaten society. In their criticisms, they are mostly concerned with other people and society in general, although some recognise that algorithms can have positive aspects. They most emphasised that algorithms have a negative impact, particularly regarding privacy issues and lack of personal information on the internet. In addition, algorithms can perpetuate prejudices, impact politics, and limit access to information outside one's bubble of interest.

This profile contrasts with Profile 2 because they do not outline taking individual actions in response to the issues they associate with algorithms. They rarely mention changes in their daily habits due to algorithmic

contexts: "I'm concerned about what our society is becoming. In the sense that we're becoming 'zombies' " (Pedro, 18, about to become an undergraduate student).

Bruna (F, 23, master student) relates her apprehension to mental health and mentioned speaking to her psychologist about it: "Sometimes I get tired of the internet….It seems like I'm kind of hostage to it, like, to the social network and the bubble I live in."

Believing that the algorithm is targeted and ends up being selfish in the bias it imposes, these young people see daily uses of digital information and have concerns about how the algorithm can limit people's perspectives, namely in news consumption.

3.5. Profile 5: There Is No Problem If the Algorithm Gives Us What We Want

In contrast to Profile 4, these interviewees strongly point to the positive advantages of the algorithm. For them, the problem is not the algorithm per se, but people who do not try to understand them, preferring to keep complaining about it. As a consequence, they trust the algorithms' utility. They recognise that their opinion is against the flow and might not be understood by others, so they react by saying that everyone is free to have their own opinion about the algorithms. This is the case of Sofia (F, 18, undergraduate student), who summarises the issue by stating: "We are all free to have our own opinion."

This profile favours getting tailored content (particularly on social networks like TikTok). They learn independently and with friends, and in some cases, by gaining insight from their studies (e.g., a computer engineering course). These interviewees value the utility of algorithms as positive but criticise those who misuse them or fail to adapt positively to their use:

> They're there, but I'm glad they're there. I don't have a problem with it. I have more of a problem with people not being awake enough to realise and counteract what they're being presented with. That's more of a problem for me. People don't invest their energy and time in thinking that this is a spectacular tool, it has nice things, it has some problematic things, but we can't do anything about it. (José, M, 24, master student)

We found no substantial differences between males' and females' self-confidence, signifying a change in the classic view of authors such as Young (1996), who points out that women tend to speak less of technical aspects than men and give less controversial arguments, opting for more informative issues:

> I realise that, for example, if I Google Marvel and then go to TikTok, I'll only get scenes about Marvel….I think this algorithm situation…it's extremely advantageous. I don't understand what the problem is [laughs]….I know people who say, "Oh, I'm being monitored, my mobile phone is listening to me"….Although there's always that problem, for example, if I want to look up how to make a bomb on YouTube, then I go to TikTok, and I get, like, those more Nazi organisations, I don't know what. I realise there's a problem there, but it's like this. So I think the algorithm is good in my opinion. (Sofia, F, 18, undergraduate student)

This group learns by doing, and unlike the previous groups, their knowledge is closely related to their areas of study and translated by more robust know-how. They see themselves as knowledgeable and able to

pass on this proficiency to others. We can also find, in some accounts, that they consider themselves highly skilled:

> I try to educate my friends about these areas [digital and algorithms]. I like to hang out with intelligent people and have intelligent and constructive conversations. I don't hang out with the typical testosterone, football, gym guy with nothing going on inside his head. I have no patience with that kind of person; I like to have intelligent, productive conversations. (Gonçalo, M, 19, undergraduate student)

> On YouTube, people have been talking about algorithms for ages because there's this situation where…the person is not banned, but their videos stop appearing in recommendations and other people's algorithms. So I already had that knowledge centuries before TikTok and stuff like that came along. (Sofia, F, 18, undergraduate student)

Since this profile is so in tune with the possibilities offered by the algorithm, we might assume this does not raise any problems from the point of view of a critical reading of the processes, understanding data, platformisation, and digital capacities. However, critical thinking about what is presented to them online is required, and this does not necessarily have to do with the scarcity or strong evidence of technical skills.

4. Conclusion and Future Perspectives

Analysing young people's everyday experiences and practices with algorithms—with emphasis on (RQ1) knowledge about algorithms and (RQ2) associated processes of learning—we distinguish five profiles anchored in everyday experience with algorithms: ethereal, ambivalent, unfamiliar, negative, and positive perspectives. The first profile considers the algorithm as a superior ethereal entity. Understanding algorithms as a superior divinity (with human faculties) aggravates learning processes that span between this technologically superior entity and the spheres of proximity (family and friends), as well as informal places of learning. In the second profile (the predominant group in quantitative terms), it can be of concern when the answers suggest that self-learning processes are predominant through user-generated platforms and friends. This profile also introduces other pressing issues regarding prejudices emerging from a polarised and less tolerant society, for example, towards older generations and those seen as less capable of mastering the digital world. The third profile represents the more vulnerable in the sample, those on the margins of society. It, therefore, implies a greater effort here to minimise similar scenarios that reinforce structural inequalities. Another challenge is that although school is an important source of knowledge, learning focuses more on technical aspects, and teaching/learning processes do not critically assess our data-driven and complex society. This school component is also found in the fourth profile, along with family and friends. These young people also exhibit a negative view of algorithms. On the contrary, young people in the last profile are the most fascinated with the possibilities provided by the algorithm, particularly for selecting information that matches their interests. Thus evidencing more technical knowledge than critical thinking.

The complexity of the algorithm and the lack of learning opportunities mean that even the youngest cannot be recognised as tech gurus, thus corroborating that the idea of digital natives is outdated, as already contested by some authors (Brites & Castro, 2022; Helsper, 2021; Helsper & Eynon, 2013). This also reinforces that more comprehensive knowledge is in the hands of a few, as we found in Profile 5, particularly among those

interviewees who have studied in the subject area (de Bruijn et al., 2022). In Profile 2, this lack of knowledge is mentioned by those who are not sure if they understand what algorithms are. They want to be more literate, so they learn by themselves and with friends. Given this, issues of digital exclusion should not be envisioned from the perspective of having or not having access. It is also a form of digital exclusion/inequality at a different and more critical level than that of knowledge/skills, as discussed in Profiles 1, 2, and 3.

Learning processes are limited and far from the challenges raised by citizens' daily life experiences in an increasingly digital society, and, therefore, they are more complex to decode. Learning processes are mainly associated with reliable close relationships (family and friends), including the person themselves—digitally bowling alone, going well beyond Putnam's (2000) democratic concerns about TV. School learning structures, as the data shows, are almost absent from all profiles. In the latter case, the exception is Profile 3, which is essentially the most troublesome and where the school has a learning offer based on technical issues and digital risks, ignoring that knowing about algorithms is no longer compatible with only knowing more about ICT. The lack of knowledge in this group was so evident that the interview became a learning moment (Brites, 2015). Most of the identified self-learning processes are not directly connected with the necessity for or the enthusiastic embrace of DIY contexts (Marsh et al., 2018). Rather, they focus on knowledge acquisition and improving algorithmic knowledge and awareness (Gran et al., 2020).

Regardless of the profile, even those that mention possible risks and criticise algorithms do not indicate changes in their behaviour or media consumption routines. In general, algorithms are considered as something both close to and distant from their lives. They are close because they are embedded in their digital routines and socialisation practices; however, they are not close enough to cause them to change their behaviour. This can be problematic for effective digital inclusion and for ensuring that they benefit from these digital advances; furthermore, this issue is no longer limited to vulnerable groups (Brites & Castro, 2022).

The relationship described in this article between knowledge of algorithms and (self-)learning contexts is challenged by algorithms being identified as a valued feature and young people not recognising that algorithms can be biased and that they can narrow one's perspective. In both cases, the algorithm reinforces one's opinion, excluding those outside one's sphere. The algorithm is understood as a reliable gatekeeper and curator that does a silent but effective job. From the perspective of critical media literacy, this rationale is not without its challenges because the responses also reveal some parsimony—more than expected—in critically thinking about what the algorithms present.

Given these findings, this study raises possibilities for additional research within this project by creating synergies with other present and future studies. Further research could explore particularly the gender dimensions, which, in this case, surprisingly appear without significant gaps contrary to what Young (1996) found at the turn of the last century. Nevertheless, how algorithms impact news perceptions and consumption from the gender dimension is likewise a topic that needs to be researched in greater detail. The results also indicate pathways for creating training programs focused on strategies for dealing with algorithms and reflections based on statements made during the interviews, for example, "My mobile phone is listening to me." The social and educational emergency raised by Profile 3 is pressing, especially when polarization is also evident in communities where the weight of low digital skills is greater. It was with great surprise that we realised that they rarely mention school. When they do, it often reveals that the educational

offer is outdated in these subjects and focused on basic aspects of ICT. The results also imply that schools need to strengthen their role. This is only possible through training as these subjects go beyond traditional ICT and require knowledge anchored in the everyday (digital) challenges and opportunities. Another facet that requires greater thoroughness is the observation of diversity issues—how they imply and are implied by the algorithm—and the strategies to deal with them. Hence, the need to strengthen the school's position in this area needs careful attention from policymakers. A field so relevant to daily life requires more than a random and soft learning process with social networks, friends, and family.

Results also indicate what mechanisms youth activate to circumvent the power of the algorithm and suggest a positive side: they facilitate access to what matters to them personally. However, we cannot overlook diversity and related issues arising from the expansion of the digital world, by disregarding human and digital rights towards media and digital literacies (UNESCO, 2006). In other words, despite the opacity and complexity of technology, we cannot forget that human rights to information and access to education have to be followed, even when we seem to be facing scenarios for which there are still many rules and supporting legislation. Otherwise, we will not be able to avoid the digital landscape being locked in a very problematic black box.

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Conflict of Interests

The authors declare no conflict of interests.

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Digital Inclusion Through Algorithmic Knowledge: Curated Flows of Civic and Political Information on Instagram

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Abstract

Social media platforms are a critical source of civic and political information. We examine the use of Instagram to acquire news as well as civic and political information using nationally representative survey data gathered in 2019 in the US, the UK, France, and Canada (n = 2,440). We investigate active curation practices (following news organizations, political candidates or parties, and nonprofit organizations or charities) and passive curation practices (liking friends' political posts and those from parties or politicians and nonprofits or charities). Young adults (18 to 24 years) are far more likely to curate their Instagram feed than older adults in all four countries. We consider two possible explanations for this behavior: political interest and an understanding of how algorithms work. Young adults have more (self-assessed) knowledge of algorithms in all four countries. Algorithmic knowledge relates to curation practices, but there are some cross-national differences. Algorithmic knowledge is theoretically relevant for passive curation practices and the UK sample provides support for the stronger role of algorithmic knowledge in passive than active curation. In all four countries, political interest positively relates to active and passive curation practices. These findings challenge depictions of young adults as news avoiders; instead, they demonstrate that algorithmic knowledge can help curate the flow of information from news organizations as well as civic and political groups on Instagram. While algorithmic knowledge enables youth's digital inclusion, for older adults, the lack of knowledge may contribute to digital exclusion as they do not know how to curate their information flows.

Keywords

algorithmic knowledge; civic information; digital inclusion; Instagram; news; political interest

1. Introduction

Digital inclusion can be defined as "the activities necessary to ensure that all individuals and communities, including the most disadvantaged, have access to and use of information and communication technologies (ICTs)" (National Digital Inclusion Alliance, 2024). Access to information is a key purpose for the use of ICTs. This article will focus on digital access to civic and political information. Globally, citizens increasingly use digital platforms to access news, according to the *Reuters Institute Digital News Report* (Newman et al., 2020, 2023). Various studies examine access to news, finding that young citizens tend to seek or engage with news less frequently (Andersen et al., 2021; Eddy, 2022; Karlsen et al., 2020). Young citizens are especially reliant on digital platforms for news (Eddy, 2022). Thus, the affordances or architectures (Bossetta, 2018; Evans et al., 2017) of digital platforms affect the flow of civic and political information. Algorithms play an increasingly relevant role in accessing information on digital platforms; algorithmic knowledge differs by sociodemographic characteristics (Cotter & Reisdorf, 2020; Gran et al., 2021). From the perspective of digital inclusion research, algorithmic knowledge can constitute an asset that facilitates digital access to information (cf. Reisdorf & Rhinesmith, 2020). Young citizens tend to report higher levels of algorithmic literacy (Cotter & Reisdorf, 2020; Dogruel et al., 2022; Gran et al., 2021). Little is known, however, about how young citizens employ their algorithmic knowledge when curating their civic and political information flows on social media platforms.

When researching young citizens' digital access to information, it is important to consider their online information repertoires. Despite the increasing diversity of platform uses, research centers on a handful of platforms, especially Facebook and Twitter (Matassi & Boczkowski, 2023). In this regard, research output does not align with actual adoption rates. Instagram, for example, is more popular than Twitter in the UK, France, Canada, and the US (Newman et al., 2023). Still, Twitter studies are far more numerous than Instagram studies. Instagram use is growing (Newman et al., 2020, 2023); it is the most popular platform for those aged 18 to 24 (Newman et al., 2023). American research suggests that among teens, YouTube and TikTok are the most popular, with Instagram in third place (Vogels et al., 2022). Yet, we know little about how this platform is used to access civic and political information. Existing scholarship on Instagram has focused on students or youth exclusively (Alhabash & Ma, 2017; Kircaburun et al., 2020; Shane-Simpson et al., 2018; Sheldon & Bryant, 2016), which makes it difficult to know if observations about Instagram relate to the platform and its affordances (Evans et al., 2017) versus the distinct characteristics of its young user group.

Instagram enables users to follow civic and political accounts to increase access to civic and political information. However, following news organizations, civic groups, and political parties represents only one method of obtaining civic and political content on one's Instagram feed. Instagram's feed is determined, in part, by an algorithm (Bossetta, 2018). Users can engage (i.e., like) with civic and political content when friends, groups, or organizations post this content. This engagement with content provides input to the algorithm that this content interests the user. The algorithm should respond to this input by showing more of this type of information, as the algorithm is designed to provide relevant content to increase the time spent on the platform (Feezell et al., 2021; Thorson et al., 2021).

We explain these practices using the concept of "curated flows" (Thorson & Wells, 2016; Wells & Thorson, 2017) and the idea of active and passive customization (Cotter et al., 2019). Instagram users can actively curate political information on their feeds by following various groups and organizations (Cotter et al., 2019; Thorson & Wells, 2016; Wells & Thorson, 2017). Direct access through following accounts (active curation) requires

little understanding of how algorithms work. Users can also passively (or indirectly) curate the flow of this content by engaging with it and signaling to the algorithm what content they want to see (Cotter et al., 2019; Thorson & Wells, 2016). The study of liking as passive curation and the role of algorithmic knowledge in this passive curation are distinct contributions to the scholarship. In this article, we consider how age impacts the likelihood of engaging in civic and political information curation on Instagram, as well as the roles of political interest and self-assessed understanding of how algorithms work in this process. We test the robustness of our theoretical model across four Western democracies, offering a cross-national perspective related to algorithmic knowledge and curation practices.

Using a 2019 survey in four countries (n = 2,440), we find young adults are far more likely to curate civic and political information flows on Instagram than older age groups. This finding replicates across the four countries. Young people engage in active curation by following news organizations, political candidates or parties, and nonprofit organizations or charities, as well as passive curation by liking political content from friends, civic groups, and political candidates. We show that self-assessed knowledge of algorithms correlates with curation practices; the strength of this correlation depends on the country. In all countries, young adults report a higher self-rated understanding of algorithms than older adults. These findings challenge depictions of young adults as passive media consumers or news avoiders. It speaks to algorithmic knowledge as an asset (Reisdorf & Rhinesmith, 2020) that can facilitate digital inclusion, specifically in the context of civic and political information.

Our findings speak to a theme of digital inclusion, highlighting Instagram as a space for inclusion and youth's algorithmic knowledge as an asset for inclusion. Young adults use their understanding of algorithms to opt into receiving civic and political information. Young adults' inclusion on Instagram sharply contrasts discourses about youth's news avoidance or avoidance of traditional news (e.g., Andersen et al., 2021; Eddy, 2022; Toff & Kalogeropoulos, 2020). While we provide support for young adults' digital inclusion in civic and political uses of Instagram, we also document older adults' relative lack of inclusion. Older adults are less likely to report being knowledgeable about algorithms. Their lack of understanding may limit their ability to curate information flow on digital platforms that employ algorithms.

2. Curated Flows and Age Differences

Instagram use is growing (Newman et al., 2020, 2023). From 2020 to 2023, the *Reuters Institute Digital News Report* shows that Instagram use increased in France from 27% to 34% and in the UK from 30% to 36% (Newman et al., 2020, 2023). Regarding news use, the numbers increased from 9% to 16% in France and 3% to 6% in the UK. In the US and Canada, Instagram use and news consumption on this platform have remained consistent (Canada: 35%; US: 35%; news consumption in Canada: 10%; news consumption in the US: 12%).

Like most social media platforms, Instagram allows users to follow civic organizations and political groups to access civic and political information. Thorson and Wells (2016, p. 314) describe five sets of actors that contribute to one's flow of information on social media: journalists, strategic communicators, individual media users (personal curators), social contacts, and algorithmic filters. They explain that:

> An individual receives a given message because of its selection by at least one of the entities present in their personal "public": because a peer has sent it to them, or a newspaper they follow has posted

> it, or they have searched for it, or a strategist has paid for them to see it, or an algorithm thinks they might like it. (Thorson & Wells, 2016, p. 317)

Following a civic or political group or a news organization is part of cultivating one's "news feed" in the language of Facebook, the platform they study. Thorson and Wells (2016) describe this process as "curated flows." Other scholars have considered unfollowing or unfriending as well as changing settings as part of curation practices (Duggan & Smith, 2016; Gagrčin et al., 2023; Swart, 2021).

The concept of curation has been tested in other studies. For example, Gagrčin et al. (2023) examine curation, defined as following or reacting to news content, political organizations, or individuals and unfollowing/refraining from interacting with content. They do not test algorithmic knowledge but instead build in this idea with their measure, framing following as a desire to see more of this content and unfollowing as a desire to see less of it. Their measure combines both activities. They find that news curation affects campaign participation and vote choice certainty but does not affect turnout, attitude reinforcement, or affective polarization using a two-wave panel of Germans. We extend curation practices beyond these following activities, offering more nuances (active and passive curation) as well as introducing the concept of algorithmic knowledge to better understand passive curation as a strategic activity that is connected to political interest and helps to explain age differences in informational uses of Instagram.

Instagram users can passively (or indirectly) curate the flow of this content by engaging with it and signaling to the algorithm what type of content they want to see. Cotter et al. (2019) distinguish these processes as active customization (users decide who to follow/friend) and passive customization (users interact with content, i.e., click Like on posts). They find that passive customization positively relates to knowledge about algorithms and exposure to political content. We combine these concepts into "active curation" (following accounts with the desired information) and "passive curation" (engaging with the content to signal to the algorithm that more of this information is desirable).

Clicking on a news story will signal to the algorithm that this is preferred content; thus, a user wants to see more of it (Cotter et al., 2017; Thorson & Wells, 2016). The algorithm is designed to increase people's platform use (Thorson et al., 2021). While liking posts on social media has been dismissed as clicktivism or slacktivism (Vitak et al., 2011), liking has clear implications on algorithms and thus can be considered a legitimate way to invite more civic and political content onto one's news feed. However, viewing this activity as a strategic curation method assumes that the user knows how algorithms work. Different platforms track users' activities to differing degrees, a process known as datafication (Bossetta, 2018; Gagrčin et al., 2023; Poell et al., 2019; Thorson et al., 2021).

Instagram is a distinctive platform due to the age-related homophily in the user group. Specifically, 73% of young adults aged 18 to 24 use Instagram compared to 14% of seniors (Boulianne & Hoffmann, 2022). The portion of young adults on this platform is consistent in four Western democracies: the US, the UK, France, and Canada (Boulianne & Hoffmann, 2022). Pew Research Center suggests that Instagram use among American teens increased substantially between 2014/2015 and 2022 (Vogels et al., 2022). While few Instagram users follow news organizations on this platform, young adults are three times more likely to do so than seniors (Boulianne & Hoffmann, 2022). Moving beyond this single measure of news consumption, we examine age differences in curating civic and political information on Instagram. In this article, civic and

political information refers to Instagram posts from news organizations, political parties and candidates, and nonprofit organizations or charities, such as an environmental organization or the Red Cross. Furthermore, we seek to assess whether the differences are more prominent in the active versus passive curation of political information on Instagram:

> H1: Compared to older adults, young adults engage more frequently in active and passive curation of political information on Instagram.
>
> RQ1: Are age differences larger for active or passive curation on Instagram?

3. Algorithmic Knowledge

Instagram feeds are "moderately filtered" and organized chronologically, whereas Facebook feeds are "heavily filtered" and based on an algorithm that defines relevance (Bossetta, 2018). However, users can still game the Instagram algorithm to tailor the content that they want to see. Of course, algorithms also operate for news platforms and on Google (Haim et al., 2018), but this article focuses on Instagram.

Scholars point out that few people are aware of the role of algorithms in producing the content they see (Dogruel et al., 2022; Eslami et al., 2015; Gran et al., 2021; Hargittai et al., 2020; Rader & Gray, 2015; Zarouali et al., 2021). Older adults are less aware of how the Facebook algorithm works than young adults; this pattern has been replicated in surveys (Cotter & Reisdorf, 2020; Gran et al., 2021) and qualitative interviews (Dogruel et al., 2022). While this awareness of algorithms has been studied in relation to Facebook (Zarouali et al., 2021), we know little about people's understanding of Instagram's algorithm (Cotter, 2019; Swart, 2021) and the implications of this algorithmic knowledge on the ways that people access civic and political information on Instagram. As noted by various scholars, we have yet to understand how awareness of algorithms shapes how people use any platform (Hargittai et al., 2020; Zarouali et al., 2021), aside from a handful of qualitative studies of influencers (Cotter, 2019) and entrepreneurs (Klawitter & Hargittai, 2018):

> H2: Knowledge of algorithms positively relates to the active and passive curation of information flows on Instagram.s
>
> RQ2: Does knowledge of algorithms matter more for passive versus active curation on Instagram?

4. Political Interest

Political interest is a key motive for accessing civic and political information. While prior generations were motivated to consume civic and political information due to their sense of civic duty (Eddy, 2022), contemporary generations are motivated by political interest (Boulianne & Shehata, 2022). If they are not interested, they will likely avoid the news. Toff and Kalogeropoulos (2020) show that news avoidance is more common among young people than older people based on their 35-country sample. Karlsen et al. (2020) found that online news sources compensated for news avoidance of legacy media among young people, making age differences in news avoidance less pronounced but still significant in Norway from 1997 to 2016. Marquart et al. (2020) use a sample of Danish youth to examine who follows politicians on social media (Instagram and other social media). They find that political interest is the strongest predictor of

whether people follow politicians on social media. According to their survey, following politicians increases campaign participation among youth. As such, political interest is a critical variable for understanding the motivation to curate information flows to access civic and political information online.

A strength of the curated flow framework, according to Thorson and Wells (2016, p. 316), is "the ability to connect curation actions (personal filtering) with individual-level characteristics (partisanship, level of interest in politics, ability to customize digital flows)." Personal interest is an important predictor of these personal curation practices (Wells & Thorson, 2017). Furthermore, Thorson et al. (2021) use political interest as a predictor of active customization of content on Facebook, which triggers the algorithmic inference about interests and increases exposure to news and politics. To follow up on this finding and test the assumptions of the curated flows framework, we use a representative sample from four countries to examine the role of political interest in curating news and political information on Instagram:

H3: Political interest positively relates to active and passive curation of information flows on Instagram.

RQ3: Does political interest matter more for active versus passive curation on Instagram?

Figure 1 summarizes the hypotheses and research questions up to this point. While we rely on scholarship that tests one dimension of this complex figure, we offer a more holistic view of how age, algorithmic knowledge, political interest, and (active and passive) curation practices are interconnected. In particular, we consider more complex relationships (pathways) mediated through the key variables of political interest and understanding of algorithms.

The algorithm is designed to consider a user's age and social network activities to predict content that will resonate with a user (Feezell et al., 2021). In particular, if the algorithm has determined that young people are not interested in news and politics, it may decrease exposure to this type of content. With our final research question, we examine the extent to which age differences in curation practices are mediated by an understanding of algorithms and political interest:

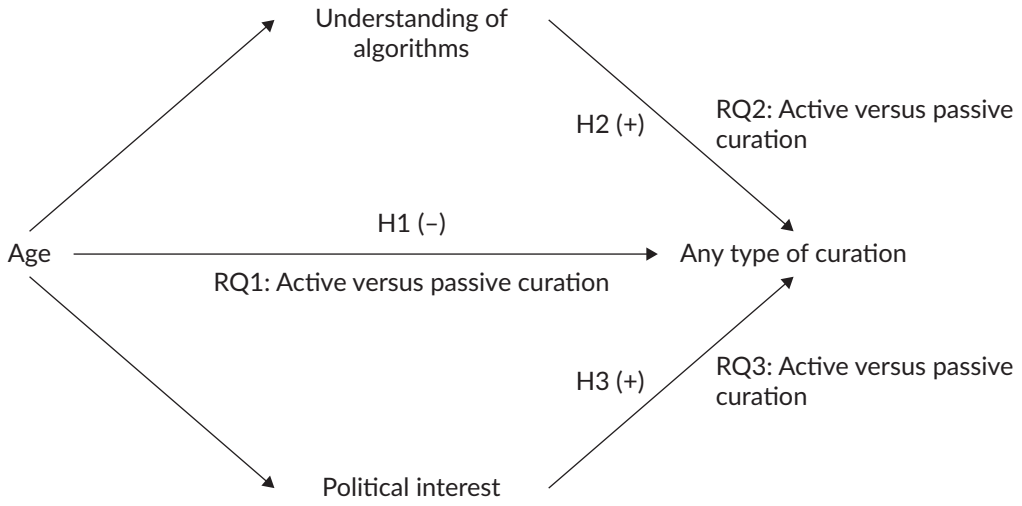

Figure 1. Conceptual model.

RQ4: To what extent are the age differences in curation practices mediated by knowledge of algorithms and political interest?

In other words, once we account for these critical mechanisms, do (direct) age differences persist, or do these two variables explain away the age differences we observe in relation to H1?

5. Methods

5.1. Sample

From September to November 2019, Kantar surveyed citizens in the US, Canada, France, and the UK using a questionnaire that the authors designed. The sample is based on an online panel with quotas to ensure the age, education, and sex representation of the population in each country. Respondents had to be at least 18 years old to participate. Including all ages in a study of Instagram is an important contribution to this field, enabling an analysis of age differences. The study is funded through the (Canadian) Social Sciences and Humanities Research Council and the other countries are chosen with Canada in mind: the US as Canada's only neighbour as well as France and the UK as the colonizing countries for Canada. The survey received human subjects ethics approval before data collection (File No. 101662), according to Canada's *Tri-Council Policy Statement: Ethical Conduct for Research Involving Humans*. The data and replication files are posted at https://doi.org/10.6084/m9.figshare.25483858.v1.

5.2. Measures

For those who reported Instagram use (n = 2,440 of 6,291) in the past year, we asked follow-up questions. For *active curation*, we used the approach from Cotter et al. (2019) and asked about following politicians, advocacy groups, and news organizations. We asked this as a series of yes/no questions, whereas they used a statement (i.e., I follow a lot of…) and a Likert or agreement scale. Guess et al. (2019) compare digital trace and survey data, finding that respondents are fairly accurate in reporting about the following of political figures. We asked whether the user followed on Instagram (a) a political party or candidate, (b) news organizations, and/or (c) nonprofit organizations or charities, such as an environmental organization or the Red Cross. Pooling across the countries, 14% of respondents followed a political party or candidate, 16% followed a news organization, and 14% followed a nonprofit organization or charity. In sum, these activities are rare. We added these different measures of active curation (0 to 3, Table 1, average = 0.44, SD = 0.78).

To measure *passive curation*, we also asked if users liked political posts from (a) their friends, (b) political parties or candidates, and/or (c) nonprofit organizations or charities. While Cotter et al. (2019) include liking as an activity, they combine this measure with reading a news story, watching a video about news, commenting on a news story, and sharing political posts on Facebook, which introduces some conceptual blurriness as commenting and posting political content are forms of political expression on social media rather than a curation of information (Lane et al., 2022). As noted, Gagrčin et al. (2023) do not consider these passive forms of curation. Again, we observe that these practices are rare. Pooling results from all countries: 23% of respondents have liked a friend's post, 18% have liked a nonprofit's post, and 16% have liked a post from a political party or candidate. We added these different passive curation measures (0 to 3, Table 1, average = 0.57, SD = 0.89).

Finally, we summed up all six activities to analyze any type of curation. On average, respondents engaged in one curation practice on a scale of 0 to 6 practices. All three measures of curation have a highly skewed distribution. As such, we performed a series of robustness tests to make sure the findings hold. We recoded the three curation variables into binaries (0 or 1) and repeated all of the analysis. Since the coefficients were similar whether curation was analyzed as count or dichotomous variables, we report on the count variables.

Several scholars have experimented with ways of measuring understanding or awareness of algorithms. Hargittai and Micheli (2019) include "algorithms" as a digital concept and use respondents' self-assessed understanding of this concept as part of a scale of internet skills. The measure captures "awareness and understanding of the systems that operate behind-the-scenes to bring content to users" (Hargittai et al., 2020, p. 765). We asked respondents to rate their understanding of a series of digital concepts, but for this article, we focus on "algorithm." Respondents selected responses from 1 (*no understanding*) to 5 (*full understanding*). The average score was 2.98 (SD = 1.36; Table 1).

Single-item measures of algorithmic knowledge are popular in this field of study. For example, in their paper examining age differences in algorithmic knowledge among Norwegians, Gran et al. (2021) asked respondents: "What kind of awareness do you have of algorithms being used to present recommendations, advertisements, and other content on the internet?" (p. 1783). Like our measure, they have a 1 (*no awareness*) to 5 (*very high awareness*) scale. They provide an extensive defense of their single-item measure (see Gran et al., 2021, p. 1783). In contrast, Zarouali et al. (2021) offer a more robust "algorithmic media content awareness scale" with five factors measured with 17 survey questions. Unfortunately, their scale has not been tested in relation to Instagram (only Facebook, YouTube, and Netflix). Also, we collected survey data before the availability of this new robust scale, so we are limited to a single item to measure the

Table 1. Descriptive statistics for the subsample of Instagram users.

	All countries (n = 2,440)	US (n = 699)	UK (n = 575)	France (n = 538)	Canada (n = 628)
Females (0 or 1)	57.50%	51.93%	65.91%	55.20%	57.96%
Education (1–4)	2.06 (1.08)	2.32 (1.11)	1.98 (1.08)	1.86 (1.08)	2.03 (0.99)
Age (18–91)	39.28 (15.03)	38.21 (13.85)	37.85 (14.10)	39.41 (15.55)	41.65 (16.37)
Frequency of Instagram use (1–4)	3.26 (0.79)	3.38 (0.76)	3.30 (0.80)	3.16 (0.79)	3.18 (0.79)
Understand algorithms (1–5)	2.98 (1.35)	3.21 (1.35)	2.75 (1.34)	3.03 (1.34)	2.89 (1.35)
Political interest (1–4)	2.68 (0.96)	2.91 (0.96)	2.60 (0.91)	2.48 (0.95)	2.66 (0.94)
Passive curation (0–3)	0.57 (0.89)	0.73 (1.00)	0.45 (0.79)	0.56 (0.85)	0.50 (0.84)
Active curation (0–3)	0.44 (0.78)	0.52 (0.83)	0.35 (0.71)	0.46 (0.77)	0.40 (0.77)
Curation (0–6)	1.00 (1.46)	1.25 (1.63)	0.80 (1.31)	1.03 (1.36)	0.90 (1.43)

understanding of algorithms. Other studies use qualitative interviews to assess awareness of algorithms (Dogruel et al., 2022; Hargittai et al., 2020; Rader & Gray, 2015). Cotter and Reisdorf (2020) explain that their survey was not designed to measure algorithmic knowledge, but they asked a question about people's perception that the following factors influence search engine results: location, history, relevance to search terms, advertising, and websites' popularity and online visibility.

Political interest was measured by responses to: "How interested would you say you are in politics?" The response options range from 1 (*not at all interested*) to 4 (*very interested*). The average is 2.68 ($SD = 0.96$; Table 1).

We control for the overall frequency of Instagram use as this use may impact network size (active curation) and understanding of algorithms. We asked respondents how often they used Instagram in the past 12 months (never, rarely, sometimes, and often). Also, we control for education (four categories) and age, which relate to views about algorithms (Gran et al., 2021). Table 1 provides descriptive statistics for these variables based on the subset of Instagram users in our cross-national sample.

6. Findings

To begin, we present Pearson's correlations among the variables (Table 2). The American Psychological Association encourages studies using structural equation modeling to include a correlation matrix (Appelbaum et al., 2018); as such, we follow this advice. We observe that active and passive forms of curation are highly correlated ($r = 0.533$, $p < 0.001$, Table 2). Furthermore, our key variables (age, understanding of algorithms, political interest, and different approaches to measuring curation) are significantly correlated ($p < 0.001$). In particular, age negatively correlates to the understanding of algorithms ($r = -0.224$, $p < 0.001$). Age also negatively correlates with curation practices ($r = -0.167$, $p < 0.001$) with small variations for active versus passive curation (within 0.04). Age positively correlates with political interest ($r = 0.125$, $p < 0.001$). In other words, young people are more likely to self-report understanding algorithms and engagement in curation practices but are less interested in politics. We also note that understanding of algorithms positively correlates with curation practices ($r = 0.267$, $p < 0.001$); the correlations do not differ much for active versus passive curation (within 0.03). Political interest positively correlates with curation practices ($p < 0.001$) with a stronger correlation for passive versus active curation (difference of 0.05).

Figure 2 presents a structural equation model that summarizes the relationships among the key variables. We used Amos 29 for this analysis, which enables testing of the direct and indirect relationships among variables. Standardized estimates from maximum likelihood estimations are reported. All models control for the effects of gender, education, and frequency of Instagram use on curation, algorithms, and political interest, but to simplify the figures, we do not report all these relationships. Instead, the complete set of results can be found in Table 3. Amos requires valid responses on all variables used in the analysis (listwise deletion); as such, the analysis is based on the subset that had valid responses on all survey questions used in this article ($n = 2{,}440$).

Older people are less likely to report their understanding of algorithms and less likely to engage in any type of curation (H1: -0.14^{***}); older people report greater interest in politics compared to younger people.

Table 2. Correlation matrix.

		Curation	Active	Passive	Females	Education	Age	Use	Algorithm
Curation	*r*	1							
	p								
Active curation	*r*	0.857	1						
	p	< 0.001							
Passive curation	*r*	0.893	0.533	1					
	p	< 0.001	< 0.001						
Females	*r*	−0.072	−0.064	−0.063	1				
	p	< 0.001	0.002	0.002					
Education	*r*	0.137	0.113	0.125	−0.021	1			
	p	< 0.001	< 0.001	< 0.001	0.293				
Age	*r*	−0.167	−0.128	−0.163	−0.128	−0.007	1		
	p	< 0.001	< 0.001	< 0.001	< 0.001	0.712			
Frequency of Instagram use	*r*	0.218	0.171	0.209	0.103	0.076	−0.240	1	
	p	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001		
Understand algorithm	*r*	0.267	0.220	0.247	−0.149	0.243	−0.224	0.125	1
	p	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	
Political interest	*r*	0.321	0.257	0.303	−0.229	0.210	0.125	0.027	0.295
	p	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	0.188	< 0.001

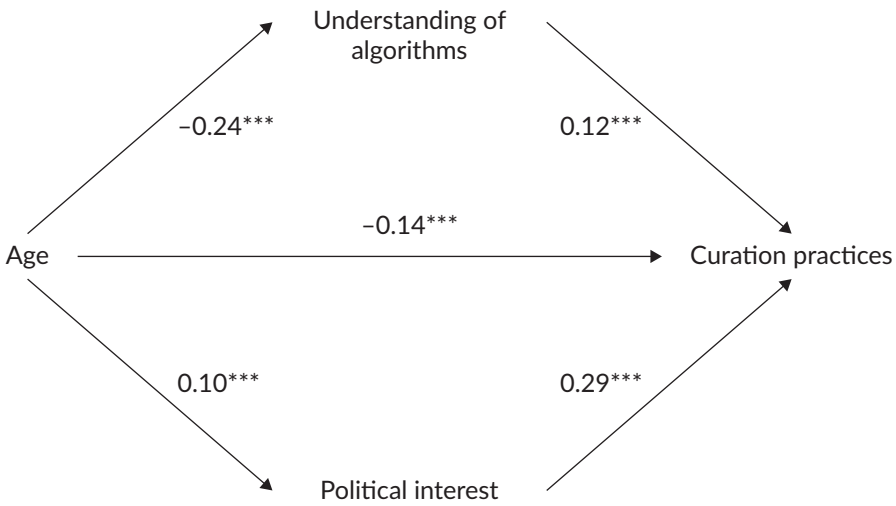

Figure 2. Any curation. Note: * $p < 0.05$, ** $p < 0.01$, and *** $p < 0.001$.

Self-reported understanding of algorithms (H2: 0.12***) and political interest (H3: 0.29***) positively relate to curation practices.

RQ1 to RQ3 consider whether the effects of key variables differ for active curation versus passive curation. Figures 3 and 4 summarize these results and Tables 3 and 4 provide the full set of results. The figures replicate the results in Figure 2. The processes are quite similar for active versus passive curation. The estimates for age and active versus passive curation (RQ1) are within 0.03 (RQ1). As for RQ2, algorithmic knowledge has a similar role in active versus passive curation (0.11***). Related to RQ3, political interest is more strongly related to passive than active curation (0.28*** versus 0.23***).

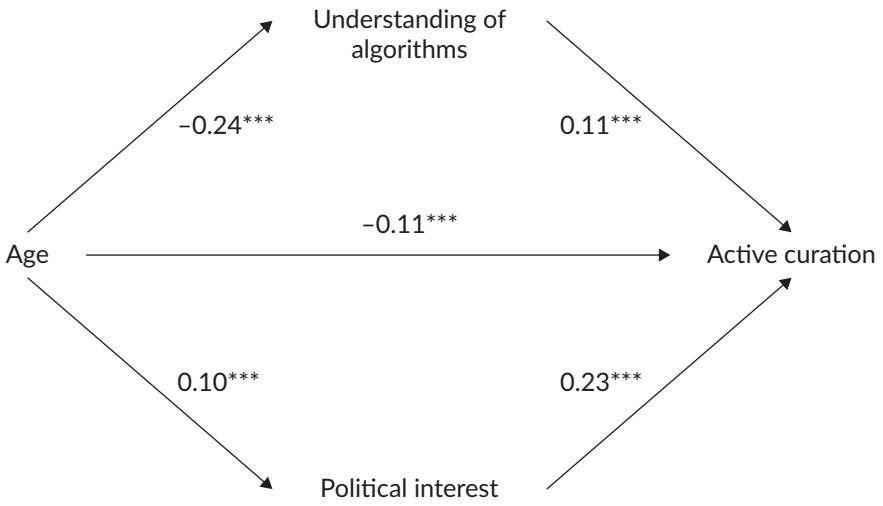

Figure 3. Active curation. Note: * $p < 0.05$, ** $p < 0.01$, and *** $p < 0.001$.

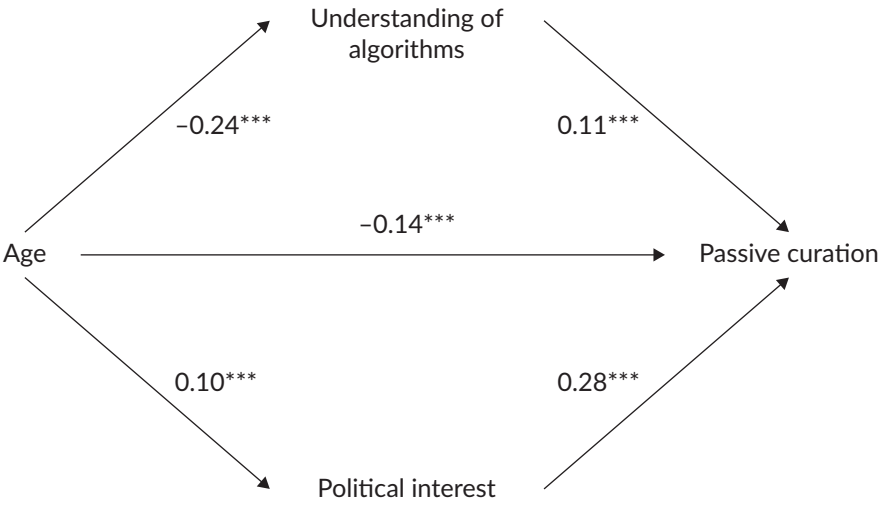

Figure 4. Passive curation. Note: * $p < 0.05$, ** $p < 0.01$, and *** $p < 0.001$.

Table 3 offers the full set of results for the analysis in Figures 2, 3, and 4. Education positively relates to the understanding of algorithms, whereas being female negatively relates to algorithmic understanding. Age is the only demographic variable that significantly relates to curation practices. The frequency of Instagram use positively relates to all types of curation practices.

Related to RQ4, we find that the indirect effects (which include the mediated effects through political interest and understanding of algorithms) are not statistically significant (standardized effect of 0.003 or less depending on the type of curation). While age has large significant effects on curation practices, these effects are direct rather than indirect.

We outlined a robust theoretical model connecting age, algorithmic understanding, political interest, and curation practices, which should replicate across the different countries. In the following figures, we outline the country-specific results. In Figure 5, we present the results for any type of curation. In all four countries,

Table 3. Full mediation model results for different curation practices.

				Estimate	Standard error	*p*	Standardized estimates
Coefficients for all models of curation	Algorithm	←	Age	–0.022	0.002	***	–0.244
	Political interest	←	Age	0.006	0.001	***	0.100
	Political interest	←	Education	0.182	0.017	***	0.207
	Algorithm	←	Education	0.298	0.024	***	0.236
	Algorithm	←	Females	–0.481	0.052	***	–0.175
	Political interest	←	Females	–0.409	0.037	***	–0.213
Curation practices (0–6)	Curation	←	Age	–0.014	0.002	***	–0.142
	Curation	←	Algorithm	0.128	0.021	***	0.122
	Curation	←	Political interest	0.438	0.029	***	0.291
	Curation	←	Frequency of Instagram use	0.300	0.034	***	0.165
	Curation	←	Education	0.045	0.026	0.081	0.034
	Curation	←	Females	–0.067	0.056	0.229	–0.023
Active curation (0–3)	Curation	←	Age	–0.005	0.001	***	–0.106
	Curation	←	Algorithm	0.059	0.012	***	0.105
	Curation	←	Political interest	0.182	0.016	***	0.226
	Curation	←	Frequency of Instagram use	0.126	0.019	***	0.129
	Curation	←	Education	0.022	0.014	0.129	0.031
	Curation	←	Females	–0.036	0.031	0.244	–0.023
Passive curation (0–3)	Curation	←	Age	–0.008	0.001	***	–0.140
	Curation	←	Algorithm	0.069	0.013	***	0.108
	Curation	←-	Political interest	0.256	0.018	***	0.278
	Curation	←	Frequency of Instagram use	0.174	0.021	***	0.157
	Curation	←	Education	0.023	0.016	0.143	0.029
	Curation	←	Females	–0.031	0.035	0.367	–0.018

older adults are less likely to engage in any type of curation practices (H1) and political interest positively correlates with curation practices (H3). In addition, in all four countries, older adults report lower levels of algorithmic understanding. Algorithmic knowledge is positively related to curation practices in three of the four countries with Canada being the exception (H2).

Age is more strongly associated with political interest in Canada (0.18***) than in other countries. While we do not have an explicit hypothesis about age and political interest, this finding has implications for H4, which examines indirect pathways between age and curation (through political interest and algorithmic knowledge). Specifically, we find that the indirect effects (0.033) are stronger in Canada because of the stronger relationships on this pathway from age to political interest to curation. However, overall, the effect of age on curation practices is direct rather than mediated through other variables.

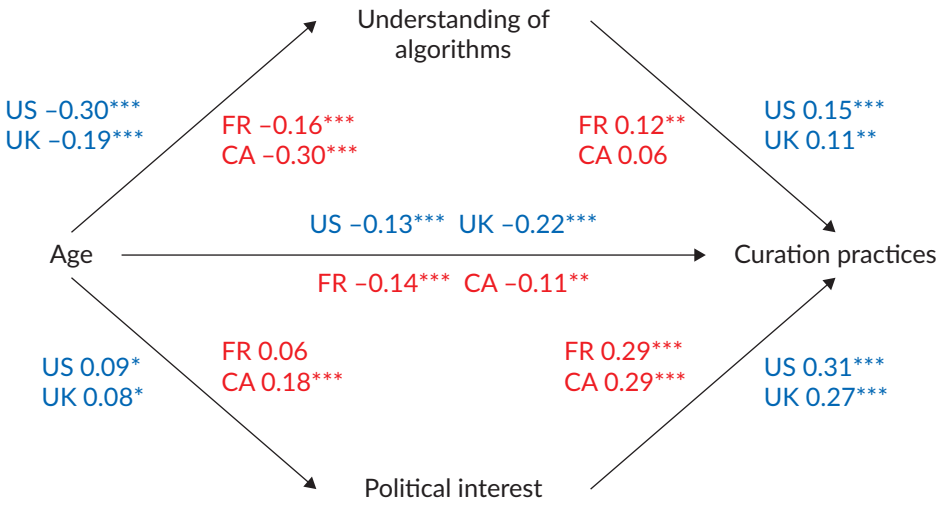

Figure 5. Curation practices in different countries. Note: * $p < 0.05$, ** $p < 0.01$, and *** $p < 0.001$.

In terms of active and passive curation, the country-specific results are in Figures 6 and 7. Age predicts active and passive curation in all countries except France for active curation (RQ1). In the UK, age is a stronger (negative) predictor for active curation than passive curation (RQ1: −0.22*** versus −0.16***). In France and the US, age differences are larger for active than passive curation. Understanding of algorithms predicts active and passive curation but only in two of the four countries. In terms of RQ2, understanding of algorithms is particularly important in passive curation in the UK (0.16***) compared to active curation (0.03). Conversely, in France, understanding of algorithms relates to active (0.15***) not passive curation (0.05). Furthermore, for all countries, political interest is more strongly correlated with passive than active curation (RQ3) with the largest difference in France (0.27*** versus 0.20***). Finally, in terms of the indirect effects of age on curation (RQ4), the effects are not significant; the effects are largest for Canada for both passive (0.035) and active curation (0.023) than other countries, which can be partially explained by the strong correlation between age and political interest (0.18***).

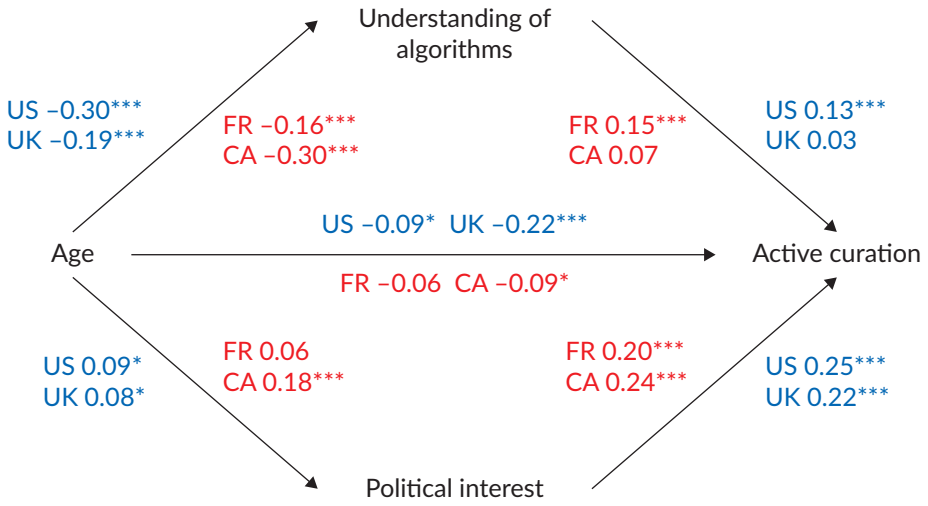

Figure 6. Active curation in different countries. Note: * $p < 0.05$, ** $p < 0.01$, and *** $p < 0.001$.

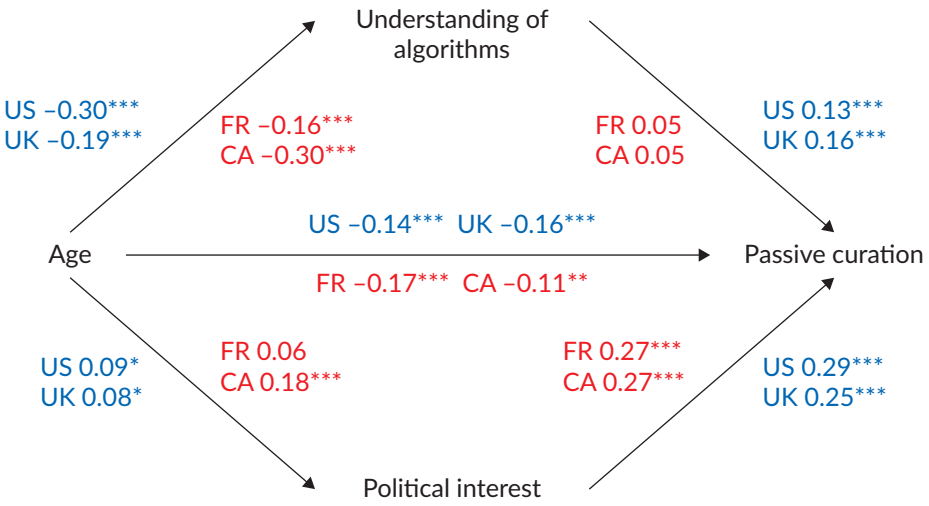

Figure 7. Passive curation in different countries. Note: * $p < 0.05$, ** $p < 0.01$, and *** $p < 0.001$.

7. Conclusion

In sum, older people are less likely to engage in civic and political information curation on Instagram (H1). In the UK, age differences are larger for active curation than passive curation, whereas in France and the US, age differences are larger for passive curation than active curation (RQ1). In addition, we find that algorithmic knowledge increases engagement in passive curation, particularly in the UK (H2 and RQ2). Finally, political interest is the strongest predictor of curation and stronger for passive than active curation (H3 and RQ3), especially in France. Overall, we find support for the three hypotheses. Age directly relates to information curation on Instagram rather than being mediated through political interest and knowledge of algorithms (RQ4). These findings highlight the importance of social media platforms for the inclusion of young citizens in civic and political affairs. They also point to the importance of algorithmic knowledge for studying digital inclusion in this domain.

Different platforms offer different opportunities for curation because of different affordances (Evans et al., 2017) or digital architecture (Bossetta, 2018). While prior literature trivializes liking as clicktivism (Vitak et al., 2011), we consider this activity important to curating political information on Instagram. In particular, for those who understand how algorithms work (young adults), liking a post is a signal (Cotter et al., 2017; Thorson et al., 2021) to the algorithm to provide more content of this nature. This article shows that young adults are more likely to passively curate political information on Instagram than older age groups. Young people also engage in more active curation, i.e., following civic and political accounts, on Instagram compared to other age groups. Specifically, young people are more likely than older people to follow news organizations, political candidates or parties, and nonprofit organizations or charities, expanding on findings from Boulianne and Hoffmann (2022).

Most importantly, our findings offer new insights into the literature about generational differences in news consumption (Andersen et al., 2021; Boulianne & Shehata, 2022; Karlsen et al., 2020; Toff & Kalogeropoulos, 2020). Other scholarship focuses on traditional media, finding that young adults are consuming lower amounts of news and political information. In contrast, focusing on a platform that they use intensely, we find that young citizens are actually more likely than older adults to curate political information on this

platform. In addition, they engage in both passive and active curation. There are two related explanations for these curation practices. First, young adults understand algorithms to a greater degree than older adults, at least when considering self-assessed measures. This greater understanding turns liking into a meaningful activity; this engagement fuels the algorithm and can increase political content on one's feed. Second, political interest predicts curation practices. The relationship between age, political interest, and curation practices is complex. Young adults are less interested in politics, but those who are interested are more likely to curate their news feeds. This finding replicates claims about generational differences in the motive for consuming news. Boulianne and Shehata (2022) argue that the youngest generation is not motivated to follow news due to civic duty (also see Eddy, 2022); they are motivated by their own bias or proclivities, which include political interest. While we focus our findings on how political interest provides motivation for curation, the flip side is that those who are disinterested may not curate information on Instagram and instead unfollow or avoid civic and political actors and their informational posts.

This study is subject to some limitations. Following Gran et al. (2021), we used a single item to measure algorithmic knowledge, replicating their findings about age differences in relation to their Norwegian sample. We document this pattern using four-country survey data. Cotter and Reisdorf (2020) measure algorithmic knowledge with perceptions about the influence of six factors in shaping search engine results. Despite our different measurement strategies, we replicate their findings about age differences. While other algorithmic awareness measures have been developed (Zarouali et al., 2021), we do not know if these measures will work in a cross-national context. Future research might consider a more nuanced measure of algorithmic knowledge to offer further clarity about which dimensions influence active and passive curation practices. Perhaps a platform-specific measure of algorithmic knowledge is necessary, following Zarouali et al. (2021).

While we offer a robust set of measures about curation, highlighting "liking" as an important activity, we do not consider all types of curation practices. For example, we could also consider unfollowing as well as changing settings as curation practices (Duggan & Smith, 2016; Gagrčin et al., 2023; Swart, 2021). In addition, we measured different curation practices as a series of yes/no questions, which was appropriate in 2019 when few people engaged in curation. However, more contemporary data collection should consider the frequency with which people engage in curation. Finally, we focused on curation practices related to political candidates, news organizations, and civic groups (i.e., the Red Cross), leaving aside curation practices that may lead to exposure to fake news or other nefarious political actors. Yet, these curation practices might influence exposure to false or misleading information on Instagram. Survey-based studies suggest that Instagram use correlates with exposure to perceived misinformation (Blanco-Herrero et al., 2021; Chadwick et al., 2022; Neyazi et al., 2022).

Despite these limitations, our study offers several contributions: Applying curated flows (Thorson & Wells, 2016; Wells & Thorson, 2017) as our core conceptual framework, we contribute to research indicating that algorithmic knowledge may be an important asset facilitating digital inclusion, particularly in the context of information access. Previous studies on digital inclusion have highlighted the important role of digital skills and literacy (Correa et al., 2020; Reisdorf & Rhinesmith, 2020), but few have examined algorithmic knowledge. By focusing on a platform popular among younger users, we challenge a generalized assumption of young adults as disengaged or passive in their news access. We, instead, find that young adults are using their understanding of algorithms in a way that leads to inclusion, expanding their digital access to civic and political information to compensate for lower uses of traditional media. In fact, we provide evidence for older adults' lack of digital inclusion in the context of civic and political information online. Older adults do

not appear to have the same ability to understand and curate their flows of political information on a digital platform such as Instagram. This lack of access to online information may not matter much today because information is available to them offline. However, as governments and civic groups move information and services exclusively online, we may see a growing pattern of digital exclusion for older adults who lack the algorithmic knowledge to access or curate this information. Lastly, while not the focus of this study, our findings indicate that to understand the effects of "news-finds-me" and related passive information consumption on social media platforms, studies need to pay more attention to political interest. Our study shows that political interest is critical in understanding exposure to political information, particularly when considering passive curation as a practice of digital information access.

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Conflict of Interests

The authors declare no conflict of interests.

Data Availability

The data and replication files are posted at https://doi.org/10.6084/m9.figshare.25483858.v1

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ARTICLE

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Digital Futures: A Signal-Based Approach to Inclusive Digital Youth Work for Socially Vulnerable Youth

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Abstract

This article examines inclusivity in digital youth work initiatives which use and discuss media and technology. The research focusses on initiatives aimed at socially vulnerable youth. Socially vulnerable and digitally excluded youth face educational inequalities due to limited resources, such as inadequate hardware or lack of academic support at home (Correa et al., 2020; Faure et al., 2022; Garmendia & Karrera, 2019). Youth work as non-formal learning plays a crucial role here, possessing certain advantages that formal education does not have—for instance, the freedom to set needs-specific learning goals that are more responsive to societal signals. Through a two-fold comparative case study analysis, we delve deeper into the successful approaches to organising digitally inclusive digital youth work. The case studies ($N = 14$), located in Flanders, Belgium, were conducted through an in-depth analysis consisting of a QuickScan of practices and in-depth interviews with practice representatives. Our findings identify four success factors for the setup of digitally inclusive practices: (a) providing young people with the means to actively participate during the activity, (b) informing youth workers about digital inclusion factors, (c) providing youth workers with the means to seek help from other actors working on digital inclusion, and (c) including the target group in the creation process of the activity. Based on these four success factors, this study emphasises the importance of a signal-based approach that starts from the needs and talents of youth.

Keywords

digital inclusion; digital media; digital skills; digital youth work; socially vulnerable youth; youth workers

1. Introduction

With the digitalisation of public services, education, work, and other aspects of our everyday lives, digital skills and familiarity with digital media and technology have become increasingly important to fully participate in society (Donoso et al., 2021; Pihlainen et al., 2021). The EU develops policies and guidelines to support digitalisation across Europe and the digital skills development of young people as citizens of the future. In this context, the Council of the European Union developed guidelines on digital youth work in 2017, digital youth work being defined as the application and discussion of digital media and technology in various youth work contexts. This means that digital youth work pursues the same objectives as general youth work, namely youth development but with a digital component (Council of the European Union, 2017).

The core of digital youth work practice is the self-development and voluntary participation of youth. It can involve either offline and/or online engagement, and digital technologies can be used as a tool, activity, or to provide content (Council of the European Union, 2017). In addition to defining digital youth work, the Council puts forward guidelines for member states on how to integrate digital youth work in policy and practice. Member states were asked to include digital youth work in policies, encourage youth workers to engage in digital youth work, and commit to digital capacity-building in the youth work sector (Council of the European Union, 2017). Alongside the fact that many youth organisations had to move their practices online in 2020 due to Covid-19, this led to an increase in interest and attention toward digital youth work in Flanders, the Dutch-speaking part of Belgium.

Digital youth work can be further framed within the concept of non-formal learning and education. In *A Memorandum of Lifelong Learning*, the European Commission (2000) presents three types of learning, namely formal, informal, and non-formal. Formal learning is formal educational activities with a specific educational goal. Informal learning is defined as spontaneous daily activities that contribute to competence development, e.g., through news consumption. Non-formal learning is a type of learning embedded in activities not necessarily designated as learning, but which focus on development and growth, e.g., extracurricular activities, summer camps, and youth work (European Commission, 2000). Youth work itself aims to provide a safe environment and space for youth to learn and grow flexibly (Corney et al., 2023; de St Croix & Doherty, 2023; Vermeire et al., 2022), where youth "can converse, find support, learn, take part in activities, or simply pass time in an atmosphere of conviviality" (de St Croix & Doherty, 2023, p. 1039). As de St Croix and Doherty (2023) indicate, youth work is mainly relational, relaxed, and open, with a strong focus on soft skills. Soft skills are social and emotional skills such as communication, collaboration, creativity, critical thinking and problem-solving, leadership, adaptability, initiative, and curiosity (World Economic Forum, 2016) and they are essential skills for the future job market, which has a rapidly changing nature and a high dependence on technology.

The Council of the European Union (2017) emphasises that using digital media has much potential, however, there are also risks involved. The document mentions that limited access to media can widen the digital gap. To address this, youth work plays a vital role in enhancing young people's digital competences, particularly for vulnerable youth (Council of the European Union, 2017). Digital youth work offers a more value-based, flexible, and experiential approach compared to formal education, allowing youth to set their own goals and boundaries, explore interests, and express themselves in digital formats (Corney et al., 2023; Vermeire et al., 2022)—aspects of educational settings that are highly motivating. To address the potential digital exclusion of

youth (11–30 years), our research focusses on the following research question: What success factors play a key role in setting up digitally inclusive digital youth work?

2. Literature Review

2.1. Social Vulnerability and Digital Exclusion

There is not one widely distributed definition of vulnerability (Taylor, 2011) that captures which young people can be defined as being "socially vulnerable" or "disadvantaged," and authors refer to different groups. Walgrave and De Cauter (1996) define young people's vulnerability as their sensitivity to the effects of social structures on their position, which hinders societal participation. This implies that certain youth are more visibly and actively integrated and represented in society than others. Building on this defining element and looking at research into socially vulnerable youth in a digital context, we consider the following groups to be vulnerable: youth living in poverty and living in precarious conditions; youth with low education levels/limited educational opportunities; youth living with disabilities or the inability to leave their homes; youth residing in institutions (such as rehabilitation centres and other similar spaces, possibly due to behavioural and/or emotional difficulties or risk of parental neglect); youth from ethnic and/or cultural minority groups or with immigrant backgrounds; refugees; and youth experiencing mental health difficulties (Brites & Castro, 2022; Cino et al., 2022, 2023; De Coninck & d'Haenens, 2023; Faure et al., 2022; Livingstone & Helsper, 2010). For disadvantaged youth, "a position of limited autonomy in digital society" (Faure et al., 2020, p. 4) is not always straightforward. It might lead to digital exclusion or the "marginalisation of an individual—or of a group—deprived of full access and capacity to use information and communications technologies (ICT), which hinders their participation in the economic, social, and political life of society" (European Centre for the Development of Vocational Training, n.d.).

Even today, with youth seen as "digital natives," there is still a substantial group that is digitally excluded. As found by the Belgian Digital Inclusion Barometer, "a third of young people aged between 16 and 24 years (33%) have only weak general digital skills" (Faure et al., 2022, p. 51). This group mainly consists of vulnerable youth, as 45% of youth with a low level of education and 39% of youth with low income have weak digital skills. Faure et al. (2022) also note that users with weaker digital skills tend to rely solely on their smartphones for internet access, which "results in a compounding of disadvantages for people who have both weak digital skills and only have access to the internet through their smartphone" (p. 30).

Furthermore, socially vulnerable youth face educational inequalities due to limited resources, such as no or inadequate hardware or lack of academic support at home (Correa et al., 2020; Faure et al., 2022; Garmendia & Karrera, 2019). This leads to inequalities in the level of access, skills, motivation, and confidence. Correa et al. (2020, 2024) note that while smartphones contribute to digital inclusion by providing access to "underserved populations," there are notable disparities in skills and internet use based on the type of device. Those who access the internet through computers, tend to have higher digital skills. According to their study, computer access provides greater opportunities for skill development, potentially linking back to educational experiences. Also, Faure et al. (2022) note that computer users generally have higher digital skills (91%) and that people with lower digital skills tend to mainly use smartphones (72%). Similarly, Van Deursen and Van Dijk (2019) also touch upon this topic, noting that youth, due to primarily using smartphones for access, experience limitations in activities and outcomes. Smartphones are mainly used for communication

purposes, using online services, or seeking information. Certain technical applications may not be feasible due to a smartphone's characteristics, such as writing, saving files, etc. (Faure et al., 2022). Correa et al. (2020) found that whilst both computer and smartphone users use their devices for communication, mobile-only users engage less in information-seeking, e-service activities, and content creation compared to those who use both devices.

Helsper (2020) noted that youth from higher-educated and affluent backgrounds have better access and use more devices, while those from lower socioeconomic status (SES) often solely rely on smartphones. However, quite a few students do not have a computer at home or share devices (Faure et al., 2022; Garmendia & Karrera, 2019). Most young people possess a phone with internet access (Faure et al., 2022; Garmendia & Karrera, 2019). Despite having smartphones, students from lower SES backgrounds often lack internet at home, having to rely on shared data and/or having to access WiFi at other people's homes or in public spaces, which also has restrictions, e.g., opening hours. These issues hinder youth in several ways, such as in completing schoolwork or partaking in social interactions.

Belgian, and more specifically Flemish, youth tend to have good operational skills (Faure et al., 2022; Vanwynsberghe et al., 2022) and are frequently self-taught, not relying on parents' or teachers' competences, when it comes to learning how to use devices (Vanwynsberghe et al., 2022). Research has shown that youth with good operational skills do not automatically have the same level in other digital skills, such as critical thinking. In a study in 10 European countries, including Belgium, Cino et al. (2022) found that a higher SES is associated with increased use of digital media for informational and social purposes and decreased use for entertainment. The study suggests that those from more affluent backgrounds engage in "more beneficial activities, which are seemingly conducive to more beneficial tangible outcomes—including better school performances, higher social or economic capital, and so on" (Cino et al., 2022, p. 49), leading to children and youth from lower SES backgrounds possibly missing out on growth opportunities.

There is a substantial discussion regarding beneficial media use. Tisdell (2008) highlights the engaging nature of media, whilst also recognising its educational value, suggesting that media can support critical engagement with various subjects in both formal and informal settings. However, this can be challenging without the right tools or support. Digital media use can positively influence youth civic engagement, but this depends on how digital media is used, e.g., by reading news online (Boulianne & Theocharis, 2020). Nevertheless, Helsper (2021) notes that individuals with a lower SES have not only less access and skills, but they are also less likely to engage in civic activities online, and if they do politically participate online, they are more likely "to be ignored or silenced" (p. 121) due to their disadvantaged background.

Cino et al.'s (2022) study shows that children with better access at home and school tend to have better digital skills. SES also influences digital skills, with higher SES households often having a higher proficiency level. Cino et al. (2022) note that parental facilitating mediation and increased availability of technology in schools contribute to improved digital skills and vice versa. Thus, exposure to technology plays a crucial role. However, the overall environment and support structures available to youth also strongly influence digital skills.

This relates to Asmar et al.'s (2020, 2022) discussion on social support, highlighting that digital inclusion goes beyond sociodemographic factors, and is influenced by soft skills and social support. Digital in- and exclusion is not only a matter of providing access. Being able to gain positive outcomes from using digital

media/technology depends strongly on other available resources and factors (Asmar et al., 2022; Helsper, 2021). The authors further stress that people's lives are connected to both social and economic aspects, and how well they adapt to the digital world depends on these settings. Individuals with strong social connections benefit the most from support. The type of support someone receives depends on the strength of their relationships with others (Asmar et al., 2020). Therefore, lower-educated individuals, despite facing challenges, can also be successful in a digital society because they are interested, motivated, actively improve their skills, and receive support from their network.

Ragnedda's (2018) digital capital theory explores this in greater depth, in terms of how the skills and resources individuals possess in everyday life affect how well they can use the technology made available. Therefore, if individuals are already doing well offline, they are more likely to do well online (Ragnedda, 2018), facilitating the transfer and accumulation of digital capital into different forms of capital, as per Bourdeusian theory (Ragnedda, 2018; Ragnedda & Ruiu, 2020). The abovementioned disparities in access then further perpetuate other disparities by hindering the equitable distribution of capital.

Being digitally included can be part of getting individuals better positioned and socially included, for instance, the ability to use e-services. However, this relationship is bidirectional (Helsper, 2021; Ragnedda, 2018; Ragnedda & Ruiu, 2020). For example, individuals may exhibit digital curiosity without concurrent social or economic strength, such as when an individual lacks access to someone who can help them or lacks the financial means to enrol in a course. This relates to the soft skills and social support provided by youth work. As seen in a report from the World Economic Forum (2016), there is limited awareness of the benefits of soft skills, as well as how digital media can improve these skills: "Parents and teachers overall believe that ed-tech is best used for developing foundational skills or for enhancing teacher productivity" (p. 19). However, digital media can be used to develop soft skills because of its potential to offer interactive and immersive learning experiences (World Economic Forum, 2016).

As Helsper (2021) notes, our digital society is ever-evolving, therefore, skills need to be transferrable and adaptable. However, teaching these types of skills (that relate more to soft skills), such as critical thinking (see Section 1), is not necessarily achieved through formal education, and is even less successful for vulnerable groups. Helsper (2021) refers to the need for individuals' socio-digital ecologies to stimulate learning. As also stated by Asmar et al. (2020, 2022), social and community support can have a strong influence on one's digital inclusion. Feraco et al. (2023) find that there is a direct link between soft skills and life satisfaction, as well as a link to self-regulated learning, emotional regulation, and motivation. They study the link between soft skills and extracurricular activities for youth. They found that taking part in extracurricular activities enhances soft skills by being given the opportunity to interact and explore, soft skills contributing to increased motivation and improved self-regulated learning (Feraco et al., 2023). This stresses the importance of digital youth work in youth skill development, particularly for socially vulnerable youth.

2.2. Digital Youth Work and Digital Inclusion

Youth work, with its emphasis on developing soft skills, fostering youth connections, and interest-driven and active learning environments, becomes instrumental in navigating digital challenges and enhancing youth digital skills. Brites and Castro (2022) emphasise that practical, hands-on learning experiences are crucial for enhancing digital skills and expression among institutionalised youth, motivating active participation.

The hands-on tactic of learning-by-doing provides a relaxed yet safe environment for participants to open up and take part in activities (Brites & Castro, 2022), with participants "[appreciating] the opportunity to discuss and reflect on topics that interest them and that [are] directly relevant to their lives" (Supa et al., 2022, p. 395). Römer et al. (2023) suggest that educational media literacy activities aimed at vulnerable youth take a participant-centred approach, break school routines, involve hands-on activities, and make room for community collaboration.

As there are diverse interpretations of digital youth work, and even confusion among youth workers around the topic, we developed a digital youth work typology, providing a simple overview of the different types of digital youth work for youth workers (Vermeire et al., 2022). Within this model, we make a distinction between blended, on-site, and online activities. Within the category of online activities, online synchronous practices involve real-time interactions, such as a game played together online. Online asynchronous activities are non-live, engaging youth online separately at different points in time. Blended activities combine online and offline elements or integrate live and non-live elements. On-site practices involve discussing and understanding, using, and/or creating digital media, such as a makerspace (Vermeire et al., 2022).

The use of digital technologies in youth work is seen as "enhancing social skills and facilitating relationship-building" among participants (Pawluczuk, Webster, et al., 2019, p. 63). However, as mentioned in Section 2.1, there are discrepancies between access and skill even among so-called "digital natives" (Prensky, 2001)—a concept highly discussed and criticised. For instance, Helsper and Eynon (2010) argue that "the frequent uncritical use of these and similar terms, even if the term is used without accepting the underlying assumptions, could have a negative impact on the perceived possibilities of teacher-student interaction" (p. 518). As the authors mention, the concept could influence what learning aspects are focussed on. Young people use the internet more than older generations (Helsper & Eynon, 2010); however, this does not automatically translate to a more beneficial skillset for the future.

Youth workers perceive their roles as complementary to formal education, stating that they could bridge the gap between educational outcomes and job market demands (Skill IT for Youth Project & Fundatia Danis, 2018). However, the Skill IT study (Skill IT for Youth Project & Fundatia Danis, 2018) emphasises the need for clarity regarding youth workers' role in enhancing digital skills. Youth workers are confronted with a lack of clear policy, funding, and equipment as well as with limited skills, the presence of anxiety, and the danger of digitally excluding disadvantaged youth (Pawluczuk, Hall, et al., 2019; Skill IT for Youth Project & Fundatia Danis, 2018; Vermeire et al., 2022). The fact that youth workers can lack digital skills themselves might be a barrier to being fully inclusive, as socially vulnerable youth typically require additional support and training. A lack of digital skills could pose other challenges as well, as they may struggle to effectively implement digital media, potentially limiting the impact of their practices.

Șerban et al. (2020) note that digital media present opportunities for disadvantaged youth, but emphasises the importance of developing policies, strategies, platforms, and tools that address digital inclusion. Cino et al. (2023) found that digital non-formal education may risk not engaging a "diverse range of children" and that what is taught in certain programs is too distant from their real experiences. To foster inclusivity, workshops should allow flexibility, adapting projects to children's interests and backgrounds, with a crucial factor being the availability of external support and motivation (Asmar et al., 2022; Cino et al., 2023).

3. Methodology

This study specifically focussed on digital youth work initiatives in Flanders, Belgium, aimed at vulnerable youth. To select the practices, we applied a QuickScan analysis, an effective method for researching new or under-documented topics through a literature review (desk research) and mapping of (potential) case studies, enabling cross-case comparative analysis (Van Audenhove et al., 2023). Our analysis consists of several methods such as the snowball method, searching existing databases, and consulting umbrella organisations to identify a larger number of cases efficiently, providing a quick understanding of variance and identification of shared characteristics (Van Audenhove et al., 2023). Our QuickScan resulted in 70 relevant initiatives. We then selected 14 best practices for a more in-depth analysis based on purposeful sampling (Sandelowski, 1996). This selection was made based on the following selection criteria: recent practices in the past two years; a mixture of online, blended, and on-site digital youth work; activities with a focus on social inclusion/engagement and vulnerable youth between 11 and 30 years old; a mix of different themes; and cases not yet included in digital youth work studies in Flanders. This selection allows us to reflect on the current developments in the field. After the initial case study selection by the researchers, the final case study selection (see Table 1) was collaboratively determined with the project funder.

These 14 cases were then analysed in-depth, applying a mixed methods approach consisting of desk research of relevant documents related to the case study and in-depth interviews ($N = 14$) of at least 60 minutes with representatives from each case. The research took place between June 2022 and January 2023. The desk research included the websites and social media of the youth organisations, newspaper articles, and other documents, such as published statements or funding applications. Through a comparative case study analysis, we delved deeper into digital youth work, and what challenges or opportunities arose when developing digitally inclusive initiatives for socially vulnerable youth. In the semi-structured in-depth interviews with representatives from the practices, we used open questions to further discuss important

Table 1. Case study selection.

Case	Type of digital youth work	Role of digital media	Theme
1	Blended	Content	Media literacy
2	Blended	Activity	Wellbeing and mental health
3	Blended	Activity	Wellbeing and mental health
4	Blended	Activity; content	Wellbeing and (online) safety
5	Online blended	Tool	Creating digital space
6	Online blended	Tool; content	Media literacy, online safety, and creating digital space
7	Online asynchronous	Tool; content	Development and creating digital space
8	Online blended	Tool	Development and creating digital space
9	Online asynchronous	Tool	E-participation
10	Online synchronous	Tool	Creating digital space
11	Online asynchronous	Tool	E-participation
12	On-site	Activity; content	STEM literacy
13	On-site	Activity	STEM literacy and maker education
14	On-site	Activity; content	Digital citizenship

aspects that arose during the QuickScan. An inductive analysis following Glaser and Strauss' (1967) grounded theory approach was applied (open, axial, and selective coding), using MAXQDA software for qualitative coding. This led to an in-depth understanding of the cases. In Section 4, we organise the findings based on the themes discovered in our analysis.

4. Results

4.1. Digital Media as a Facilitative Tool in Youth Work

In examining various digital youth work initiatives, it became evident that digital media are predominantly used as a facilitative tool rather than being the central focus. While digital media commonly enable specific activities, the broader landscape of digital youth work presents diverse opportunities, such as overcoming geographical barriers, expanding audience reach, providing anonymous support, and more (Vermeire et al., 2022). Through digital media, youth can further develop their identity, voice, and confidence, for instance through e-participation. Despite the evident advantages, concerns emerged among youth workers about the potential replacement of regular youth work by online initiatives. Issues such as moderator responsibilities, the availability of online trainers, and joining anonymously also require clarification and guidelines:

> We used to get messages through all possible channels, but now they only contact us through the app. [But] we have to use the app constantly…you're never done working and you do have to put a lot of time into moderating. You can't let it run on its own, because then it will go wrong. (Case 6)

Despite the challenges, respondents agree that digital youth work positively engages youth, aiding their digital development. It offers youth and youth workers much-needed space to experiment with digital media (Brites & Castro, 2022), and to figure out its possibilities and most effective, creative uses (e.g., testing what tools work for what target group). However, a crucial consideration here is digital inclusion.

4.2. Participants' Digital Inequalities

Contrary to common assumptions about youth being "digital natives," not all youth possess the necessary digital skills to participate actively and effectively. Several respondents addressed this issue. They indicate that specific target groups have different strengths and encounter different obstacles, such as a lack of critical thinking skills: "We had a lot of participants who didn't know how to install the app….Some [participants] are very technically savvy, but a lot are not" (Case 6). Simultaneously, digital inequalities contribute to existing social exclusion (Helsper, 2021; Ragnedda, 2018). A respondent highlighted challenges encountered by their target group—young people with cognitive disabilities—in establishing online relationships and engaging in social media, often getting frustrated, upset, and ultimately being excluded. Consequently, they developed a dedicated platform for their demographic, fostering participation in online social activities. This initiative also facilitated the development of online social skills, with youth workers providing guidance on potential challenges through a chat, FAQ sheets, and one-on-one sessions.

The organisations recognise these differences and try to set up "engaging" and "empowering" practices through an accessible, motivating approach (e.g., employing platforms familiar to the target group, such as Discord or PlayStation) or working on a specific issue in the community to make the project meaningful for

participants (Vermeire & Van den Broeck, 2023). While digital youth work has a lot of potential, many youth workers did not consider the importance of digital inclusion before organising a digital practice. They were often unaware of the obstacles their participants might face, drawing on the idea that youth have the necessary skills and access to participate fully. This realisation, influenced by the pandemic, had youth workers adapt their practices to be more digitally accessible. Despite efforts to target vulnerable groups, skills and access remain crucial, emphasising the need for ongoing collaboration and consideration of various solutions.

4.3. The Accessibility of Practices

One respondent noted that their organisation chose to opt for blended activities, as these offer a wider range than on-site activities but do not exclude vulnerable youth by moving entirely online. Almost all practices see a future for blended youth work activities to reach their target group. Nevertheless, they also note that blended or online practices cannot and should not replace face-to-face interactions, but depending on the goal of the practice, online or blended can be more successful (e.g., removing certain barriers or addressing challenges more swiftly):

> Working online is great because it offers many opportunities, but it also has its limitations. If you can't reach young people online, the story ends. The combination of being able to work online and offline is important. Yesterday someone came by, and an hour ago she called me [online] because she had something that couldn't wait. Working online means you can switch gears very quickly, whereas with purely offline you have to wait until you see them again. (Case 5)

To have successful online practices, the youth sector calls for clarity and guidelines (e.g., advice for setting up ethical and practical standards for online practices, such as guidelines related to anonymous participation or how reachable youth workers should be online). These guidelines should also provide support regarding digital inclusion. It needs to be noted that online practices still have their limitations, such as creating an interactive space for youth—an important part of youth work's goals (de St Croix & Doherty, 2023; Vermeire & Van den Broeck, 2023). In-person interactions foster better interpersonal connections and provide opportunities for shared experiences, which can be integral to building a supportive community, whereas online spaces may inadvertently favour those with better access and skills.

Respondents chose to set up blended practices to still be able to provide on-site support for their target group (e.g., by helping them get online or discuss what they learned in an online module). Due to the respondents' experience with vulnerable groups and the importance of inclusion, most of the cases analysed had solutions to certain barriers or had adapted the initiative to be digitally inclusive: "Laptops we didn't do, because we saw…that [laptops] are used much less by young people. And they almost all have smartphones, so that's why we chose to [make the game] in an app" (Case 3).

As noted in Cino et al. (2023), practices that are not adapted to a certain group could lead to perpetuating inequalities instead of overcoming them. Several respondents noted how important it is to keep your target group in mind and to be aware of their needs (Cino et al., 2023; Donoso et al., 2021; Supa et al., 2022). For instance, enhancing accessibility for youth with low literacy through voice-over features, the possibility to chat with youth workers anonymously, providing train-the-trainer sessions to address topics possibly

unfamiliar to youth workers (such as online privacy), creating a smartphone-friendly website, providing all essential hard-/software, and organising initiatives based on the target groups' skills and interests.

4.4. Disposition of Youth Workers

Several youth workers also express doubt, exhibit uncertainty, and even insecurity regarding their own digital competences. During the pandemic, almost all face-to-face activities had to move online. Therefore, youth workers were challenged to use digital media, noting that they did not feel confident in supporting youth with, for instance, technical issues and feared having to be a digital "expert": "Youth workers feel that they have to be able to do something well themselves before they can transfer it, so they don't do it" (Case 13). This is also noted by Pawluczuk, Hall, et al. (2019), who observe that youth workers experience anxiety due to their personal perceived lack of expertise/skill.

We found that youth workers who exhibit (more) confidence already have prior experience with setting up media-related activities, are familiar with the tools and platforms they use, and/or can rely on the support of a partner organisation. Almost all good practices are a collaborative effort. The respondents indicate that learning the necessary skills only happens when youth workers are sufficiently motivated to do so. They also emphasise the significance of collaboration among youth organisations to complement each other's strengths and weaknesses. As mentioned in the paragraph above, an open disposition is crucial, however, the support provided by the youth organisation is also important. Organisations with a positive disposition toward digital media provide more working room and help for setting up inclusive practices. Less technology-oriented organisations, but whose youth workers were tech-savvy or convinced of its value and took the lead to organise activities with digital media, also resulted in good practices.

Solely providing access to infrastructure, tools, and platforms will not necessarily improve use or translate into more quality implementation. Adov et al. (2020), who researched teacher attitudes toward using mobile devices for teaching, mention that creating user-friendly technology is not sufficient—"We must also work with teachers to support their self-efficacy and relieve the anxiety that comes with using technological tools" (p. 12). The study suggests that social context plays a significant role in addressing self-efficacy and anxiety. Similarly, we found that it is important to foster an open disposition and supportive environment to enhance youth workers' confidence and capacity when using and discussing digital media.

Therefore, encouraging factors include informing youth organisations about digital youth work opportunities, enhancing youth organisations' and youth workers' capacity through accessible training, and fostering knowledge-sharing and partnerships (Vermeire & Van den Broeck, 2023). As Todorović et al. (2023) found, without understanding young people's online world and its difficulties, youth workers will run into difficulties on whether and how to provide appropriate support for youth. Donoso et al. (2021), through roundtable discussions with young people, mention that it is crucial to check if their perspectives are sufficiently integrated and listened to. Therefore, some respondents propose integrating digital youth work into social work training to reach a broader audience. However, respondents primarily emphasise the need for clear guidelines and communication on digital youth work, as confusion about what digital youth work is (not) also creates misconceptions, resulting in demotivation.

4.5. Organisational Capacity and Collaborations

Organisations require certain expertise and understanding of their target group but also need to have clear goals and targets before setting up a practice. As mentioned, youth workers are not digital experts, nor do they need to be. However, to set up a digitally inclusive practice they need to first be aware of the digital resources that their target group possesses. To set up a digitally inclusive practice, it is most often necessary to collaborate and bring together different stakeholders to combine expertise, as a lot of youth work organisations do not yet have the resources to set up a digitally inclusive practice. It requires funding for materials, but also the necessary skills and knowledge to support their target group. As found by Asmar et al. (2022) and Helsper (2021), digital inclusion is not only influenced by socio-demographic factors—which is also noted by our respondents. Youth organisations aim to go beyond merely providing access and offer ongoing support, such as providing parental assistance or updating the platform based on youth feedback. However, this is not always easy, with respondents noting that it is important to gather input throughout the project from the participants.

Most of the good practices analysed were collaborations that made the practice more relevant and successful. Involved stakeholders are not only technical partners and youth organisations but can also include the participants. Respondents note how crucial it is to get young people's input, listening to their needs and interests (Supa et al., 2022; Vermeire & Van den Broeck, 2023) before organising something. Sometimes youth practitioners get caught up in the novelty factor of certain digital technologies, however, it is not always needed or wanted to create a successful practice. For instance, integrating virtual reality can be a worthwhile endeavour to cross distances and include youth who cannot leave their homes, but it might not be the right choice when trying to create a safe space to share or learn as a group:

> You can be very convinced of your own idea and see a lot of benefits in it, but if your target group doesn't like it, [it's over]. I think input and participation is something you need with everything you [develop]. Often, as the developer, because you're working on it so hard, you don't see all the nuances and obstacles of what you're developing. (Case 1)

4.6. Setting up Signal-Based Practices

Youth work possesses certain advantages that formal education does not have, such as the freedom to set their own learning goals, thus also being more responsive to societal signals. Youth workers establish close relationships with their target demographic, becoming mentors, trusted adults, and friends—something Sonneveld et al. (2021) referred to as "proximity." These aspects make youth work and youth workers more attuned to the emerging needs and challenges that young people face and more responsive to these needs (de St Croix & Doherty, 2023; Sonneveld et al., 2021): "How many laptops are missing, how many internet vouchers do we have to give out, what signals are we getting from young people?" (Case 5).

Being sufficiently aware of the strengths and weaknesses of your target group is indispensable. Additionally, a practice may be more gratifying for the target group, not only because of its fun nature, but also because it touches upon a relevant topic for them and connects them to their environment, is centred around the participant, and allows them to make autonomous choices, which stimulates the motivation of the participants (Cino et al., 2022; Römer et al., 2023; Sonneveld et al., 2021; Supa et al., 2022).

It is therefore important that activities are tailored to their participants, youth workers listen to the participants, and they take a signal-oriented approach: "It should be more bottom-up than top-down….[We need] more awareness of what happens on the ground" (Case 14). Based on our inductive analysis, tailored and signal-based work emerged as crucial concepts for setting up digital youth work for vulnerable groups. Having a good understanding of their experiences seems to be a requirement to develop something tailored to the target group's needs, which is why working signal-based is a necessity. This term is used to emphasise that these signals originate from the target group and young people themselves, encompassing more than merely the observed needs.

Adopting this approach and considering youth perspectives emerge as crucial elements in creating truly meaningful and effective initiatives. Furthermore, clearly defining the target audience is essential, as an activity tailored for one group may not resonate with another. For instance, girls in assisted living facilities will require a different type of program and level of support, such as the involvement of their social workers and focus on the dangers they face, like their vulnerability to grooming. Recognising that some vulnerable youth may excel in using social media but lack basic computer skills or knowledge about digital media is crucial. Practices should be proactively designed with digital inclusion in mind rather than adapting subsequently. This underlines the importance of motivating youth workers and equipping them with resources for organising and facilitating co-creation and participation discussions with youth.

5. Conclusion

Due to youth work's proximity to and familiarity with the target audience, knowing their needs, interests, and strengths is crucial. Youth workers' contextual understanding enables them to tailor practices to be more relevant and engaging for their target group and makes them a key stakeholder. Youth workers can provide guidance in navigating the digital world responsibly and effectively, creating a supportive environment for youth to develop their skills.

Youth organisations can create digitally inclusive practices by being proactive, collaborative, and responsive to the specific needs and competences of their target group whilst providing ongoing support for their youth workers and fostering a signal-based, empowering approach. However, without clear guidelines, organisations will have difficulty promoting digital youth work and capacity-building among their youth workers.

Based on our analysis of 14 practices and in response to our research question concerning the success factors for setting up digitally inclusive digital youth work, we identified four key elements to implement digitally inclusive initiatives: (a) work tailored to the participants' needs, (b) inform and train youth workers about digital exclusion, (c) collaboration is key, and (d) apply a signal-based approach.

Regarding the first success factor, due to the importance of tailored practices, it is essential to provide youth with the means to actively participate during the activity. This entails ensuring that an activity is sufficiently tailored to the participant's needs, providing support and flexible, interactive spaces. This goes hand in hand with the need to understand youth experiences and perspectives (Donoso et al., 2021; Todorović et al., 2023).

Secondly, youth workers need to be informed about digital exclusion factors as well as the main challenges and indicators faced by young people. We see that youth workers are self-sufficient; however, they require

the necessary information, training, and support to set up sufficiently useful and adapted digitally inclusive practices. Otherwise, digital inequalities might be exacerbated (Cino et al., 2023)—e.g., by assuming skill levels. In the identified cases, it became clear that youth workers felt more empowered and confident when they received training.

Thirdly, next to informing youth workers about digital inclusion, it is equally important to provide youth workers with the means to seek help from other actors working on digital inclusion. Our research shows that collaboration and partnerships make practices more successful. The latter two factors can also improve youth workers' confidence and self-efficacy (Adov et al., 2020; Pawluczuk, Hall, et al., 2019).

Lastly, the target group should be included in the creation process of the activity. By listening to and including youth's perspectives, input, interests, and feedback, youth workers can use a signal-based approach and centre the practice around the target group. This will help youth workers provide the required resources and support for their target groups to gain positive outcomes from participating in the practices (Asmar et al., 2020, 2022). The importance of these factors lies in their ability to not only address digital exclusion but also empower youth to actively participate, engage, and have agency within the practices. This could contribute to their active participation in a digitalised society.

The study's limitations include the absence of direct input from youth participating in digital youth work, as interviews were conducted solely with youth workers. Understanding participants' experiences is crucial. Future research could broaden its scope by including perspectives from different stakeholders like policymakers and parents for a holistic view of the digital youth work field. Additionally, exploring the long-term impact of digital youth work initiatives could be considered, as this was not in the scope of this study. To improve further understanding, future research could also explore case studies on less successful practices, shedding light on youth workers' specific needs and challenges.

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Conflict of Interests

The authors declare no conflict of interests.

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Young People's Diversity and Digital Media: A Systematic Review (2010–2022)

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Abstract

Youth is not a homogeneous group. With this motto in mind, YouNDigital aims to study youth, their engagement with news, and digital citizenship dynamics. One of the core elements of the project is a digital newsroom, a space for meeting and exploring digital citizenship and news, considering the significant disparities that characterise individuals in this group. In order to better understand the target groups and to support the decisions regarding the development of the youth-led digital newsroom, the research team carried out a systematic literature review focused on youth, digital citizenship, diversity, and different methodological approaches. This article explores the outcomes of the systematic literature review, particularly delving into the data gathered in one of the subclusters (Diversities). Findings underscore the challenges of inclusivity and diversity and the need for tailored media and digital literacy interventions that consider cultural differences, socioeconomic factors, and evolving technological landscapes. They also highlight the difficulties, as well as the positive results, of using digital tools and strategies to trigger learning and motivational processes for diverse audiences—digital tools that rely on media creation, creativity, critical thinking, and collaboration can promote the empowerment and inclusion of youth from distinct backgrounds, bridging the gap between their realities and citizenship experiences. For research teams, the findings point out that involvement in collaborative, immersive, and participatory processes anchored on sustained literature review processes can encourage distancing preconceptions while bringing them closer to research participants. The article contributes to discussions regarding the potential and the challenges of considering youth's diverse backgrounds through pillars such as co-creation or inclusive design, and the urgency of mitigating youth social and digital exclusion in order to enhance democratic participation.

Keywords

digital citizenship; digital media; diversity; media literacy; youth

1. Introduction

Digital media play a crucial role in young people's developmental and learning processes. They integrate professional, personal, and family routines, facilitating leisure activities, interpersonal communication, and expressing ideas. In today's highly mediated environment, young citizens are more than ever connected and equipped with accessible tools for information retrieval and usage. However, the impact of digital transformation on information dynamics is not consistently positive and does not uniformly affect all young lives. Consequently, instead of being inclusive spaces for citizenship, media can also become sources of exclusion, posing threats to democracy.

Studying younger generations' media usage, socialisation, and growth reveals significant differences from older generations—youth exhibit distinct behaviours and interactions, placing greater value on exploring and learning through new technologies and tools (Mude & Undale, 2023). But while literature shows us that leveraging the experiences of informal learning contexts can positively contribute to making connections, getting involved in causes, and engaging with digital participation dynamics (Dahlgren, 2013; Oliveira, 2022), it also uncovers persisting inequalities. Socially and digitally excluded young people (or those at risk) often lack media and information literacy (MIL) competencies and access to digital technologies, being overlooked by educational and technology research (Cranmer, 2013).

This article stems from a research project carried out in Portugal focused on youth, news, and digital citizenship. It understands media as participatory and educational spaces (Kahne et al., 2014) and digital media as aggregators of diverse communities and shapers of engaged civic consciences (Juris, 2012; Olson, 2016). Starting from an interpretative paradigm and analysing the media from the point of view of empowerment (Bulger & Davison, 2018), we recognise the integrative potential of media education to respond to inequalities and social exclusion and of digital media to reach scattered audiences.

This article presents an analysis of the findings of a systematic literature review (SLR) which aimed to identify the main theoretical frameworks linking young people, diversity, and digital citizenship since the beginning of the century, with special emphasis on the last 10 years. One of the subtopics of interest was the influence of gender, race, and socioeconomic, cultural, and educational backgrounds on this interaction as the diversity of these attributes often intersects, leading to compound disadvantages. Moreover, a holistic approach to inequalities provides solid ground to understand how these factors connect and shape an individual's experiences. Thus, the following section focuses on three crucial questions forming the basis for the subsequent work. We begin by addressing the concept of MIL and the relevance of the competencies associated with it for experiencing and expressing citizenship. Secondly, we debunk the myth of digital natives, addressing the biases that cloud the understanding of the relationship between young people and the media. Finally, we discuss social and digital exclusion, detailing its interconnections and influence on the ways the relationship between young people and the media is perceived and analysed.

2. MIL as an Expression of Citizenship

MIL stems from the idea that media literacy and information literacy complement each other (Lee & So, 2014). According to Lee and So (2014), while information literacy focuses on storing, processing, and using information, media literacy's main concerns are the media industry, the social impacts of the media, and the

content created and disseminated. Gallotti et al. (2015) stress that a clear distinction between them according to their different characteristics and practical perspectives is necessary—they are interdependent and compatible (p. 352). Furthermore, Gallotti et al. (2015, p. 355) consider that while information literacy skills ensure the ability to "identify, read, receive, interpret, decode and appropriate the message," it is through media literacy skills that individuals use and disseminate significant messages, according to a particular context and needs (Gallotti et al., 2015, p. 355). MIL can, therefore, be understood as a blend of different knowledge, attitudes, skills, and practices that are necessary to "access, retrieve, understand, evaluate and use, create, as well as share information and media content in all formats, using various tools, in a critical, ethical and effective way" (UNESCO, 2013, p. 17)—all in all, to empower and support citizens' democratic engagement, fostering informed, inclusive, and resilient communities.

Contemporary MIL appears as a core competency that ensures freedom of expression, prevents violent behaviours and discourses, and fights inequalities (UNESCO, 2020). By encompassing these aspects, Hobbs advocates that MIL involves cognitive, emotional, and social skills (2013) crucial for citizenship in the 21st century. Hence, the concept closely relates to digital citizenship: While MIL pertains to critical thinking about the various media, digital citizenship refers to how people live and interact with the technology around them (Council of Europe, n.d.). As Pangrazio and Sefton-Green (2021) emphasise, digital citizenship entails being a citizen in digital contexts while also engaging in traditional models of citizenship through digital practices—the internet serves as both an extension and a facilitator for various social, political, economic, and cultural activities (Yue et al., 2019).

Through MIL, citizens become more informed and empowered to participate in the full extent of democratic processes and understand the different roles played by the media in shaping public opinion and influencing decision-making. Given the complexity of the current socio-technological context, affected by information disorder and the profound disparities in technology access and use, promoting MIL is determining for individuals from various generations and sociodemographic backgrounds. It relates to mastering fundamental skills to explore critical perspectives, communicate responsibly, and avoid aggressive discourses and information disorder (Frau-Meigs, 2019). More than a matter of competencies, MIL is a matter of diversity and empowerment—it is a human rights-based approach to media and societal development that values diversity, and equal and ethical opportunities to access, create, and disseminate content.

3. The Digital Natives Misconception

For today's youth, digital media presents new spaces for expression, integration, and community participation (Herrero-Diz et al., 2016). The close relationship built over time between younger generations and digital media has led to various theories that describe them based on their behaviour in the digital society—from Prensky's (2001) digital natives to Feixa's (2014) #Generation. These proposals—that define a generation by overlooking their particularities, contexts, and experiences—have been criticised for their excessive positivism and disregard for diversity. Pereira (2021) claims these concepts are anchored in technological determinism since they assume that young people are born or are imbued with the technical skills to master (all kinds of) technologies. This deterministic point of view places different generations in a position of inequality between them (Pereira, 2021)—it attributes biased traits, opportunities, or outcomes based on the age factor, promoting a partial view of individuals and their competencies. Furthermore, there is no guarantee that all young people have intrinsic attributes that make them more technologically capable

and savvy (Buckingham & De Block, 2010). Further criticism emphasises the importance of looking at youth and their media and democratic practices outside the prism of idealistic concepts, which, as boyd (2014) cautions, can make it difficult to reflect on the adversities and challenges that they face in the connected world. Moving beyond idealised notions, acknowledging the different socioeconomic conditions, cultural and educational backgrounds, and access to technology will clarify the disparities in how youth experience and participate in digital spaces to better support them in navigating these challenges.

4. Risks and Pitfalls of Social and Digital Exclusion

Digital and social exclusion are complex, multi-layered phenomena (Ragnedda et al., 2022) that encompass political, cultural, social, and economic dimensions. Worldwide, young people are among the most vulnerable groups at risk of social exclusion. The dynamic intersection between social and digital exclusion significantly influences youth's life opportunities, social mobility, and well-being, potentially reinforcing discrimination and stigmatisation (Ragnedda et al., 2022; Serban et al., 2020). This exclusion negatively impacts self-realisation, self-esteem, and resilience, reducing social and civic engagement (Arslan, 2018).

Concerns arise regarding socially and digitally excluded young people (or those at risk of exclusion), as they often lack access to digital technologies and remain absent from educational and technological research (Cranmer, 2013). This puts them in a position of greater risk and vulnerability when using ICTs and in even worse situations when it comes to social exclusion and inequalities. Ragnedda et al. (2022) describe an "inequality loop" resulting from the self-reinforcing effect of social and digital exclusion.

Facing today's rapid technological progress, digital exclusion may exacerbate social inequalities, strengthening social exclusion and affecting citizenship and democratic engagement. Consequently, disadvantaged youth miss the opportunity to use ICT for social inclusion, undermining democratic engagement due to limited access to resources, opportunities, and rights. Thus, two questions become fundamental: On the one hand, policies that address the (infra)structural and educational aspects of digital inclusion are essential to combat social exclusion and enhance democratic engagement (Celestino & Valente, 2022); on the other, MIL research and interventions based on the lens of existing inequalities can positively contribute to designing and promoting targeted actions that are highly focused on the real needs and expectations of these target audiences.

5. Context and Methodology

5.1. The Project

YouNDigital is a pioneering study into the link between young people, news, and their digital citizenship, seeking to understand these fluid dynamics in a deeply digitised society. The project is based on a participatory action-research approach combining traditional and digital methods. Focused on young people aged 15–24 from various backgrounds, the approach emphasises digital media as democratic, equitable, and participatory tools to engage multiple audiences, even those more distant and difficult to reach. We draw on Helbing et al. (2023) and their conception of digital media as instruments that, moored in education, pose opportunities for participation and facilitate civic involvement, collective decision-making, transparency, and the establishment of more inclusive and representative democratic contexts. Additionally, we turn to Andersen et al. (2020) and

Newman et al. (2019) and studies that stress younger generations' preference for digital technologies and tools for learning and digital media to engage with the news.

A SLR was conducted in the first stage of the project with the aim of providing a detailed knowledge of the literature published between January 2010 and September 2022, helping to build a theoretical framework on the scientific production of the last decade related to the focus of this project. It also contributed to identifying theoretical gaps in research on young people, news, and digital citizenship. At a later stage, the SLR's results supported the decisions made during the development of a youth-led digital newsroom (integrated into a web app). This article focuses on and debates the outcomes from one of the SLR's subclusters (Diversities) and its contributions to understanding young audiences and their diversity.

5.2. Methodology

5.2.1. SLR Process

To conduct the literature review, the team chose to follow the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analysis Methodology) guidelines (Page et al., 2021). The Web of Science Core Collection and SciELO were the selected databases to be searched. The PRISMA approach was chosen on the basis of its rigorous features: (a) the clarification of the research questions; (b) the use of precise metrics to define the eligibility criteria; and (c) the use of time-limiters for searching the databases (Moher et al., 2009).

The overarching research question that guides the YouNDigital project is: How does the digitally born generation relate to news nowadays? A set of 11 research sub-questions was used to guide the SLR, aiming to respond to the goals and all the thematic areas under study in this project (see Appendix 1—SLR Search strategy). To define the research equation, the team engaged in an active discussion and reflection process over four months to identify fixed categories and search words (see Appendix 1). The team's expertise, previous knowledge of the research topics, and the analysis of the terminology used in recent review papers were considered. The team opted to use the same set of broad search words (Appendix 1) for all the research sub-questions to ensure comprehensive coverage, facilitate identification of emerging themes, topics, and gaps in the literature, as well as to ensure flexibility and avoid possible initial bias.

In order to be included in the SLR, studies had to meet the following eligibility criteria:

- Be focused on the relationship between audiences (children and young people), news, and digital citizenship with the intersection of aspects related to the consumption of news/information and the production of news/information, namely: (a) attitudes and practices towards news and digital citizenship; (b) information about what, how, where, and why young people research, read, and talk about news and civic issues;(c) attitudes and practices regarding the consumption of news media, including behaviours of rejection, resistance, or disconnection; and (d) whether gender and socioeconomic and educational conditions influence this dynamic;
- Empirical journal articles or book chapters;
- Written in English, Portuguese, or Spanish;
- Published between 2010/01/01 and 2022/09/08;

- Having an abstract;
- Be part of selected areas of the Web of Science Core Collection and SciELO, as presented in Appendix 1.

Considering the upsurge of intense informational changes and emerging expressions such as "fake news," algorithms, post-truth-era, and digital citizenship in the last decade, the search focused on the period between 2010–2022. The team understood that tracing this field progression—from the recurring debates to the gaps and trends—would make it possible to update and consolidate the conceptual framework guiding the project and propose new research directions—theoretical and methodological.

The SLR was conducted in three stages—identification, screening, and inclusion (Figure 1). Firstly, a comprehensive search of Web of Science Core Collection and SciELO databases was conducted by a research team member (sociology), followed by title screening to identify duplicates and pinpoint the relevance of the topic addressed. The following data was extracted into a Microsoft Excel sheet: author(s), year of publication, article title, abstract, keywords, magazine, type of document (article or book chapter), research areas, language, count of cited references, country, ISBN/ISSN, DOI or URL link, and export date.

As a result, a total of 1,133 articles were found eligible for full-text review. Later, another researcher (journalism and communication sciences) conducted the initial full-text review of articles screening for non-empirical studies (e.g., editorials, reviews, working papers), which did not meet the inclusion criteria for this review. Articles were classified throughout the database with the aid of a predefined colour scheme: "included" (green), "excluded" (red), "in doubt" (orange), and duplicates (pink).

Afterwards, two reviewers from different scientific areas (communication sciences and educational technology sciences) independently and simultaneously screened the articles from the initial search by title and/or abstract and read and coded the ones included for final review according to a protocol drawing on the guidelines suggested by Belur et al. (2021). The researcher who did the first coding was involved in the process whenever necessary. The coding agreement between the reviewers was 93.9%. Disagreements were resolved through discussion.

The final database gathered 462 eligible articles. Three main clusters were identified as previewed in Table 1. This article focuses specifically on the subcluster Diversities (n = 28) included in Cluster C (Gaps). As any other generational category, youth are different in various personal and cultural attributes. Common attributes can lead to the aggregation of individuals or labelling them as a unit, i.e., a specific social group differentiated from other groups (Qin et al., 2013). Within the scope of this project, diversity is understood from a collective perspective, considering aspects such as cultural pluralism, representation, and intersectionality. Therefore, this subcluster congregates works that focus on youth media in cross-referencing with matters related to inclusion and representation of distinct individuals, ideas, beliefs, or elements within a group or context (e.g., religion, ethnic origin, cultural and social background, gender, sexual orientation, and other conditions of marginalisation).

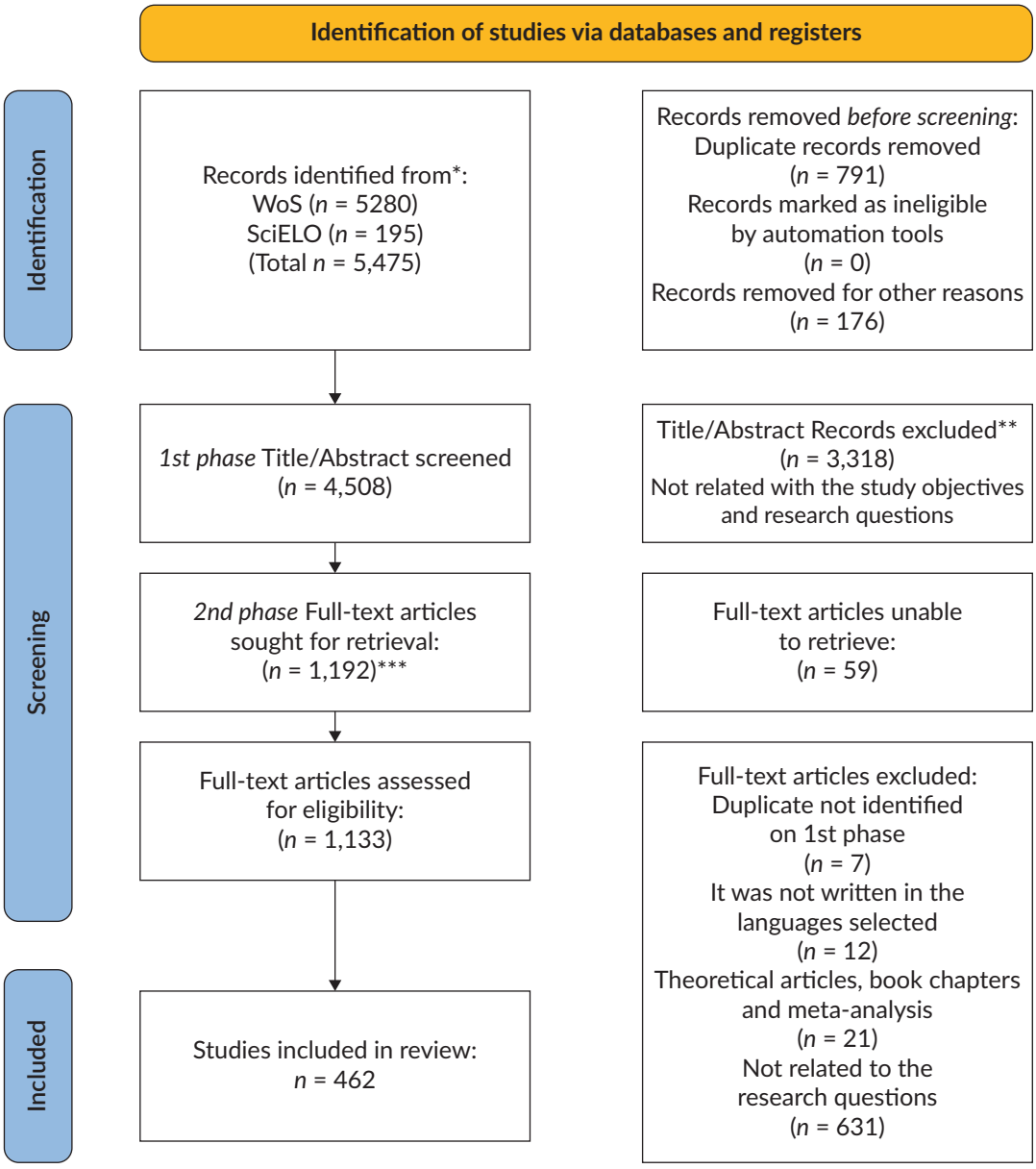

Figure 1. SLR flowchart, adapted from Page et al. (2021). Notes: WoS means Web of Science; * the number of records identified from each database or register searched; ** no automation tools were used; *** 1,190 from phase 1 + 2 added manually.

Table 1. SLR overview.

Cluster A: Traditional	Cluster B: Emergent	Cluster C: Gaps
Politics and the political (*n* = 114)	Algorithms and information disorders (*n* = 47)	Diversities (*n* = 28)
Literacies (*n* = 56)	Content production and activisms (*n* = 40)	Avoidances and resistances (*n* = 14)
Digital media (*n* = 75)	Towards business models (*n* = 7)	
Socialization (*n* = 5)		
(Dis)trust (*n* = 27)		

6. Results and Discussion

6.1. SLR

6.1.1. Overview of the Diversities Subcluster

Considering the 462 articles gathered in the project database, the Diversities subcluster represents 6.06% ($n = 28$) of the research interest. The annual distribution shows no upward or downward trend, with 2018 being the year with the most publications ($n = 5$; 17.86%), followed by 2020 and 2017, with three publications each (10.71% each). In the remaining years, only one or two publications were identified. Regarding geographical distribution, the map in Figure 2 shows that the sample concerns production from the broader international context, including countries in the so-called Global South. Even so, it should be noted that the country where most studies are carried out in this area is the United States ($n = 7$; 25%), followed by transnational studies ($n = 5$; 17.86%), Portugal ($n = 3$; 10.71%), and India ($n = 2$; 7.14%).

Of the 28 studies analysed in this subcluster, 25 indicated the size of the research sample—a total of 8,211 individuals were included in the review, with an average of 328.44 participants per study ($SD = 682.75$). As shown in Table 2, it covers young people from a wide range of age groups and backgrounds.

6.1.2. Operationalizing Diversity

This analysis adopted an intersectional lens to diversity, youth, and media research, an option that facilitated the exploration of inclusive strategies for representation, access, and participation (Tefera et al., 2018). In operationalising the diversity of media education and young people's digital creation, we identified

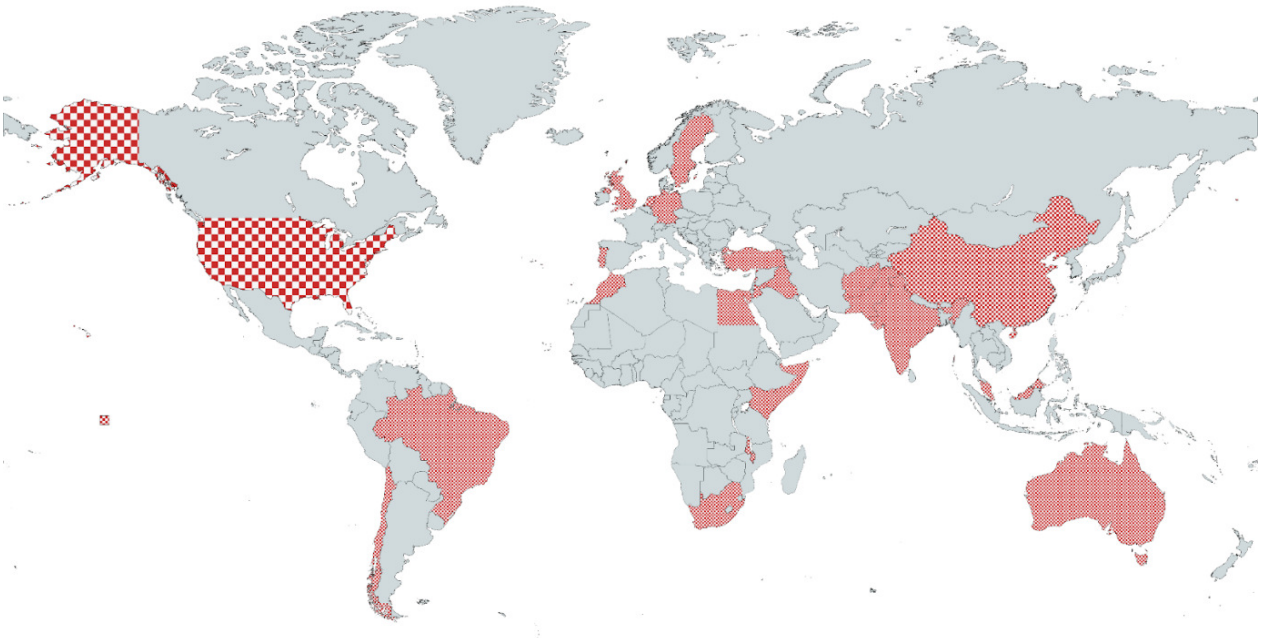

Figure 2. Map representing the distribution of the included studies. Notes: Countries marked in red are represented in the sample; made with Mapchart.

Table 2. Sample and characteristics for the various studies ($N = 28$).

Study No.	Citation	Sample Size	Individuals
1	(Gezduci & d'Haenens, 2010)	539	Youth aged 12–19, Morocco, Türkiye, and Germany
2	(Correa, 2010)	3,139	College students at two large public universities, Southwestern United States
3	(Cogo & Barsi Lopes, 2011)	3	Youth aged 14–20, Fortaleza, Brazil
4	(Tamani, 2011)	1,153	625 Malay, 416 Chinese, and 112 Indian youths (mean age: 19.5 years)
5	(Marchi, 2012)	30	Teenagers aged 14–18 who were participants in afterschool journalism (predominantly low-income, minority youth)
6	(Herrera, 2012)	28	Egyptians aged 16–30
7	(Bosch, 2013)	956	Youth aged 15–30 years, South Africa
8	(Ho & Baildon, 2013)	n/a	n/a
9	(Marôpo, 2014)	15	Children and youth aged 9–16 with families of African descent living in Portugal
10	(Santos et al., 2015)	101	University students, Portugal
11	(Baroutsis et al., 2015)	18	Young people from an alternative school, Australia
12	(Brites et al., 2017)	n/a	Young people at risk of exclusion, both in the field of education and employability, Portugal
13	(Marchi, 2016)	30	Latino youth living in East Boston
14	(Leurs, 2017)	16	Young refugees living in the Netherlands
15	(Jenzen, 2017)	n/a	Participants aged 16–26 who regularly attend a social safe space for gender-exploring youth in Brighton, United Kingdom
16	(Leurs et al., 2018)	30	Young people aged 15–20, Somalia, Iraq, Afghanistan, and Chile
17	(Malhotra et al., 2018)	2,835	General population
18	(Mchakulu, 2018)	98	University students
19	(Stornaiuolo & Thomas, 2018)	45	Students from the Collaborative Design School
20	(Khan et al., 2019)	504	Students from COMSATS University Islamabad and University Utara Malaysia
21	(Miconi, 2020)	44	Youth migrants from Syria, located in Türkiye, Lebanon, and Jordan
22	(Pham et al., 2020)	23	Transgender and gender nonconforming youth (13–19 years) from Seattle Children's Gender Clinic
23	(Bhatia & Pathak-Shelat, 2020)	49	23 males and 26 females, from grades 7 and 8, enrolled at a primary school in India
24	(Lindell, 2020)	56	Young people aged 17–20, Sweden
25	(Marchi & Clark, 2018)	14	A group of youth (aged 15–17) who were members of an Environmental Youth Crew
26	(Tallam, 2021)	755	University students, Kenya
27	(Pahore et al., 2021)	533	University students, Pakistan
28	(Wilf et al., 2022)	32	Racially and ethnically diverse immigrant-origin youth (18–23 years) living in the United States

different lines of research that took into account cultural differences, gender, race, ethnicity, class, age, LGBTQI+ issues, and religious differences.

Five emerging themes arise from the analysis of this subcluster (Braun & Clarke, 2022). Firstly, (a) media consumption and representation (Gezduci & d'Haenens, 2010; Marchi, 2012; Mchakulu, 2018; Santos et al., 2015) are intertwined dimensions that involve studying individuals' media content consumption and how that content represents multiple aspects of society, influencing perceptions and attitudes. The examples encompass various topics—e.g., news influencing attitudes, the portrayal of marginalised groups, and the impact of specific media outlets on local youth. (b) Digital media and online participation (Bosch, 2013; Correa, 2010; Khan et al., 2019; Marchi & Clark, 2018; Miconi, 2020; Pahore et al., 2021; Tallam, 2021; Wilf et al., 2022) is another emerging theme. It explores how factors, platforms, and contexts shape individuals' online content engagement and participation in activities based on diverse examples. For its part, (c) identity, citizenship, and cultural diversity (Bhatia & Pathak-Shelat, 2020; Cogo & Barsi Lopes, 2011; Herrera, 2012; Ho & Baildon, 2013; Marôpo, 2014) comprises studies exploring how communication technologies, especially digital media, influence society, including citizenship perceptions, identity construction, political engagement, and the discourse surrounding sensitive issues (e.g., immigration and religious diversity). Regarding (d) media literacy and educational impact (Brites et al., 2017; Leurs et al., 2018), the studies that relate to this theme mainly explore media education's transformative impact on educational outcomes, youth engagement, and the ability of specific demographic groups (e.g., migrants) to navigate and critically engage with media content. Finally, the theme of (e) diverse identities and news consumption (Pham et al., 2020; Wilf et al., 2022) emphasises the influence of diverse identities on news consumption patterns while exploring the unique dynamics at the intersection of identity and media engagement. This set of articles, divided into five emerging themes, highlights that diversity comprises a range of dimensions, such as cultural, social, and ideological differences. Therefore, and throughout the context of media production and consumption, diversity encompasses the inclusion of perspectives from marginalised or underrepresented communities, as well as the acknowledgement and validation of various points of view and experiences.

In methodological terms, and as systematised in Table 3, this subcluster demonstrates a significant presence of qualitative studies (n = 21) and a lower presence of quantitative studies (n = 5) and mixed-methods approaches (n = 2).

The lack of experimental research designs to explore the effects of MIL interventions or educational experiences identified in the subcluster suggests the academic urgency to study, both quantitatively and qualitatively, young people and their diversity profiles in media consumption and production in their daily contexts, adopting more interpretative models instead of purely positivist ones (Carragee, 1990). This view is corroborated by the need to foster subjectivity and the conceptual value of individual meanings in the educational context (Pervin & Mokhtar, 2022). Moreover, in the six articles identified in this selection where the research teams opted to collect data through processes based on media analysis (whether media creations by participants or not), it is noted the pivotal role of creation and self-expression in shaping discourse, promoting civic engagement, and empowering marginalised voices.

The data collection techniques adopted in the analysed sample of studies show a dominance of in-depth methods to approach the phenomena, including interviews and focus groups. This is aligned with the acknowledgement of the relevance of such approaches to exploring the complex contexts of children, youth, and families (Adler et al., 2019; Schelbe et al., 2015).

Table 3. Diversity axis, research design, and data collection techniques for the various studies ($n = 28$).

Study No.	Diversity Axis	Research Design	Data Collection
1	Cultural differences	Quantitative (between groups comparison)	Standardised scales
2	Gender, race, class, and age	Quantitative (cross-sectional study)	Standardised scales
3	Cultural differences and class	Qualitative	Interviews
4	Cultural differences and ethnicity	Quantitative (cross-sectional study)	Questionnaire
5	Race and class	Qualitative	Interviews
6	Cultural differences	Qualitative	Interviews and focus groups
7	Cultural differences	Mixed methods	Questionnaire and focus groups
8	Race and ethnicity, focusing on migration	Qualitative	Media analysis (web platforms)
9	Race and ethnicity	Qualitative	Interviews
10	Gender	Qualitative	Focus groups
11	Class and other conditions of marginalisation	Qualitative	Interviews
12	Class and other conditions of marginalisation	Qualitative	Interviews and focus groups
13	Race and ethnicity	Qualitative	Interviews
14	Race and ethnicity, focusing on migration	Qualitative	Ethnography
15	LGBTQI+ issues	Qualitative	Ethnography
16	Race and ethnicity, focusing on migration	Qualitative	Ethnography, interviews, and focus groups
17	Class and other conditions of marginalisation	Qualitative	Interviews and focus groups
18	Cultural differences	Qualitative	Media analysis (texts produced by youth)
19	Race and gender	Qualitative	Media analysis (artefacts produced by youth)
20	Cultural differences	Quantitative (cross-sectional study)	Questionnaire
21	Cultural differences, focusing on migration	Qualitative	Interviews
22	LGBTQI+ issues	Qualitative	Interviews
23	Religious differences	Qualitative	Media analysis (artefacts produced by youth) and interviews
24	Class	Qualitative	Focus groups
25	Cultural differences and other conditions of marginalisation	Qualitative	Media analysis (social media content) and interviews
26	Cultural differences	Mixed methods	Questionnaire and focus groups
27	Gender	Quantitative (cross-sectional study)	Questionnaire
28	Race and ethnicity, focusing on migration	Qualitative	Media analysis (social media content) and interviews

6.1.3. Key Findings

The SRL findings reveal valuable insights that align with the research objectives of examining the capacity to involve diverse young individuals in self-exploration and transformative learning experiences related to media production and news consumption through media production. Additionally, it investigates the difficulties of considering the attributes of youth from different backgrounds through co-creation or inclusive design. In the following paragraphs, we explore these ideas in more depth.

The results underscore the disparities in media participation practices among minority groups and groups at social and economic disadvantage, pointing to situations of digital exclusion. Correa (2010) highlights inequalities in content production within connected groups influenced by gender, race, and age traits—not only having access to a computer from an early age but also aspects related to confidence and motivation when there is a low self-perception of skills necessary for content creation. Moreover, Marchi (2012) mentions that the viewpoints and engagement of economically disadvantaged teenagers with journalism and democracy are greatly influenced by their socioeconomic conditions. Based on the point of view of young refugees, Leurs (2017) notes that while this group prioritises meeting its basic needs, it considers smartphone usage to be an essential part of the right to communicate—something that manifests in everyday practices in which the smartphone takes the place of a personal digital archive and alternative knowledge production tools. These findings highlight the necessity of further exploring digital media's potential to understand practices, experiences, and expectations, and incorporating inclusive design to tackle socioeconomic inequalities and guarantee fair access to opportunities for media engagement.

Other findings underline the ever-changing nature of civic participation and the necessity for comprehensive strategies that integrate conventional and digital methods. Cogo and Barsi Lopes (2011) reveal the simultaneous presence of conventional mass communication models and networked communication in the communication (and participation) practices of young people in the context of NGOs. In line with this, Bosch (2013) observes that youth's use of Facebook encompasses a subactivism aspect, which implies a manifestation of citizenship and democratic experiences. Likewise, Ho and Baildon (2013) emphasise the significance of education, specifically intercultural education, in equipping young individuals to actively participate in online civic spaces.

Research also sheds light on the multifaceted nature of youth's political participation. Khan et al. (2019) underscore that political factors, satisfaction with policies, interest in politics, and online incivility influence youth's online political participation. Other authors uncover discrepancies in social media usage among immigrants, indicating possible areas of limited awareness in digital social interaction (Miconi, 2020) and a correlation between disparities in social classes and in democratic engagement and awareness of current events (Lindell, 2020). While these results stress complex aspects of political involvement among young individuals, they also emphasise the relevance of addressing and further exploring the factors affecting their participation—such as the growing fragmentation of digital spaces and the avoidance of specific topics.

The review provides further insights related to youth representation and representativeness, such as prevailing stereotypes in media content and production. Santos et al. (2015) observe the continued presence of conventional gender portrayals in media while highlighting the insufficient examination of media's influence on the construction of gendered social norms. In a related context, Malhotra et al. (2018)

questioned idealised concepts of Indigenous communication, stressing the importance of employing so-called sophisticated communication tactics when engaging with marginalised communities—namely context- and evidence-based digital or mobile interventions. These aspects point out the significance of media literacy programmes that advocate for inclusive portrayals within diverse communities.

Furthermore, warning signs regarding technology's profound influence on consumption and engagement with news appear. For Marchi and Clark (2018), the transition from conventional to connective journalism prioritises developing personal and group identities. In turn, Tallam (2021) examines the impact of internet-enabled mobile devices on the conception of "news" and the timing of news events. The author argues that the impacts concern how the social world is formed, uncovering both the changing nature of media involvement and the need to adjust educational approaches to use technological advancements effectively.

Finally, the research highlights differences in the impact of news on young individuals from various cultural settings. Gezduci and d'Haenens (2010) emphasise that comparatively to Flemish youth, news holds greater significance in the lives of Moroccan and Turkish youth than native, evidencing e.g., different perspectives in terms of the perceived credibility of the information. In contrast, Tamani (2011) proposes that although Malaysian youth have a positive disposition towards their country, their local news consumption is comparatively limited—something the author possibly attributes to a lack of interest, minimal need for news information, or even a diminished perception of media credibility (pp. 77–78). These findings highlight the importance of employing sophisticated strategies when developing MIL interventions, considering cultural contexts, identities, antecedents, and preferences.

7. Final Notes, Future Perspectives, and Limitations

The SLR presented in this article accentuates the complex process of involving young people in educational experiences that promote change through digital, mobile, and internet-based tools and materials, and through media creation. It highlights the difficulties alongside the positive results of using digital tools to trigger learning and motivational processes across diverse audiences. On a positive note, digital tools centred on media creation, creativity, critical thinking, and collaboration are presented as drivers to promote the empowerment and inclusion of youth from distinct backgrounds. By doing so, they can bridge the gap between youth's realities and citizenship experiences while promoting opportunities for participation and encouraging ownership of learning and democratic processes. Additionally, they provide insights into the difficulties associated with inclusivity and diversity, underscoring the significance of customised interventions that consider cultural subtleties, socioeconomic variables, and changing technological environments. These understandings serve as a basis for creating targeted educational programmes and policies that capacitate youth to become active and knowledgeable citizens in an increasingly media-influenced world.

Regarding the subsequent phases of the project, the SLR's findings informed the design-thinking process in which the research team anchored the development of a digital newsroom. It aimed to engage young people from diverse socioeconomic backgrounds in the active process of participation through the creation of news. During the design-thinking process, researchers developed personas, scenarios for using the web app, and a set of functionalities for the digital newsroom. These tasks relied on and scaled up the SLR's major conclusions: firstly, the urgency of adopting inclusive design strategies to respond to vulnerable groups'

needs and expectations; secondly, the need to ensure different formats and possibilities for participation, promoting fair access and multiple opportunities; and finally, the advantages and opportunities that multimedia formats (e.g., digital narratives and other digital-based materials and tools) present when aiming to collect perceptions and experiences of specific target groups. Future research on particular target groups and contexts can draw on the example of this research work to tailor their approaches and design strategies aimed at achieving specific objectives and bridging needs.

The limitations identified in this SLR are combined with possibilities to further the research results. Firstly, it was conducted in two leading academic databases (though additional studies, i.e., "grey literature," that may have been conducted on the topic were not considered for feasibility purposes due to the amount of published data). As a result, relevant data may have been excluded from the review, although the intersectional nature of models for operationalising diversity in media and education research can be emphasised, there seem to be underexplored aspects and social structures, such as disability and ableism in line with previous studies (Sousa & Costa, 2022). Media creation tools still need to be explored at an operational level in research compared to their outcomes. Lastly, most of the review studies identified limitations that cannot be disregarded—e.g., the lack of longitudinal designs focused on specific target groups, as well as the lack of comparative approaches that could promote a better contextual and temporal understanding and consistently inform policies and educational materials.

As a final note, this research reinforces that efforts to mitigate youth social and digital exclusion are crucial for enhancing democratic participation. Understanding how youth think, behave, and feel and what they expect from news and citizenship is essential to comprehending democracies and contributing to fairer and more inclusive societies. Social and digital exclusion affects each individual's life and social cohesion. Stigmatisation, the increasing gap between those with access to technology and education and those who lack digital citizenship competencies, is evident. The results of this SLR can positively contribute to scholarship in the fields of youth, news, and digital citizenship, suggesting an urgent need for research to consider the particularities of the individuals who make up groups rather than solely attending to their unifying characteristics and traits. The idea of diversity is broad and challenging, but considering it contributes to understanding the cultural, social, and ideological forces that shape society, its groups, and individuals.

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Conflict of Interests

The authors declare no conflict of interest.

Data Availability

The data included in this study can be found in the YouNDigital Project database (https://youndigital.com), specifically in "Cluster: Diversities," available at https://www.zotero.org/groups/5106692/youth_and_news_publications_2000-/tags/Cluster%3A%20Diversities/library

Supplementary Material

Supplementary material for this article is openly available online in PDF, through FigShare platform (Appendix 1—SLR Strategy: https://doi.org/10.6084/m9.figshare.26268610; Appendix 2—SLR Flowchart: https://doi.org/10.6084/m9.figshare.26269732).

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A Longitudinal Perspective on Digital Skills for Everyday Life: Measurement and Empirical Evidence

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Abstract

Our everyday lives are increasingly digital: We meet with friends, search for information, watch films, and buy goods online. This generates data that is automatically collected and analyzed. The ability to deal with the resulting algorithmically selected and personalized content is essential to benefit from digital technologies, and for this, digital skills are crucial. Studies focusing on digital skills, their antecedents, and consequences have mostly relied on self-reported, one-time measurements. A deeper understanding of the measures of digital skills and the role such digital skills play in everyday life and over time is needed. To address these gaps, this article compares self-reported measures of digital skills and knowledge of datafication and algorithmization in everyday internet use and maps the evolution of their relevance for digital everyday life. To do so, this articles analyzes data from multiple cross-sectional surveys conducted from 2011 to 2023 with representative samples of Swiss internet users. First, the findings indicate that self-reported skills reflect internet users' knowledge of algorithmization and datafication in everyday internet use. This renders the measure a decent tool for empirical studies. Second, the findings show that digital skills are associated with socioeconomic background, cyber-optimistic attitudes, usage time, use of social media, health trackers, voice assistants, ChatGPT, and feeling included in the information society. These relationships varied over time. This article provides longitudinal empirical evidence on the relevance of digital skills in a highly digitized country. The findings highlight that promoting digital skills can contribute to fostering more inclusive digital societies.

Keywords

algorithmization; datafication; digital inclusion; digital inequality; digital skills; online survey; skills measurement

1. Introduction

Our everyday life is marked by internet use. Ninety-six percent of the Swiss population is currently using the internet (Latzer et al., 2021). On average, Swiss internet users spend 5.6 hours per day online and this amount has vastly increased in the past years (Latzer et al., 2023). Since the Covid-19-pandemic, people have spent more time online than before, for instance working from home, shopping online, and spending their free time using digital technologies (Latzer et al., 2023). The current trends of digitalization can be viewed as marked by datafication, platformization, and algorithmization (Latzer, 2022). To be able to use the internet in a beneficial way, internet users need a certain level of digital skills (Hargittai & Micheli, 2019). The effective use of new innovative services, like for instance voice assistants, requires specific digital skills (Gruber et al., 2021). Moreover, they are needed for protecting one's privacy online (Büchi et al., 2017) or for coping with algorithmic risks (Kappeler et al., 2023). In addition, theoretical approaches have suggested that digital skills are an important factor that is associated with the inclusion in the information society (see e.g., Hargittai & Micheli, 2019; Ragnedda, 2020; van Dijk, 2020). Indeed, recent empirical studies have indicated that differences in skills can lead to the reproduction of existing social inequalities (Blank & Lutz, 2018; Festic et al., 2021; Gruber & Hargittai, 2023; Ragnedda, 2020; Sharp, 2023). Theoretical approaches like the digital divide framework or the digital inequalities perspective have argued that a person's digital skills are impacted by their social position (van Dijk, 2020), which has been evidenced empirically as well (see e.g., Bonfadelli, 2002; Büchi et al., 2016; Ragnedda, 2020). Differences in digital skills can lead to a variety of internet uses and also to various consequences such as different levels of inclusion in the information society (Correa et al., 2022). This makes the study of digital skills highly relevant, especially in societies where the digital is increasingly becoming the norm and both private corporations, and governments employ a digital-first strategy (Allmann & Blank, 2021). The rapid development of digital technologies requires matching digital skills to use them. Therefore, this article asks: How can digital skills be measured and how has their association with socioeconomic background, cyber-optimistic attitudes, internet use, and the feeling of inclusion in the information society changed over time?

To answer this overarching research question, first, this article compares survey-based self-reports of digital skills with internet users' knowledge of datafication and algorithmization related to everyday internet use. Second, this article aims to illustrate the role that digital skills play in everyday internet use and how they have developed over time. To do so, this article tests the association of digital skills with socioeconomic background, cyber-optimistic attitudes, internet usage, and the feeling of inclusion in the information society. It compares data from multiple cross-sectional surveys that were conducted in Switzerland, each with a representative sample of Swiss internet users. This study contributes to current research on digital skills on two levels. Firstly, it compares a self-reported digital skills measure with an evaluation-based knowledge measure. Secondly, it adds a longitudinal perspective on the role that digital skills play in the literature. In a fast-evolving digital world, it substantiates theoretical claims on the relevance of digital skills with comparisons of empirical data from a highly digitized country over time. The findings presented in this article highlight the importance of digital skills for everyday life in today's digitized society.

2. Theoretical Background and Previous Research

2.1. Defining Digital Skills

The idea that the use of information and communication technologies, digital media, or the internet requires a specific form of literacy, competency, or skills has evolved with the advent of these technologies. According to van Dijk (2020), the term "literacy" originates from the larger field of media, and the term "competency" can be viewed as more general than the term "skills." The terms "computer" and "digital literacy" were used in conceptual research from the early 2000s on and are still used lately (see Bawden, 2001; Livingstone & van der Graaf, 2010; Tinmaz et al., 2022; Warschauer, 2003). The term "competency" is predominantly used in policy-related settings, like the DigComp digital competence framework by the European Union (see Carretero et al., 2017). The terms "online" and "internet skills" were promoted by Hargittai (2002) who referred to abilities that are necessary for navigating the internet and completing online tasks. In a similar vein, van Deursen and van Dijk (2014) referred to "internet" or "digital skills" to highlight the digital characteristics of the concept. This term has been adopted by recent policy reports as well (Helsper et al., 2021). Recently, the term "algorithm" has been added to the concepts of "literacy" and "skills" to denote a specific focus on the role that algorithms play in today's online environment (see Dogruel et al., 2022; Hargittai et al., 2020). Alongside this, the term "digital skills" is used to denote a more general, overarching concept (see Allmann & Blank, 2021; van Dijk, 2020).

2.2. Measuring Digital Skills

The ways in which digital skills are measured differ greatly between studies (see Dogruel et al., 2022; Grošelj et al., 2020; Hargittai, 2005; Litt, 2013; Livingstone et al., 2023; Oh et al., 2021; Orero-Blat et al., 2022; van Deursen et al., 2016; van Deursen & van Dijk, 2010). Self-report questions that ask survey respondents to evaluate their own digital skills are widely used. A benefit of this measurement is its easy administration and efficiency. However, the validity of self-reported measures remains unclear (van Dijk, 2020) and researchers have found systematic gender biases in self-evaluations (Hargittai & Shafer, 2006). One strategy to avoid the subjective evaluation of one's own skills involves the administration of experimental tasks (see Eshet-Alkali & Amichai-Hamburger, 2004). However, while this approach improves external validity, it also increases costs, thereby reducing feasible sample sizes (van Dijk, 2020). Another way to measure skills is through the understanding of terms that can be viewed as proxies for skills (see Hargittai, 2005). However, this measure still relies on self-reports. Besides quantitative studies, observations and interviews have tried to measure skills qualitatively (Allmann & Blank, 2021; Hargittai et al., 2020). While such approaches allow for an in-depth study of skills, they require a lot of resources and are only applicable to specific groups and not to population-based investigations. The vast variety of measurements of digital skills and related concepts renders the comparison of results across studies difficult (Sharp, 2023). Therefore, a comparison of different modes of measurement is desirable. As self-reports are the most common approach and these measurements have the advantage of being timeless as they reflect individuals' subjective perceptions, I ask in my first research question:

> RQ1: How do self-reported digital skills compare to knowledge of datafication and algorithmization in everyday internet use?

To answer this research question, I compare a self-reported evaluation of digital skills with the correct evaluation of statements related to everyday internet use.

2.3. Associations With Digital Skills

The relevance of digital skills originates from the role they play in beneficial internet use (Hargittai & Micheli, 2019). The digital divide framework sets out to explain three levels of differences related to internet use. The first level is concerned with differences in access to and mere use of the internet. The second level focuses on differences in the types of internet use and digital skills. Finally, the third level centers around differences in the consequences of internet use (Ragnedda, 2020; van Dijk, 2020). As the view of such digital divides has become more nuanced, differences in internet use have been referred to as "digital inequalities" to denote their non-binary nature (Hargittai, 2018; Helsper, 2021). With the spread of the internet, such divides or inequalities were expected to diminish and vanish over time. However, it soon became apparent that this was not the case and that existing social inequalities were perpetuated rather than eliminated through internet use (van Dijk, 2005). Recent research shows that digital inequalities are still relevant today, even in highly connected societies. Research on the first level suggests that internet use remains stratified along socioeconomic background variables and that more privileged groups are more likely to use the internet (Kappeler et al., 2021). Similarly, research on the second level reveals that digital inequalities in how the internet is used still persist (Festic et al., 2021). A person's social position is associated with their level of digital skills. The more privileged groups—i.e., young, highly educated, well-earning individuals and men—have reported a higher level of digital skills (Bonfadelli, 2002; Büchi et al., 2016; Festic et al., 2021; Grünangerl & Prandner, 2022; Hargittai, 2002; Helsper, 2021; Ragnedda, 2020; Scheerder et al., 2017; van Dijk, 2020). This leads to the first hypothesis:

> H1: A person's age, level of education, income, and gender are associated with their level of digital skills.

According to van Dijk (2020), a person's attitude is related to their internet usage and skills. In addition, individual digital skills facilitate varied and beneficial internet use, which in turn relates to more favorable attitudes towards such technologies (Hargittai & Micheli, 2019). Recent research has shown that attitudes are indeed related to digital practices and skills (Blažič & Blažič, 2020; Cabellos et al., 2024; Ma et al., 2017). From this, a second hypothesis can be deduced:

> H2: Cyber-optimistic attitudes are associated with a higher level of digital skills.

According to van Deursen et al. (2011), a person's digital skills relate to the time they spend online. This relationship has been supported by empirical studies (Cantú-Ballesteros et al., 2017). Moreover, according to the digital divide framework, a higher level of digital skills allows for more active and more innovative internet use (van Dijk, 2020). Indeed, skills have been shown to relate to the active use of social media (Correa, 2016) and the use of emerging technologies like voice assistants (Gruber et al., 2021). The relationship between digital skills and the use of digital technologies is recursive; hence, use can lead to a higher level of skills (van Dijk, 2020). Therefore, I hypothesize the following:

> H3: The level of digital skills is associated with internet usage time and the active use of social media, health trackers, voice assistants, and ChatGPT.

Within the digital divide, second-level differences have an impact on the third level. This is exemplified by research on older adults, a group among which first- and second-level digital divides are still apparent. For them, digital skills are important for strategies to bridge these divides and hence lead to more equal outcomes of internet use (Blažič & Blažič, 2020). Research on younger groups, and specifically students, has shown that digital skills relate to individuals' academic performance (Ben Youssef et al., 2022). In addition, studies focusing on adolescents reveal an association between a higher level of digital skills and online opportunities (Livingstone et al., 2023). Also, more generally, a person's skill level is relevant for the application of privacy protection strategies (Büchi et al., 2017) and for coping with algorithmic risks (Kappeler et al., 2023), both of which may lead to fewer negative consequences of internet use. Still, the differences in outcomes of internet use and the role that digital skills play remain understudied (Scheerder et al., 2017). Conceptualizations of digital skills have established their relevance for usage, as well as for social inclusion as a consequence of usage (Hargittai & Micheli, 2019; Helsper, 2021; Reisdorf & Groselj, 2018; van Dijk, 2020). This claim has been empirically supported by a recent panel study on internet use and digital skills (Correa et al., 2022). The relationship between digital skills, internet usage, and the feeling of inclusion in the information society is especially relevant in a society where the digital is the norm (Allmann & Blank, 2021). Therefore, I propose the following:

> H4: The levels of digital skills and internet usage are associated with the feeling of inclusion in the information society.

Finally, research on digital skills predominantly relies on cross-sectional surveys at one specific point in time. Comparative studies mapping the evolution of digital skills over time are rare. Therefore, I want to address this with my second research question:

> RQ2: How have the relationships of associated factors with digital skills evolved over time?

To do so, I analyze data from seven cross-sectional surveys that were conducted between 2011 and 2023.

3. Method

3.1. Data Collection, Samples, and Analysis

This study analyzed telephone and online survey data that is representative of Swiss internet users aged 14 years and over regarding age, gender, household size, and employment status ($n_{2023} = 1,008$; $n_{2021} = 1,069$; $n_{2019} = 1,035$; $n_{2017} = 1,013$; $n_{2015} = 981$; $n_{2013} = 949$; $n_{2011} = 851$). The data was weighted to closely match the demographics of the general internet-user population. The survey was conducted in German, French, and Italian, thus representing the three big language regions in Switzerland. For this article, the items were translated into English. In Switzerland, 96% of the population uses the internet (Latzer et al., 2021). Respondents gave informed consent to participate in the study and the scientific use of their data. No personal inferences were possible. To answer the research questions and to test the hypotheses, I applied multiple linear regressions using R. The hypotheses were analyzed for the years in which the individual items were in the field.

3.2. Measures

The self-report measure for digital skills was applied using one item, which was the following question: "How good are you at using the internet?" Respondents were given five possible answer options—*bad*, *sufficient*, *good*, *very good*, and *excellent*—to subjectively rate their digital skills.

To compare the self-reported digital skills measure to knowledge of current challenges of digital everyday life, i.e., datafication and algorithmization, I applied a knowledge measure consisting of five statements related to everyday online experiences. This list was based on previous qualitative and quantitative studies (see Dogruel et al., 2022; Festic, 2020; Hargittai et al., 2020). The following five statements were shown to the respondents:

- Internet services can tailor the recommendations they give a user to their personal interests.
- When using Google with the same search terms, everyone always gets the same results.
- If different users visit the same website at the same time, they will always receive the same advertising.
- How long one stays on a post on Facebook or other services can influence what content they are shown on the internet.
- The newsfeed of individual users on social media such as Instagram, Facebook, or TikTok is compiled by humans.

For each of these statements, respondents were asked to evaluate the correctness of these statements (1 = *true*, 2 = *false*, 3 = *not sure*). I then recoded these variables to capture the percentage that evaluated each statement correctly and calculated an index from these. This index is used next to reflect the knowledge of everyday internet use processes related to datafication and algorithmization.

In terms of socioeconomic background, respondents were asked about their gender (1 = *male*, 2 = *female*, 3 = *diverse*); their age (in years); their education level, which was recoded into categories (1 = *low*, 3 = *high*); and their household income, which was also recoded into categories (1 = *low*, 5 = *high*).

The active usage of the internet was operationalized in terms of the daily time spent on the internet (in minutes), actively using social media like Facebook or Instagram, and the intensity of active use of innovative technologies including health trackers, voice assistants, and ChatGPT on a six-point frequency scale (1 = *never*, 6 = *several times a day*).

Cyber-optimistic attitudes were operationalized using the following five items:

- My internet use has more positive than negative consequences for my life.
- All in all, the internet is a good thing for society.
- New digital technologies have the potential to solve almost all of society's problems.
- New technologies have the potential to develop people's physical and mental abilities in a targeted manner.
- My high level of trust in these services makes my everyday life much easier.

For each statement, respondents gave their agreement on a five-point agreement scale (1 = *do not agree at all*, 5 = *fully agree*).

The feeling of inclusion in the information society was captured with one question asking about how included individuals feel in today's information society on a five-point scale (1 = *not at all*, 5 = *completely*). Hence, this item reflects respondents' perception of their own inclusion in the information society.

4. Findings

This section presents the empirical findings to the three research challenges related to digital skills that I address in this article: (a) I compare self-reported digital skills to knowledge about datafication and algorithmization, (b) I test literature-based factors' association with digital skills, and (c) I show how these changed over time in a highly digitized society.

4.1. Measuring Digital Skills

As pertains to RQ1, the descriptive findings show that on average, 3.15 out of 5 statements were evaluated correctly. There was some variance in the knowledge, depending on the statements: The correct evaluation per statement ranged from 44% (curation of newsfeeds) to 82% (tailored recommendations). A quarter of all internet users evaluated all statements correctly. 10% evaluated only one statement correctly and 4% none. The proportion that evaluated two, three, or four statements was each roughly 20%. The comparison of the two types of measurements shows that the self-report digital skills measure (mean = 3.27) has a significant positive correlation with the knowledge measure ($r = 0.260$, $p < 0.001$).

4.2. Associations of Digital Skills Over Time

To test the hypotheses and to answer RQ2, I used the one-item self-reported digital skills measure. Table 1 depicts how the mean level of self-reported digital skills developed over time. The findings show that from 2011 to 2023, the distribution of digital skills was relatively stable.

4.3. Social Background and Attitudes' Association With Digital Skills

H1 states that younger, higher educated, higher income, and male persons are more likely to report a higher level of digital skills. It was tested for 2011–2023. Table 2 depicts the results and coefficients of the multiple linear regressions per year. For the years 2011, 2013, and 2015, the overall model and the individual

Table 1. Mean level of digital skills, between 2011 and 2023, in Switzerland.

Year	*M*	*SD*	*n*
2011	3.21	1.022	804
2013	3.27	1.048	861
2015	3.23	1.004	904
2017	3.15	0.963	844
2019	3.14	0.947	869
2021	3.03	1.071	916
2023	3.27	0.915	1,008

Note: Swiss internet users aged 14 years and older.

associations were not significant. For 2017, the model was significant and so were the effects of gender and education. For 2019, the model was significant, as well as the effect of income. For 2021, the model was significant, and the effects of gender and income were significant too. For 2023, the model was significant,

Table 2. Association of digital skills with socioeconomic background, 2011–2023.

Year		*B*	*SE*	*β*
2011	Constant	3.250	0.228	–
	Gender	0.061	0.073	0.029
	Age	–0.003	0.036	–0.003
	Education	–0.024	0.067	–0.014
	Income	–0.026	0.031	–0.031
2013	Constant	3.271	0.226	–
	Gender	–0.003	0.075	–0.002
	Age	–0.010	0.037	–0.010
	Education	0.046	0.066	–0.026
	Income	–0.022	0.034	–0.024
2015	Constant	3.062	0.201	–
	Gender	0.052	0.068	0.026
	Age	–0.029	0.034	–0.031
	Education	0.046	0.052	0.032
	Income	0.023	0.025	0.034
2017	Constant	2.909	0.129	–
	Gender	–0.150	0.069	–0.077*
	Age	0.030	0.034	0.032
	Education	0.124	0.058	0.082*
	Income	0.019	0.023	0.031
2019	Constant	3.011	0.193	–
	Gender	0.16	0.068	0.008
	Age	–0.045	0.033	–0.050
	Education	0.032	0.053	0.022
	Income	0.057	0.023	0.090*
2021	Constant	2.816	0.221	–
	Gender	–0.168	0.077	–0.079*
	Age	0.026	0.038	0.026
	Education	0.048	0.064	0.030
	Income	0.069	0.027	0.103*
2023	Constant	3.634	0.166	–
	Gender	–0.206	0.056	–0.115***
	Age	–0.188	–0.028	–0.213***
	Education	0.170	0.056	0.099*
	Income	0.071	0.020	0.113***

Notes: Swiss internet users aged 14 years and older; * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

and age, education, income, and gender were significantly associated with the level of digital skills a person reported. This means that respondents who were younger, had higher education, higher household income, and were male were more likely to report a higher level of digital skills.

H2 states that more cyber-optimistic attitudes are related to a higher level of digital skills. It was tested for 2023. The model to test H2 was significant. Table 3 shows the results and coefficients of the multiple linear regression. Attributing more positive than negative consequences to the internet, thinking the internet is a good thing, believing in the potential of new technologies to solve societal problems, believing in the potential of technologies to further human abilities, and thinking that trust in these services eases everyday life have a significant positive association with the level of digital skills. This means that those with stronger cyber-optimistic attitudes have a higher level of digital skills.

4.4. Digital Skills' Association With Usage and Inclusion

For H3, I looked at the relationship between different usage practices and digital skills. It was tested for the years 2011–2023. The included independent variables vary across years as not all of them were included in the survey every year. Table 4 shows the results and coefficients for the multiple linear regressions. For the years 2011, 2013, 2015, 2017, and 2019, the overall models and associations were not significant. For 2021, the overall model was significant and using social media had a significant negative association with digital skills, while using voice assistants had a significant positive association. For 2023, the model tested as significant. It shows that overall daily usage time, using social media, using health trackers, and using services like ChatGPT had a significant positive association with the reported level of digital skills.

Finally, to test H4, I looked at the relationship between usage time, digital skills, and inclusion. This hypothesis was tested for the years 2015–2023. Table 5 shows the results and coefficients of the multiple linear regressions. For the years 2015, 2017, and 2021, the overall model was significant and daily usage time had a significant positive association with the feeling of inclusion in the information society. For 2019 and 2023, the model tested as significant, and it showed that usage time and digital skills both had a significant positive association with the feeling of inclusion in the information society.

Table 3. Association of digital skills with cyber-optimistic attitudes, 2023.

	B	*SE*	*β*
Constant	1.773	0.124	—
More positive than negative	0.083	0.032	0.091**
Good thing	0.175	0.036	0.176***
Solve societal problems	0.083	0.030	0.099*
Develop human abilities	0.085	0.030	0.102*
Easier everyday life	0.053	0.025	0.068*

Notes: Swiss internet users aged 14 years and older; * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Table 4. Association of digital skills with internet usage, 2011–2023.

Year		*B*	*SE*	*β*
2011	Constant	3.295	0.065	–
	Usage time	0.000	0.000	–0.034
	Social media	–0.022	–0.036	–0.036
2013	Constant	3.241	0.068	–
	Usage time	0.001	0.000	0.011
	Social media	0.007	0.019	0.377
2015	Constant	3.243	0.063	–
	Usage time	–0.001	0.000	–0.006
	Social media	–0.004	0.017	–0.009
2017	Constant	3.219	0.070	–
	Usage time	0.000	0.000	–0.081
	Social media	0.011	0.018	0.024
	Health trackers	–0.015	0.022	–0.023
2019	Constant	3.045	0.075	–
	Usage time	0.000	0.000	0.048
	Social media	0.027	0.017	0.058
	Health trackers	–0.023	0.021	–0.040
2021	Constant	2.950	0.086	–
	Usage time	0.000	0.000	–0.040
	Social media	–0.047	0.018	–0.090 **
	Health trackers	0.027	0.021	0.043
	Voice assistants	0.153	0.030	0.171***
2023	Constant	2.244	0.078	–
	Usage time	0.049	0.007	0.202***
	Social media	0.070	0.015	0.142***
	Health trackers	0.039	0.017	0.072*
	Voice assistants	0.021	0.022	0.030
	ChatGPT	0.210	0.030	0.215***

Notes: Swiss internet users aged 14 years and older; * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Table 5. Association of digital skills and usage time with digital inclusion, 2015–2023.

Year		*B*	*SE*	*β*
2015	Constant	3.233	0.122	—
	Usage time	0.001	0.000	0.241***
	Digital skills	0.045	0.035	0.043
2017	Constant	3.064	0.117	—
	Usage time	0.002	0.000	0.365***
	Digital skills	0.038	0.034	0.035
2019	Constant	3.012	0.130	—
	Usage time	0.001	0.000	0.169***
	Digital skills	0.103	0.038	0.087**
2021	Constant	3.304	0.104	—
	Usage time	0.002	0.000	0.368***
	Digital skills	–0.040	0.030	–0.040
2023	Constant	1.624	0.008	—
	Usage time	0.000	0.000	0.079**
	Digital skills	0.517	0.027	0.527***

Notes: Swiss internet users aged 14 years and older; * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

5. Discussion

This article explored longitudinal findings to expand our understanding of different measurements of digital skills (self-reported versus knowledge-based through correct evaluation of statements related to everyday internet use) and the change in their association with socioeconomic background, cyber-optimistic attitudes, internet use, and the feeling of inclusion against the backdrop of existing literature.

With regard to the comparison of self-reported levels of digital skills with knowledge of datafication and algorithmization in everyday life examples, the findings demonstrated that they correlate positively, albeit weakly. In terms of research economics, this is a positive finding since it allows studying digital skills with a resource-saving instrument (Parry et al., 2021). The self-reported digital skills were relatively stable between 2011 and 2023. This relative stability can be explained by the changing nature of the online context. While skills are expected to increase over time, so are the challenges that internet users face (Hargittai et al., 2020). The online environment is known for its quick developments and new technologies can emerge quickly. One such example is the generative AI service ChatGPT, which is based on a large language model that allows for interaction with a chatbot using natural language. The use of such a service requires a new level of skills, like knowing how to formulate prompts to receive useful answers and being able to judge the quality and truthfulness of the answers received (Kasneci et al., 2023). These skills differ vastly from, for instance, being able to upload a picture on Facebook, which was a new digital skill in the 2010s. Hence, measuring skills requires trying to get hold of a moving target: With new technologies, new affordances arise, which necessitate new digital skills. Therefore, instruments measuring skills should be constantly adapted and include affordances that are relevant at a specific moment in time, e.g., understanding artificial intelligence (see Dogruel et al., 2022) or prompting for services like ChatGPT.

Regarding the associations of digital skills with socioeconomic background, cyber-optimistic attitudes, internet usage, and the feeling of inclusion in the information society, the findings showed that they changed over time. Before 2017, socioeconomic background was not associated with digital skills. However, in 2023, gender, age, education, and income were related to a person's level of digital skills. This illustrates that in the latest survey, socioeconomic background played a bigger role in digital skills than it did in previous ones.

In 2023, digital skills were associated with cyber-optimistic attitudes. Moreover, since 2021, digital skills related to the extent and ways the internet is used. This means that what people do online has become more important for digital skills over time. Furthermore, while internet usage time played a role in feeling included in the information society, digital skills increasingly became more important. Taken together, these findings highlight that the relevance of digital skills has grown over time.

However, it should be noted that the identified associations should not be understood as unidirectional, but rather as intertwined relationships. For cyber-optimistic attitudes, internet usage, and the feeling of inclusion in the information society, the relationship with digital skills should be considered as a recursive one (Gillespie, 2014; van Dijk, 2020). While socioeconomic background can enable a higher level of digital skills, the relationship between skills and internet use can be viewed as recursive (van Dijk, 2020). Hence the two are mutually shaping each other and a higher level of digital skills can lead to more sophisticated uses which again can further a person's skills.

In a similar vein, the level of digital skills and the feeling of inclusion in the information society can be viewed as closely intertwined. On the one hand, when a person reports that they can cope with digital technologies well, this can lead them to feel more included in the information society. On the other hand, when a person feels included in the information society, this can motivate them to use the internet in different and more advanced ways, which in turn can entail an increase in the perceived level of digital skills. Hence, the empirical evidence presented in this article should be understood against the backdrop of the entanglement of social and digital inequalities (Chen & Li, 2021; van Dijk, 2020).

The findings presented here shed light on an important aspect of digital inequality research: Inequalities do not automatically disappear with the wider spread of the internet. Rather, existing social inequalities can be reproduced in the digital sphere and in addition, new ones can emerge (Schradie, 2020). As the digital becomes the norm, being able to use it becomes a requirement (Gruber & Hargittai, 2023). People who do not possess the needed digital skills will encounter real-life disadvantages, ranging from spending more time or paying higher prices to even completely missing out on opportunities.

6. Limitations and Future Research

This study has some limitations which should be reflected on critically. The nature of these limitations and potential avenues for future research are discussed here. First, it should be noted that the correlation between self-reported digital skills and knowledge about datafication and algorithmization was characterized by a small effect size. This could be related to the five-item measure that was used for measuring knowledge about datafication and algorithmization. Measuring knowledge with only five items is problematic as such a scale only covers a limited number of relevant aspects. For this study, the choice of items was a compromise between including aspects that would apply to many people (e.g., types of social

media mentioned) and at the same time allowing for variation in the complexity of statements to be able to depict potentially varying digital skill levels adequately. Future studies should extend this measure and include additional statements to reflect the breadth of everyday internet use and to depict its evolving nature. Especially, the inclusion of current technological developments specific to the population under scrutiny will be valuable to paint an adequate picture of a population's digital skills. Furthermore, to test the association of digital skills with other variables, this study used the self-report measure. While this study has shown that it correlates with the knowledge-based measure, self-reports have another shortcoming. Research has shown that they can be biased in terms of social desirability and gender patterns. In terms of skills related to internet use, this has been demonstrated by Hargittai and Shafer (2006): Men were more likely to self-report a higher level of digital skills than women, even when experimental evidence showed their skill level was the same. Moreover, this study viewed the feeling of inclusion in the information society as a potential consequence of internet use. Here, the feeling of inclusion was used as a proxy for social inclusion (see, e.g., Hargittai & Micheli, 2019; Ragnedda, 2020; van Dijk, 2020). This entails shortcomings. For instance, the feeling, which is in itself subjective and perceived, was measured using a self-report measure. This entails the potential of social desirability and hence, can be biased (Parry et al., 2021). To measure digital inclusion, future studies should include more tangible consequences of digital practices and investigate their relationship with digital skills (see Helsper et al., 2015). In addition, this study was conducted in Switzerland, a highly digitized society, with high levels of internet penetration and use. Therefore, the findings cannot be automatically transferred to other countries and cultural contexts. While this study included a comparative component by describing the evolution of digital skills across cross-sectional samples at different points of time within a country, future studies should use panel data to illustrate the evolution of these phenomena and include cross-country-comparisons as well to further substantiate the claims here and to take cultural differences into account. Moreover, while this study focused on potential barriers to digital skills, future studies should look more closely at interventions that are aimed at tearing down these barriers and evaluating their efficacy. In line with this, future research should derive concrete policy measures to promote digital skills to contribute to a more inclusive digital society. Finally, similar studies that aim to investigate digital skills face one dilemma: On the one hand, the skills measure should reflect current internet use validly. On the other hand, the measure should be designed in a way that is not too time- or place-sensitive, so that it can be used over a longer period of time and across cultural contexts for comparative research. The problem is that knowledge-based measures that ask about concrete knowledge or understanding about specific processes are the most valid. At the same time, they need resources as they require multiple items to capture the concept adequately. Also, they need constant updating as digital technologies are constantly evolving and differ across contexts. Therefore, for now, self-reports provide a simple and easily applicable way to measure digital skills, although they come with limitations that should be considered when applying them. At this stage, a combination of different measures can be regarded as the best way to go.

7. Conclusion

This article set out to compare a self-reported digital skills measure with an evaluation-based knowledge measure and to investigate how the associations of digital skills with socioeconomic background, cyber-optimistic attitudes, internet use, and the feeling of inclusion in the information society changed in Switzerland in the years 2011–2023. To address these aims, it quantitatively analyzed survey data representative of Swiss internet users. In sum, the findings show that (a) self-reported digital skills correlate

with evaluation-based measures for knowledge of datafication and algorithmization, and (b) self-reported digital skills were associated with gender, age, education level, and income, as well as with cyber-optimistic attitudes, internet usage in terms of average daily hours spent online, active use of social media, health trackers, voice assistants, and ChatGPT, and that furthermore, usage time and digital skills were associated with feeling included in the information society. These associations varied over time and the relevance of digital skills grew over the past years. These findings show that there is empirical evidence for the theoretical claim that existing social inequalities can be reproduced through digital inequalities in terms of digital skills. Hence, this study contributes to research on digital skills by substantiating theoretical claims on relationships between digital skills and associated factors. It demonstrates that internet usage and digital skills relate to the feeling of inclusion in the information society. In terms of policy, this highlights that focusing on digital skills to alleviate digital inequalities can be a valuable route. Hence, it provides an empirical basis for the promotion of digital skills for greater inclusion in today's information society.

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Conflict of Interests

The author declares no conflict of interests.

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Smartphone- and Tablet-Reliant Internet Users: Affordances and Digital Exclusion

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Abstract

In countries where digital-only service delivery has become the norm, the removal of offline services and channels risks exclusion and alienation for marginalised communities, many of whom have access to the internet exclusively through a smartphone or a tablet computer. These users have been described as part of a "mobile underclass" who face challenges interacting with systems that are difficult to use on devices other than laptops or desktop computers. This article uses the theoretical lens of affordances to explore the everyday realities of digital engagement for economically and socially marginalised communities who only have internet access through a smartphone or tablet computer. This allows for an examination of the ways in which these devices might discourage or refuse certain actions such as applying for a job, as well as how they might encourage or allow other courses of action. Using data from qualitative interviews with people working at community-based organisations delivering support to digitally excluded unemployed people seeking welfare and employment support in three cities in the US and the UK, we seek to understand the role of the affordances of devices in preventing smartphone- and tablet-reliant users from accessing their basic entitlements and finding work. In doing so, we offer new perspectives on mobile-only internet access, digital divides, and digital inequalities.

Keywords

digital by default; digital divide; digital engagement; digital exclusion; mobile internet access

1. Introduction

Digital-by-default service delivery has become the norm since the Covid-19 pandemic, and there is concern that the removal of offline support in essential services such as welfare and job-seeking is leading to exclusion

for persistently digitally excluded communities. This led the UN Special Rapporteur on Extreme Poverty and Human Rights to warn of the risk of a "digital welfare dystopia" (Alston, 2019, p. 21) in which people are denied their human right to social protection because of their inability to engage with digital government platforms. This broader trend has been described as "digital enforcement" (Díaz Andrade & Techatassanasoontorn, 2020) or "compulsory digitality." In their work on this topic, Kuntsman and Miyake (2022) argue that this shift makes digital refusal or opt-out increasingly impossible in interactions with the state, impacting in particular those most dependent on welfare who are some of the most vulnerable people in society. This shift to effectively compulsory digital access has impacted debates on the digital divide, which now take on new urgency as social and digital inequalities are now more intertwined than ever. Recent work by Robinson et al. (2020) on the "third-level digital divide" draws attention to the way in which inequalities and injustice caused by persistent digital inequalities in access and use have been exacerbated by the spread of technologies such as automation and surveillance systems in many aspects of daily life.

Against this backdrop, it becomes even more important to understand the realities of digital access for people who access the internet exclusively through a smartphone or tablet computer. Data from the UK telecommunications regulator Ofcom (2023) put this figure at 18% of the population. For unemployed people and those working in semi-skilled and unskilled manual occupations, the figure is even higher, with 27% only going online via a smartphone and 48% going online on devices other than a desktop or laptop computer. In the US, 15% of American adults are "smartphone-only" internet users (Pew Research Center, 2021); 27% of those living on an annual household income of less than $30,000 were reliant on smartphones for internet access. The figures reflect broader inequalities; 25% of Hispanic people and 17% of Black people are reliant on smartphones for connectivity compared to 12% of the White community, and just 6% for those with a household income of $75,000 and above (Pew Research Center, 2021). This data from the UK and US shows how these digital inequalities intersect with socio-economic and race-based axes of inequality.

To understand the challenges these communities might face in engaging with essential services online, this article draws on work within the digital divide literature on the "mobile internet underclass" (Napoli & Obar, 2014) which has explored the limitations of internet access through mobile phones compared to desktop or laptop computers (Reisdorf et al., 2022; Tsetsi & Rains, 2017). The contribution of this article is to look at these "device divides" (Pearce & Rice, 2013) through the theoretical lens of affordances (Davis, 2020) to explore the everyday realities of digital job-seeking, employment-related education, and welfare access for marginalised communities who only have internet access through a smartphone or tablet. This follows Marler's (2018) call for work which explores how mobile affordances might shape outcomes for marginalised users but extends this beyond mobile phones to understand how cheap tablet computers, often provided as a "solution" for digital exclusion in the UK, might have similar limitations. Using this framing allows for an examination of the ways in which smartphones and tablets might "discourage" or "refuse" certain actions such as applying for a job or completing forms online. However, it also enables consideration of conditions such as the digital literacy of the user or digital poverty which may lead to insufficient mobile data to complete the task.

This article seeks to understand the affordances of smartphones and tablets for instrumental purposes associated with job seeking and welfare using data from qualitative interviews with community-based organisations (CBOs) providing support to digitally excluded unemployed people and with digitally excluded people seeking welfare and employment support in three cities in the US and UK. In doing so it aims to

illuminate the challenges faced by smartphone- and tablet-only internet users in a digital-by-default society, where offline access to many essential services has effectively been removed.

2. Digital by Default, Digital Exclusion, and the Mobile and Tablet Underclass

This section explores the background context of digital exclusion in the UK and US and efforts made to address this issue through the provision of free devices such as tablet computers. It then looks at the literature on device divides and the mobile underclass which seeks to understand the extent to which devices other than computers can address these divides. The theoretical framework of affordances is introduced to understand these "device gaps."

2.1. Digital Exclusion in the UK and US

Government policies which move services to a digital-first or digital-by-default model, often with the stated aim of saving money and improving customer service experiences, are underpinned by an implicit logic that anybody who needs to get online to apply for welfare or find work has consistent, affordable access to the internet (Al-Muwil et al., 2019). Whilst internet access statistics in the UK might give the impression that as many as 96% of people have this level of access, interrogation of these statistics shows that digital exclusion remains a persistent problem, since this figure only indicates whether the respondent has gone online at least once in the past three months (Hernandez & Faith, 2023). In the US, 95% of people report using the internet, but economic divides remain in access to broadband. Nearly all (95%) adults with an annual household income of at least $100,000 say they have broadband, compared to only 57% of adults in households that make less than $30,000 per year (Gelles-Watnick, 2024). Once they are online, people need digital skills to interact with services; yet 25% of the UK population are considered to have the lowest levels of digital capability and as a result are likely to struggle to interact with online services (Lloyds Bank, 2023).

In 2023, the UK House of Lords Digital Exclusion and the Cost of Living inquiry recommended that schemes to distribute devices should be scaled up in the UK: "Device distribution schemes cannot solve digital exclusion on their own. But they are a practical way of reducing barriers to getting people online" (Communications and Digital Committee, 2023). Whilst the US government rolled out a programme to provide subsidised internet connectivity and devices, funding for this programme was withdrawn by the government in April 2024 (Universal Service Administrative Company, 2024). In the face of these funding challenges, the provision of tablet computers is often promoted as an affordable solution to address digital exclusion in marginalised communities with schemes aimed at disabled people (Department for Digital, Culture, Media & Sport & Dinenage, 2021), older people (Age UK, 2022), and unemployed people (Liverpool City Region Combined Authority, 2023). Whilst these devices offer some degree of connectivity, they also can prove challenging for complex tasks (Liberatore & Wagner, 2022; Ozok et al., 2008).

2.1.1. Digital Exclusion and Device Divides

A significant body of research in communications studies over more than 20 years has drawn attention to the social inequalities arising from unequal access to technology (DiMaggio et al., 2004; Hargittai, 2003; Warschauer, 2003). This led to substantial bodies of work which explored digital divides beyond access to understand intersecting inequalities in technology use (Van Deursen & Van Dijk, 2014) and the impact of

digital access on capital-enhancing activities (Helsper, 2012; Ragnedda, 2018). Other work has drawn attention to the intermittent connectivity and technology maintenance issues experienced by marginalised communities, including insecurely housed and homeless people (Faith, 2018; Gonzales, 2016; Humphry, 2021; Williams et al., 2023). More recent theorisations of "third level" digital inequalities (Robinson et al., 2020) and "disconnected communities" (McMahon et al., 2023) reflect broader shifts in social relations brought about by the rapid spread of digital-only service delivery, "digital colonialism" (Couldry & Mejías, 2019), and the resulting power and information asymmetries (Taylor & Mukiri-Smith, 2021) experienced by marginalised communities.

Alongside this mainstream body of digital exclusion research, there is significant work on "device divides" (Pearce & Rice, 2013) and the challenges faced by mobile-only internet users, first described by Napoli and Obar (2014) as a "mobile underclass." Their work was an attempt to address claims that mobile phones might be a substitute for connectivity on desktop and laptop computers, highlighting the very different usage patterns of these devices and how "these disparities detrimentally affect users' abilities to engage in information seeking and content creation, and to develop a wide range of digital skills" (Napoli & Obar, 2014, p. 330). Despite the advances in mobile phone technology since this work was first published, studies have reinforced their findings showing how mobile phones' limitations impact the activities people undertake on these devices. Marler's (2018) review of this work shows how the experiences of people who are reliant on mobile phones to get online might reinforce patterns of stratification across socio-economic groups. Whilst his review covers works which show how these devices might impact positively people's lives through the growth of personal networks (Campbell, 2015), it also highlights the usage gaps and findings that mobile phones are used more for social rather than "instrumental" or productive uses. The "usage gap" hypothesis is part of the wider body of digital exclusion research and suggests that the wealthier an individual, the more likely they are to use the internet for information-/transaction-based activities, with poorer users focusing more on entertainment and social uses, and argues that this risks widening inequalities (Van Deursen & Van Dijk, 2014). These instrumental uses are central to this study as it is concerned with the use of technology for job seeking and welfare, and more broadly with the implications of mobile and tablet-only internet access in a context of digital by default government service delivery.

Mobile-only internet users who use them for social rather than instrumental purposes have also been described as "limited" users. In their analysis of UK telecoms data, Yates et al. (2020) show how these users are likely to be younger people from deprived backgrounds and with lower educational attainment. Tsetsi and Rains (2017) analyse US data and come to similar conclusions in relation to the usage gap. They warn that not only are smartphones not closing the digital divide but that there is a risk that they "may even be widening it by giving upper income people more tools to expand the gap" (Tsetsi & Rains, 2017, p. 251). Similar findings emerged in Fernandez et al.'s (2020) study of digital divides in urban Detroit which showed that the types and diversity of online activities dropped dramatically when a household lacked an internet service provider or when individuals relied primarily on their phones to access the internet. The study showed that shopping online was particularly impacted by the lack of an internet service provider—meaning that they were unable to compare costs online and shop around for lower prices. This also has implications for the development of digital skills since this limited usage is correlated with lower digital skills. A study of digital exclusion in Chile found that people who accessed the web through mobiles only had lower levels of skills (Correa et al., 2020).

Whilst these studies are not concerned with accessing the internet through tablet devices, attention needs to be paid to what Marler (2018) describes as the "constellation" of devices people might be using and the need for "device variable" research. Within this constellation, Tsetsi and Rains (2017, p. 251) distinguish smartphone-dependent users from what they describe as "multimodal" internet users who have the choice of choosing a particular device to suit different online activities.

2.1.2. Affordances of Smartphones and Tablets

To understand the inequalities that might arise between people who can choose to use a smartphone for communication and a laptop for job-hunting, and those who are dependent on one device for everything, it is useful to look at the affordances of these devices. Although the technological limitations (Napoli & Obar, 2014) and everyday materialities (Newlands & Lutz, 2021) of mobile phones have had some attention, the contribution of this study is to understand how the theoretical affordances might be fruitfully applied to the study of mobile-only internet users.

The term "affordance" means how "objects shape action for socially situated subjects" (Davis, 2020, p. 6). It was originally used by the psychologist Gibson (1977) as a way to understand the possibilities afforded—provided or furnished in other words—by an environment to an individual and has been widely adopted to help us understand how technologies shape action possibilities across the fields of human–computer interaction, psychology, information systems, communications studies, and science and technology studies. The concept of affordances provides a conceptual bridge between material and semiotic understandings of technology (Curinga, 2014) which enables a recognition of the way the meaning of a technology's use is constructed both by the user and the user's societal and cultural context (Pinch, 2009), and also recognise the actual possibilities for human action made possible by the device or system. The term has been widely used to understand the impacts of mobile phones through their communicative affordances (Schrock, 2015), their use to access social media platforms (Willems, 2021), and their limitations in accessing mobile internet in resource-constrained environments (Wyche et al., 2018).

The term has been subject to criticism for conceptual vagueness, in response to which there have been different approaches to try and achieve greater conceptual clarity. Evans et al. (2017) attempt this by suggesting threshold criteria which distinguish affordances from features and outcomes, whilst Nagy and Neff (2015) proposed the addition of "imagined" to affordances to capture users' expectations of technology. Finally, Bucher and Helmond (2018) distinguish between the more abstract high-level affordances associated with platforms and media and low-level affordances associated with user interfaces such as buttons and screens. Davis (2020) created an affordances, mechanisms, and conditions framework which "takes a relational position in which humans and technologies are inherently co-constitutive" (p. 15). This framework goes beyond previous binary conceptualisations of affordances—either/or framings of what an object enables or constrains. Instead, it proposes the idea of mechanisms to analyse technological objects in ways that more closely describe our everyday encounters with devices such as smartphones. So rather than simply affording or not affording a course of action, a device might request, demand, encourage, discourage, refuse, or allow. The conditions part of the framework specifies the relational nature of human/technology encounters: perception, dexterity (skills), and cultural and institutional legitimacy. These three conditions help us understand how users perceive an object, the skills needed to use it, and finally the embedded power relations in these socio-technical dynamics. In the context of the enforced use of technology and the

removal of offline channels, the inclusion of these conditions of use allows for a richer understanding of the experiences of technology access for users who are dependent on smartphones or tablets to get online.

3. Methodology

This article draws on data from two separate studies carried out during the Covid-19 pandemic, in 2020–2021, with both people who were directly digitally excluded themselves and with support workers and intermediaries who were supporting these communities. The interviews involved respondents from the cities of Brighton and London in the UK and from New York City in the US. The study was originally planned in late 2019 with interviews meant to take place in person in Brighton with digitally excluded people only. The onset of the Covid-19 pandemic and social distancing restrictions made it impossible to reach digitally excluded groups in person. Moreover, although many professional and social meetings shifted to video-conferencing technology, this approach was not appropriate to reach the intended interviewees given their lack of access to the necessary devices, internet access, and low levels of digital skills. Thus, the research team decided to adjust their approach to interviewing employees and volunteers from community-based organisations who were providing support to digitally excluded people during lockdowns, many of whom continued to have physical or phone-based contact with beneficiaries. Due to the nature of their work (providing digital support), the community workers did possess the appropriate technology and skills to participate in remote interviews. This approach provided the research team with insights from intermediaries who had a broad overview of how digital exclusion was playing out for members of their communities including those who only had access to smartphones or a tablet. The authors tapped into their social networks to identify the first round of interviewees and then applied a snowballing approach to identify further interviewees in both contexts. The authors stopped at 18 interviews with CBOs because it became clear that there were diminishing returns on any further interviews due to content saturation.

Towards the end of data collection, the research team was able to secure further funding to provide tablets to 12 digitally excluded unemployed individuals in Brighton. The tablets were distributed in partnership with a local digital inclusion charity with experience providing device and remote digital training support to digitally excluded people in the local area predating the pandemic. The new project and partnership provided the research team with the means to reach a group of people who had been digitally excluded at the onset of the pandemic and who had since gained access to the internet, albeit only on a tablet.

Interviews with CBO workers and volunteers took place on Zoom and Teams and lasted between 45 minutes to an hour. Interviews with digitally excluded people lasted approximately 30 minutes and took place over Zoom and via phone calls for those who were not comfortable with video-conferencing technology. All interviews were semi-structured and an interview guide was used. Two interview guides were used (one for CBO representatives and one for previously digitally excluded people). All interviews were recorded with the consent of the participants. CBO workers and volunteers were not provided with any incentive to participate.

As mentioned earlier, digitally excluded interviewees were beneficiaries of a scheme to provide basic tablet computers and connectivity to vulnerable people. Although the new project funded tablets for 19 beneficiaries, the partner organisation routinely distributes devices to digitally excluded people and the chosen beneficiaries—at random—were part of a backlog of referrals. The beneficiaries were given the

choice to receive the tablet immediately with the condition that they signaled that they were open to participating in short interviews. Participants were made aware that they would still receive a device at a later date if they turned down the offer. Participants were also informed that they were free to change their minds about participating in interviews without having to return the device or repercussions on any digital support received. None of the digitally excluded people turned down the offer. Thus, although tablets were provided to beneficiaries who showed an inclination to participate in interviews, participation in the study was not compulsory. Ethics approval was obtained through the University of Sussex institutional ethics process.

The data was transcribed and then analysed using Dedoose qualitative coding software using thematic analysis (Braun & Clarke, 2012). Dedoose was chosen given its cloud-based collaborative functionality which allowed both authors to jointly work on the same codebook at the same time. After having conducted and transcribed the interviews, the authors met to discuss potential open codes and agreed on the codes in Table 1. These codes were then loosely coded into a set of thematic codes relating to the mechanisms and conditions shown in Table 2. Table 3 lists the respondents in this study.

Table 1. Open codes.

Difficulty doing things on the phone
Challenges of getting people set up on free devices
Old or broken devices
Digital meetings better than face-to-face
WhatsApp
Phone is slow or freezes
Phone is too old
Limitations of mobile phone affordances
Downloading and installing apps
Hardware issues (e.g., mouse touchscreen)
Downloading and installing apps
Filling in forms, creating accounts, emails, passwords
Setting up device
System updates
Uploading documents and pictures
Using email
Tablet is slow
Smartphone screen too small
Downloading and installing apps
User interface issues
Grateful to have the tablet
Maintenance and upgrades

Table 2. Thematic codes.

Code	Example of open code
Mechanism: Discourage	Smartphone screen too small
Mechanism: Refuse	Difficulty doing things on the phone
Mechanism: Encourage	Digital meetings better than face-to-face
Mechanism: Allow	Connecting communities via WhatsApp
Condition: Dexterity/skills	Filling in forms, creating accounts, emails, passwords
Condition: Device	Setting up device
Condition: Operating system	System updates
Condition: App	User interface issues Downloading and installing apps

Table 3. List of interviewees.

ID	Location	Description	Interviewee type
UK01	UK	Unemployed construction worker	Digitally excluded
UK02	UK	IT trainer working at a community centre	CBO support worker
UK03	UK	Community worker supporting refugees	CBO support worker
UK04	UK	Beneficiary of free tablet from digital inclusion scheme	Digitally excluded
UK05	UK	Beneficiary of free tablet from digital inclusion scheme	Digitally excluded
UK06	UK	Beneficiary of free tablet from digital inclusion scheme	Digitally excluded
UK07	UK	Beneficiary of free tablet from digital inclusion scheme	Digitally excluded
UK08	UK	Employment support worker in low-income area	CBO support worker
UK09	UK	Voluntary community worker in low-income area	CBO support worker
UK10	UK	Voluntary community worker in low-income area	CBO support worker
NY01	US	Two English-as-a-second-language teachers for migrants in NYC	CBO support workers
NY02	US	Community worker with an organisation focusing on migrant labour rights in NYC	CBO support worker
NY03	US	Two community workers working with African migrants in NYC	CBO support workers
NY04	US	Community worker supporting low-income residents in public housing	CBO support worker
NY05	US	Director of a network of community-based organisations in NYC serving low-income communities and migrant groups	CBO network director
NY06	US	Community worker providing employment services and training to low-income migrants in NYC	CBO support worker
NY07	US	Community worker providing legal advice and services to recent migrants in NYC	CBO support worker

4. Smartphones, Tablets, and the Mechanisms of Affordance

Technological artefacts often present obstacles which might either put us off a particular action or downright refuse to allow us to make something happen. In some instances, this can be a trivial annoyance, but for the respondents in our study, these mechanisms could have serious consequences. Whilst they

might have a smartphone or basic tablet computer to access vital training, welfare information, or applications, the devices they were dependent on often made these lines of action implausible or impossible. The interviewees who were supporting digitally excluded communities were also experiencing these challenges as they had had to rapidly move their activities online at the onset of the Covid-19 pandemic. Despite these challenges, the data also revealed the ways in which these technologies were encouraging and allowing activities and connections which were personally and economically enriching. This section explores the different mechanisms of affordance of mobile phones and tablets which impeded or facilitated different lines of action for the interviewees in our study in relation to their engagements with digital platforms for training, job seeking, and welfare information. It should be noted that this takes Davis's (2020, p. 65) framework as she intended: a "set of hooks on which analysts can hang their descriptions" rather than as a prescriptive set of codes.

In common with almost half of the UK's manual or unemployed workers, one UK construction worker had no way to get online other than his smartphone (Ofcom, 2023). However, to get his health and safety certification card he was required to take a test on a device other than a smartphone to allow him to get work on a building site. He had been provided with a basic tablet computer and, as he reflected: "I was in desperate need. I could have had this card sorted out three or four weeks ago, but I don't have a tablet" (UK01). In this instance, the technology he had previously had access to was not simply "discouraging," it was "refusing" to allow him to get this vital certification.

The data revealed other instances where smartphone dependency led to "discouragement" in trying to access education opportunities and job-seeking activities on small screens. One interviewee reflected on the intersectional digital inequalities experienced by the undocumented migrant men from Central America they worked with: "If they're single, they most likely don't have a laptop. I'll say around half will have a smartphone, But for laptops, it's pretty rare" (NY02). This presented challenges when trying to engage them in educational activities:

> Most of them in my class have cell phones. They're frustrated because the screen is so small, so if I'm sharing my screen, sometimes they're like, "I can't see!" and then they just totally disengage and I try to teach them you can pinch the screen, this is what I do, pinch the screen! They prefer a laptop because the screen is bigger. (NY01)

The same interviewees reflected on how the affordances of the small screen discouraged their students from paying full attention as they could only see four of their classmates, concluding that this discouraged engagement and facilitated disruptive behaviour such as walking around or napping: "One of my guys loves to take a little nap because he only sees four students right, but he doesn't realise I can see everyone on the screen [on a laptop]" (NY01).

As in the UK, some US interviewees were supporting workers who were attempting to complete health and safety training courses but, in this case, they were struggling to complete the requisite 40 hours of training via Zoom on their phones as the screens discouraged effective learning: "It's very difficult because they're taking the lesson through their phone…that's [even] difficult for college students to try to see a whole lecture and a professor and take notes through their tiny smartphone compared to a laptop" (NY03).

One worker compared the on- and offline experiences of providing career advice to disadvantaged youth, reflecting that "with Zoom…it's really hard to get people to participate because people can be outside—They dial in on their phone and other people are there" (NY03).

Yet smartphone and tablet access also encouraged and allowed activities such as setting up email and access to the welfare systems. One interviewee had been able to set up his account for his Universal Credit (digital-by-default welfare payment) account: "I don't have much computer experience. It's a bit different from a laptop, isn't it? I've set up my universal credit accounts and email" (UK05). Another talked about how he was able to engage in online meetings, encouraged by the fact that he found them less anxiety-inducing than face-to-face meetings (UK06). In the US, an employment support worker described a migrant worker who had poor English and digital skills but was encouraged by the visual interface on her phone to learn how to send a vital document to a prospective employer:

> She speaks a low amount of English but she was so excited to have a job interview. But the employer emailed her and said, "I want a photo of your social security." So we spent an hour on the phone and I had to teach her how to make an attachment to an email. I had to explain what things look like. Do you see the blue triangle? So she figured it out really fast when I explained what things looked like, but if I had explained to her in like technical terms, we would have been there forever. They make up for a lot of that lack in digital literacy with just like really strong visual cues. (NY01)

Another employment worker described how the use of WhatsApp had allowed more people to join training and advice sessions:

> We do our virtual sessions, we share it on WhatsApp….It's actually expanding now because we are now getting more people reaching out to us to ask for sessions on some other areas or some other topics that we, you know, ordinarily wouldn't have addressed. (NY07)

On some level, the basic tablets provided to the digitally excluded people we interviewed were a step up from the smartphones they had been using previously and encouraged a wider range of uses, thus suggesting that these devices can go some way towards addressing "usage gaps." One neurodivergent interviewee had found that the tablet was well-adapted to his needs: "I'm dyslexic as well and so I've always struggled to do some of that stuff on a phone more than I do on the tablet. Like, I can get specific apps for mind-mapping and this and that" (UK04).

He later reflected on how the tablet had also encouraged certain paths of action, for bidding on social housing and for being able to have a device separate from his phone to keep these functions separate from his personal life that he sometimes shares with his toddler for entertainment. This experience shows the rich picture of positive and negative affordances of the devices the digitally excluded respondents in this study and the advocates who were supporting them had access to, both encouraging connection and exploration but also discouraging certain instrumental activities related to employment and education.

5. The Conditions of Human/Technology Encounters

In Davis's (2020) affordances framework, conditions of perception, dexterity, and cultural and institutional legitimacy specify the relational nature of human/technology encounters, in a way that she suggests "gives depth and breadth to analytic understandings of human–technology relations" (p. 90). For the disadvantaged communities in our study, the condition of "dexterity" she describes is particularly relevant since it is a way to understand how dexterity translates into digital skills—or the lack thereof. One trainer from the UK reflected on the many hurdles his clients faced when they were trying to apply for a job on a smartphone or a tablet:

> They often need to register with a site, they need to be reasonably familiar with typing up a document, saving a document such as a CV, uploading a file to the website, doing a cover letter, in some cases doing copy and paste. There are barriers built into those things. (UK02)

Other marginalised communities also faced barriers caused by a lack of digital skills. A US trainer reflected that their construction certifications training presented barriers to people who were formerly incarcerated: "It's more common than in any other sector to come across individuals who are formerly incarcerated in the construction sector and they tend to have some of the worst or least developed digital skills" (NY05). Similarly, a worker supporting refugees to access welfare and employment reflected that many of her clients lacked the digital skills to fill in online forms (UK03).

Whilst Davis's affordances framework allows us to think about conditions of device use such as digital skills, our data revealed other conditions of use which impacted users' ability to use smartphones and tablets for instrumental purposes such as job seeking or education. Whilst mobile devices and tablets are seen as ubiquitous, they are not homogenous and vary wildly in speed, ease of use, and accessibility. Our data suggests the importance of interrogating further conditions of device use impacting human technology encounters, including speed, operating systems, and the applications installed on the device.

Some issues that emerged in the data related to experiences of applications that had been poorly configured to the device. One tablet recipient was trying to learn Excel for work and to write cover letters for job applications on her device. This was in part due to the affordances of the tablet as it lacked an external keyboard and mouse but could be seen to be part of the conditions of use, that the application and the user interface were simply not optimised for tablet users:

> But I do still find it really difficult to do stuff on the tablet. You know I'm a Windows girl. It hasn't got an external keyboard and mouse to do stuff with. When I'm typing stuff into Google and I press enter or search just like…nothing happens. I don't know if the tablet's faulty or whether I'm faulty! (UK07)

Later she reflected on the fact that she found it difficult to understand where to save documents on her tablet, making the task of saving cover letters and CVs more challenging. Overall, she had found the move to working on a tablet challenging:

> I know all about digital technology and how it will help you and like what you can achieve with it. But I'm struggling to move operating systems—figuring out how to get the most out of the tablet and do the stuff that I used to find really simple on a computer on this tablet. (UK07)

An employment support worker also found that the communities he was working with were struggling to complete their Excel training on their phones:

> Most of them had Wi-Fi at home because it came as a package with the TV, but they didn't have laptops, they were just using their phones. Phones are not designed to do [productivity] applications or even training. They were trying to do some Excel training online—All of that was impossible on the phone. (UK08)

In both these cases the devices were technically able to run Microsoft Excel, but the usability on a phone or tablet—the only devices the interviewees had access to—was so limited that the training was effectively useless.

Beyond the fundamental difficulty of trying to use a tablet or phone to perform the functions of a computer, our interviewees experienced other challenges in the operating systems and apps they were trying to use. One trainer in New York bemoaned the fact that they could not draw on Zoom on the phone during training (NY01). Another described the challenges of trying to run an employment webinar with participants who struggled with basic Zoom functionality:

> There was the unemployment webinar where we had the most participant engagement [ever]—We had a lot of issues. People didn't know how to mute their phones, people even didn't know they could speak into the phone, they thought it was more one-sided—where they can listen to hear us but they can't respond or interact with us. (NY06)

Other users struggled with basic functionality such as using email on a phone owing to their problems with the user interface:

> Then you might have the ones who are but now it's like a real learning curve just getting them to learn how to open the Gmail icon on their phone and bring it up okay "where did that email go?" and teach them things like that so that's definitely absolutely been a challenge. (NY04)

For some communities, their access to basic services was impeded by the lack of information available in languages other than English on apps and websites, as revealed by a community worker who supported refugees: "The failure of websites to be fully accessible is a complete nightmare. I think a lot of the contact forms on websites aren't necessarily accessible in different languages" (UK03).

Beyond the apps, the device itself was a barrier for some recipients of free tablets; a recipient of a free tablet was worried at the start of the interview that the tablet was asking for a system update and that he was unsure whether he had sufficient data to update it. Another community worker who was providing free devices to vulnerable members of her community reported that the recipient was unable to get the device to work and could not fix it without the aid of an external IT expert:

> The lady that I had the iPad delivered to, for the first week of having that tablet, she couldn't work it. She didn't know how to use it. So she kept on saying to me, "It's not working." Then they took it back to the IT person and figured out that it was the SIM card that was the issue. (UK09)

Other intermediaries reflected that the cheap tablets they were providing were simply of too low a specification to be of genuine use to people:

> But there's also a level of we have got what we paid for. It was an entry-level Android tablet I think that they're around the 70 to 90 pounds mark. The use of it is horrible. The battery dies really quickly. The camera's useless. (UK10)

Another tablet recipient reflected on how the tablet had enabled him to keep up with the news, which he had not previously been able to do on his mobile phone which had been damaged: "My phone's really been through wars, the speakers are all gone, and the screen is cracked." However further interrogation of his experiences using the tablet showed the limitations of the device in terms of its speed: "I guess it's just the way it works. Just going from one program to another, one action to another, it's a bit slow" (UK05). Another recipient needed weekly support from a digital champion to understand how to restart the tablet when it was running slow.

Finally, one further condition of use described by Davis (2020, p. 98) is "cultural and institutional legitimacy," an "intrinsically political condition tied to existing status and power structures." The political and economic decisions to make welfare and job applications only available online is a significant condition of use. Reflecting on their powerlessness in the face of these developments, this interviewee talked about being "dragged" into using technology:

> Well, it's the way things are going, I'm sort of being dragged into the 21st century, if you understand. Before I used to say I am an "InterNOT," so when People used to ask, "What's your email address," I used to say "I'm an InterNOT." (UK05)

This section has shown how a range of conditions impact the effective use of technology beyond those detailed in Davis's framework of perception, dexterity (skills), and cultural and institutional legitimacy. The devices themselves, the apps, and the operating systems shape users' experiences of using these technologies. Our data showed how these experiences often left users feeling powerless and helpless and impeded them from carrying out basic digital activities.

6. Discussion: Smartphone- and Tablet-Reliant Internet Users and Digital Service Delivery

This study illuminates both the positive and negative ways of digitally excluded communities engaged with smartphones and tablets, revealing the ways in which these technologies impeded instrumental activities such as job seeking or education through mechanisms of refusal and discouragement, but also encouraged other more positive actions involving connection and engagement on their own terms, such as through participating remotely in meetings or using visual interfaces to send important documents. It also shows the complexities of the conditions of this engagement, including the "institutional legitimacy" of the political decisions to move services online.

In exploring these other conditions, we go beyond Davis's original conditions to highlight the impact of the device (the model, age, condition, and battery life), the operating system, and the apps people are using (the user interface). The addition of other conditions to Davis's framework suggested by the data from this study

illustrated in Figure 1 below adds further value to its use in understanding the relationship between social and digital inequalities. These issues of technology maintenance (Gonzales, 2016) have been raised in previous work on the digital divide, and the data from this study shows the importance of factoring these issues into discussions of "device divides" (Pearce & Rice, 2013).

Digital access statistics in countries such as the UK and the US are often premised on the assumption that access to a smartphone or tablet computer is sufficient to classify that person as an internet user (Hernandez & Faith, 2023). This article has shown how the limitations of these devices are possibly masking the full extent of digital exclusion. Digital inclusion interventions in high-income countries are often based on the supply of cheap tablets or smartphones to digitally excluded communities who need to get online to access basic entitlements or find work. Whilst these tablets clearly made some positive impact on the lives of people who had previously been without connectivity, their limitations were very apparent. In terms of the policy relevance of this research, this data shows the importance of designers of government digital systems prioritising the needs of marginalised users; this is in line with the UK Government Digital Services' stated aim of "continuing to champion the needs of end users above all else" (The GDS Team & Read, 2021).

This study therefore contributes to earlier literature and discussions on mobile-only internet users and device gaps to show how the theoretical lens of affordances and in particular Davis's conceptualisation of mechanisms and conditions is a fruitful way to understand the limitations of this type of internet access in the broader context of compulsory digitality (Kuntsman & Miyake, 2022) in many countries. For the respondents in this study, the conditions and mechanisms of their encounters with smartphones and tablets had implications beyond mere inconvenience or frustration. These experiences were shaping their access to essential welfare payments, jobs, and education. These were members of underserved communities who were already experiencing social and economic marginalisation, which was, arguably, being exacerbated by these very conditions and mechanisms which meant that the technologies were discouraging or refusing a particular outcome. Data from Ofcom in the UK shows that 66% of all smartphone users in the UK reported that completing job and public service application forms and working on documents was more difficult on a smartphone than on a laptop or desktop (Ofcom, 2023). Data from our study reflects this broader trend,

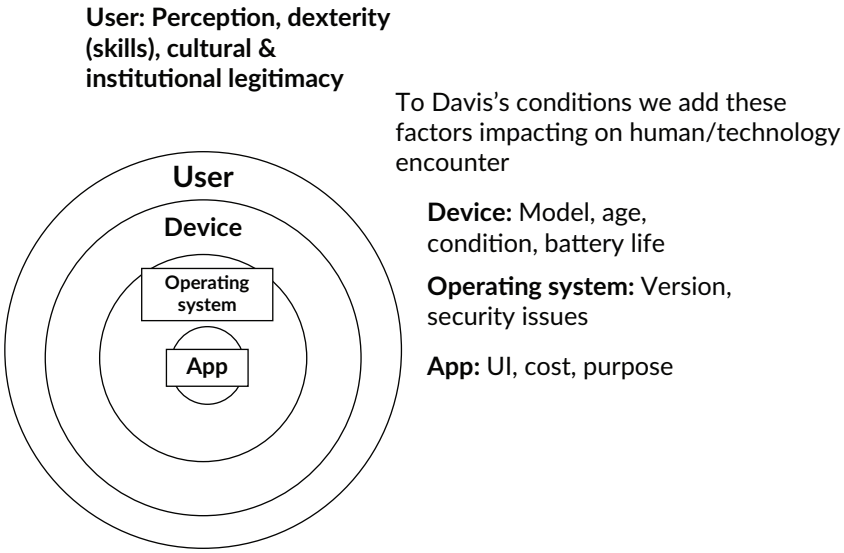

Figure 1. Additional conditions.

with respondents and intermediaries reporting that filling in complex forms, participating in online learning, and uploading CVs are part of the reality of welfare and job-seeking but extremely challenging to perform on a smartphone or tablet. Beyond the empirical value of this work in contributing to the literature on mobile-only internet access (Marler, 2018) digital exclusion and divides, this article shows the value of Davis's affordances framework in adding nuance and depth to our understanding both of digital exclusion and how we might address it. Whilst this is only a limited study carried out during the unusual research conditions of the Covid-19 pandemic, further research which engages directly face-to-face with mobile and tablet-only internet users would be of value to understand their experiences of engaging with essential services.

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Conflict of Interests

The authors declare no conflict of interests.

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ARTICLE

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Digitalizing Access to Care: How Self-Check-In Kiosks Shape Access to Care and Efficiency of Hospital Services

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Abstract

Responding to labor shortages and rising healthcare expenses, hospitals increasingly turn to self-check-in kiosks to streamline service delivery and improve patients' experiences. The purpose of this study was to reflect on the implementation of these self-check-in kiosks in a Dutch university hospital, particularly in relation to access to care for more vulnerable patients and intended efficiency goals. We followed a technology-in-practice approach to better understand how new technologies shape care practices in relation to in/exclusion and carried out an ethnographic action study involving desk research, participatory observations, semi-structured interviews, and reflection sessions with developers and hospital staff. Data were analyzed through ethnographic content analysis. Our results show that although self-check-in kiosks work well for some patients, many people experience practical and psychosocial difficulties, especially those who go through a complex care pathway, are low-literate, experience a distance the online world, or have sensory, motor, or cognitive impairments. Kiosks are not yet attuned to these patients and typically leave little flexibility and room for negotiation and personal support in what is, for many, a foreign environment. Therefore, patients frequently seek confirmation and assistance from already downsized or busy staff. In conclusion, we find that digitalization under the banner of efficiency within a healthcare system already under pressure carries risks, as it can unintentionally generate extra (invisible) work for patients and care professionals and threaten access to and quality of care for patients most in need. A more concentrated effort on refining the digitalization of healthcare processes using an inclusive-technology-in-practice approach has the potential to contribute to fairer and more efficient care for all patients.

Keywords

access to care; efficiency; eHealth; health inequalities; hospital ethnography; self-check-in kiosks

1. Introduction

Covid-19 and the healthcare crisis have significantly accelerated the development and adoption of transformative digital health tools. These tools are said to enhance the healthcare system by boosting efficiency, improving patient care, optimizing the use of scarce resources, and helping respond to the growing demand for care due to emerging demographic challenges such as aging and migration (Carboni et al., 2022; Greenhalgh et al., 2019). One such emerging technology is the "digital welcome desk" or "self-check-in kiosk," which promises efficiency for receptionists, offering them the opportunity to allocate their efforts towards alternative responsibilities (Joseph et al., 2023; Letafat-Nejad et al., 2020), and expediting patient experience by eliminating the need to queue (Williamson, 2016). Such kiosks have been proposed to reduce costs, increase information transparency, and significantly reduce time-to-first-identification for patients arriving in emergency departments (Joseph et al., 2023; Letafat-Nejad et al., 2020). Evidence of long-term efficiency remains scarce; nevertheless, the prevalence and future expectations of health kiosks are increasing (Maramba et al., 2022).

How such self-check-in kiosks generate, perpetuate, or reduce health inequalities is rarely discussed (Yao et al., 2022). However, it is increasingly known that access to digital technologies depends on social, economic, health, and cultural resources, such as education and income (Goedhart et al., 2022; Van Dijk, 2020). This unequal access to digital technologies was originally referred to as the digital divide (Morey, 2007) but is increasingly portrayed as a complex problem, encompassing motivation, skills, material, and user access, highlighting the multifaceted nature of the challenges people might face in accessing the online world (Van Dijk, 2020). These obstacles are particularly prevalent among people in more vulnerable circumstances. These groups—who also would benefit the most from improved access to healthcare—include those with a low socioeconomic position (Braveman, 2022; Huxley et al., 2005), limited health literacy, disabilities, long-term health conditions, the elderly, the homeless (Latulippe et al., 2017), and transient populations such as refugees, asylum seekers, and individuals experiencing homelessness (Huxley et al., 2015). They are likely to encounter problems accessing healthcare if self-check-in kiosks become the main route for accessing a hospital. This is problematic, as it is precisely these groups that are highly dependent on good care.

In this article, we reflect on the implementation of self-check-in kiosks in a Dutch university hospital. The aim of this study is to contribute to the integration of more inclusive technology within a (hospital) context by exploring how self-check-in kiosks work in practice and how they relate to (digital) access to care for patients in more vulnerable circumstances and necessary efficiency goals of the hospital in order to deal with an increase in healthcare demand and labor shortages (Huxley et al., 2015). To study this, we build on the principles of the technology-in-practice approach.

1.1. Technologies and Practices of Exclusion

Throughout history, medical sociologists have frequently analyzed medical technologies within the framework of medicalization—a process through which medicine asserts control over society by categorizing various conditions as medical issues (Timmermans & Berg, 2003). Consequently, medical technologies have often been viewed either as direct instruments of medical authority or as static entities, lacking historical context yet possessing a dynamic capacity to influence social practices and interactions (Casper & Morrison,

2010; Conrad, 1979). Timmermans and Berg (2003) divide the approach to technology into three distinct perspectives: technological determinism, social essentialism, and the technology-in-practice approach.

Technological determinism views technologies as decontextualized objects with the power to impact social arrangements (Dafoe, 2015). This perspective assigns significant explanatory influence to technology by isolating it and presupposing a unilinear impact—whether it is predominantly detrimental or beneficial. Technological determinism manifests in different degrees of intensity (Smith & Marx, 1994). Advocates of strong technological determinism contend that technology evolves autonomously, shaping society to conform to its inherent logic. Technological determinism, as it presents itself in medical sociology, usually does not concern the analysis of technology. Often, technological determinists exclusively focus on controversial, innovative technologies that threaten social order. The main theoretical problem with technological determinism is reductionism: Scholars attribute "super technological" powers to tools and practices, powers that do not hold up under empirical analysis (Dafoe, 2015; Henwood & Marent, 2019; Țicău & Hadad, 2021).

Social essentialism, on the other hand, underestimates the role of technology, focusing solely on the social context (Timmermans & Berg, 2003). From this perspective, medical technologies are seen as blank slates to be interpreted and imbued with meaning by culture. While such empirical analyses claim to center around medical technology, they actually delve into topics such as patient compliance, narratives of illness, caregiving and treatment, roles of illness, ideologies surrounding disability, experiences of illness, gender and race dynamics, and issues of inequality. These are all subjects traditionally studied by sociologists, but they are projected onto medical technology while the intrinsic characteristics of the technology remain unexplored. For social essentialists observing interactions influenced by technology, these technologies serve as sociological catalysts: They facilitate interactions or convey social meanings but do not independently act, influence, or evolve (Feenberg, 2000).

An alternative to these ways of understanding technology–society relations is the technology-in-practice approach, where technologies and humans are reframed as actors in a network that shapes technology's meaning (Law & Hassard, 1999; Timmermans & Berg, 2003; Timmermans & Kaufman, 2020). This approach has become a widely deployed alternative to the more traditional models of technological determinism and social essentialism, which are unsatisfactory for studying the complex relationship between technology and society in practice. The technology-in-practice approach has been widely used to study the social implications of (new) technologies without reducing them to the notion of "impact." This includes the study of Zillien and Hargittai (2009), who explore how users' online activities are influenced by their socioeconomic status and context of use. Starting from the technology-in-practice approach, Zillien and Hargittai found that digital inequalities are not only a temporary social phenomenon that will disappear once high-quality equipment and comfort with the technology become more widespread; they showed that despite a potential reduction in status-based disparities related to technological resources and digital expertise, discrepancies in internet utilization based on social standing are expected to persist. The technology-in-practice approach also helps to co-constitute relationships between humans, medical technologies, social effects, and social structures (Gardner, 2023; Timmermans & Kaufman, 2020). Through the examination of multiple case studies, Timmermans and Kaufman (2020) showcase how the elevated expenses, intricacy, and limited availability of critical technologies, such as those essential for kidney dialysis, have contributed to health inequalities.

Ultimately, the technology-in-practice approach enables one to identify whether issues such as social and material influences have consequences for how self-check-in kiosks work, the possible mismatches between their predicted and actual benefits, and their role in relation to health inequalities (Gardner, 2023; Øversveen, 2020; Timmermans & Berg, 2003) since self-check-in kiosks are not developed in isolation, and the organizational context in which they are implemented matters. Therefore, we focus not only on the interaction between patients and the technology but also on the perspectives of professionals, such as desk employees and those responsible for the kiosks' implementation. Our research is guided by the question: How do self-check-in kiosks work in practice, and how do they relate to access to care for more vulnerable patients and intended efficiency goals?

2. Methods: An Ethnographic Action Research

This study is part of the broader participatory action research project Doing eHealth Right, which aims to enhance the health potential of people with a low socioeconomic position and prevent further widening health inequalities (Amsterdam UMC, n.d.). In this sub-study, we reflect on the implementation of self-check-in kiosks in a Dutch university hospital. Employing an ethnographic action research design (Bradbury, 2015), we employed a variety of qualitative research methods, including participatory observations, semi-structured interviews, and desk research. Preliminary findings, for example, using fewer colors and adapting a larger font size (see Figure 1), were shared with members of the program Digital Transformation (outpatient) Care 2025 to improve the design and implementation of the self-check-in kiosks.

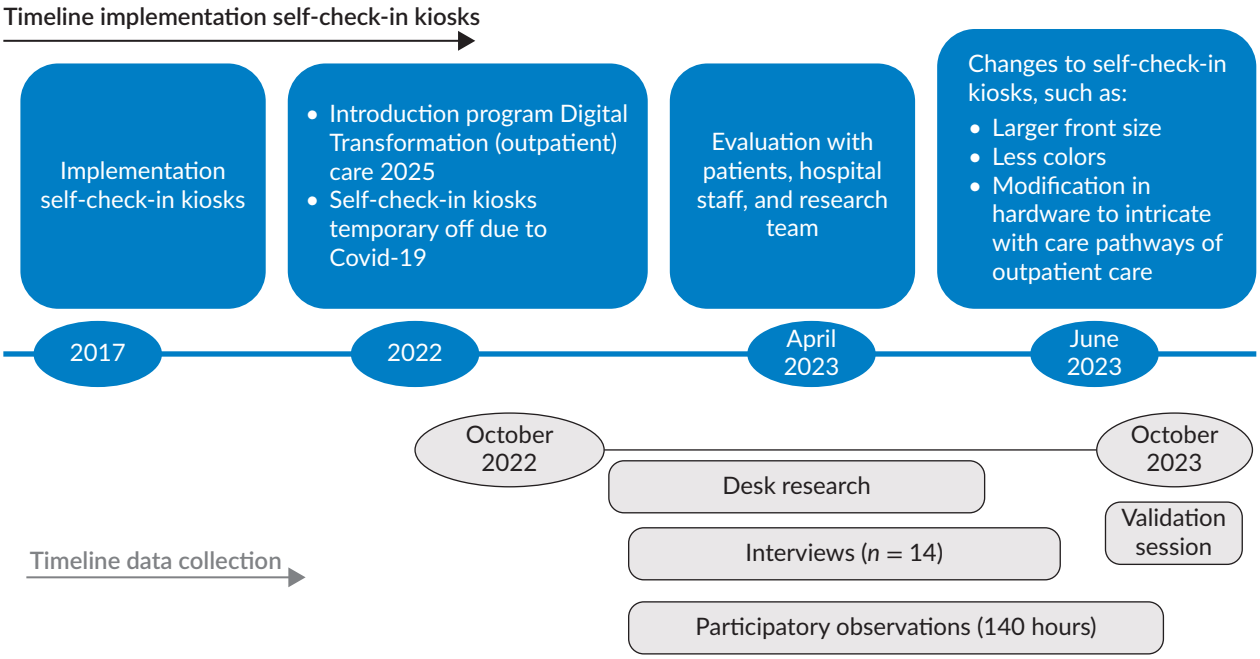

Figure 1. Timeline of the implementation of self-check-in kiosks and data collection.

2.1. Case: Self-Check-In Kiosks in the Netherlands

As in many European nations, health disparities persist between individuals with high and low socioeconomic positions. In the Netherlands, highly educated men have a life expectancy of 5.8 years greater than their less-educated counterparts, while highly educated women live 4.3 years longer than their less-educated counterparts. A gap of approximately 15 years lived in good health also exists between the highly educated and low educated (Rijksinstituut voor Volksgezondheid en Milieu, 2023). Despite efforts by policymakers and health organizations to reduce (health) inequalities through digital means, the Dutch healthcare system's combination of national insurance coverage coupled with market mechanisms of "regulated competition," as well as limited inter-hospital collaboration, results in highly diverse IT systems that do not always aid this goal.

The Dutch university hospital, central to this research, implemented the self-check-in kiosks in 2017 as part of a major digitalization initiative (Figure 1). The goal was to improve care efficiency, empower patients, ease administrative burdens on healthcare staff, and foster meaningful interactions between patients and healthcare providers. During the Covid-19 pandemic, the kiosks were temporarily turned off for hygiene reasons, and a policy program—Digital Transformation (outpatient) Care 2025—was introduced to define, develop, and implement enhanced digital health services. This included renewing the outpatient care registration process to reduce desk-employee workload and cut costs while still maintaining a high-quality patient experience.

From April 2023 to June 2023, time and resources were invested to enhance the user-friendliness of the self-check-in kiosks and to align their hardware/software with the diverse and intricate care pathways of outpatient care. Intermediate findings from the data were used to make these changes. In June 2023, the new registration process was launched. Despite its introduction, the older registration method, via the outpatient counters, persisted in some cases. Throughout the 12-month observational period, assistance availability varied: Sometimes, assistance was provided at the self-check-in kiosks; at other times, it was provided at the counter, and occasionally, it was unavailable. These fluctuations in the development process may influence the results of our study and are addressed when relevant.

2.2. Data Collection

Comprehensive understanding and triangulation of data were ensured by using a range of methods, including desk research, observations, interviews, and a final validation session (Figure 1). We met with members of the program Digital Transformation (outpatient) Care 2025 three times to share and discuss interim findings, enrich data collection, and inform the optimization of self-check-in kiosks. The improvements (June 2023) were partly based on the findings of this ethnographic action research. No new insights were found in the final validation session with the local project leaders.

For contextual understanding, desk research was conducted by analyzing (internal) policy documents. During the participatory observations (total of 140 hours), researchers (authors of the present article IL and NG) offered assistance and engaged in informal conversations with patients, employees, and volunteers in the hospital. Following exploratory observations, an observation schedule was developed to systematically record specific behaviors, such as searching for the self-check-in kiosks, handling these kiosks, searching for

help or assistance, interacting with others, and the consequences of and emotions relating to these patients' behaviors. Field notes were discussed with the team (IL, NG, TZJ, CD). Semi-structured interviews (n = 14) were conducted with hospital staff consisting of policymakers (n = 5), team leaders (n = 3), desk employees (n = 3), a staff member, a volunteer, and an application developer by using purposive sampling (Gray, 2021). The 30- to 60-minute-long interviews were audio recorded and transcribed with participants' consent.

2.3. Data Analysis

Data was analyzed, with the help of MAXQDA, through an ethnographic content analysis, meaning themes "emerged" from the data through a process of open coding and theme refinement without restricting the analysis by predefined codes and themes (Chapman et al., 2015). Intermediate findings were used to adjust the interview guide and the observation schedule. The quotes in the final manuscript were translated into English by the authors.

2.4. Ethical Considerations

This study was evaluated by the Medical Ethical Review Committee of the Amsterdam University Medical Center (AUMC), location VUmc, the Netherlands, which confirmed that the Dutch Medical Research Involving Human Subjects Act did not apply.

3. Results: Practical Obstacles and Consequences for Patients and Professionals

The self-check-in kiosks aim to streamline hospital processes, guide patients effectively, facilitate assistance, and alleviate administrative burdens on healthcare staff, as outlined in internal policy documents. The self-check-in kiosks appealed to numerous patients, particularly those familiar with the hospital infrastructure and those who visit the healthcare facility regularly. Such patients display a distinct behavior pattern, heading directly to the self-check-in kiosks for an efficient registration process before proceeding to the designated waiting area. One couple in their 60s–70s exemplified this as the woman effortlessly scanned her partner's pass, stating "we know the way," emphasizing their 20 years of visiting the hospital.

However, for other patients, this is an unfamiliar environment that they approach with apprehension, uncertainty, or concern about what will happen in their medical trajectory. This manifests in patients searching for the correct department in a large and unfamiliar building, visitors attempting to assist each other in navigating the hospital, and patients appearing stressed and emotional. A service desk employee (R10) said: "Well, patients come to a hospital for a result or with complaints. They don't know what to expect. It's different from checking in with public transportation at the bus." Although a considerable amount of time, energy, and money have been invested in making the self-check-in kiosk more patient-friendly (Figure 1), some patients still experience difficulties. Below, we portray the practical difficulties patients face and describe the consequences of this new service system for patients and healthcare workers.

3.1. Practical Obstacles in Signing Up

The self-check-in kiosks were placed in the hospital without modifying the physical space. In some departments, the signage still directs patients to the counter, meaning patients easily pass the self-check-in

kiosks. A mother of a six-year-old twin said: “The first time, I went straight to that counter, and then I was redirected to the registration kiosks. There was no one there. When no one is present, it’s easy to walk past.” Many people expect to be helped by a person and do not recognize the machine as a way of checking in: “I don’t understand why I have to check in at a kiosk when you’re [the researcher] standing here [between the self-check-in kiosks].”

Patients who did find the self-check-in kiosks were not welcomed but were immediately exposed to instructions: “Hold your patient card or appointment letter under the card reader or touch the screen.” As there is no text-to-speech function, patients are expected to be able to read the information themselves. Some patients struggle with reading, so the small text size and the short message display time (20 seconds) are insufficient to familiarize themselves with what is being asked. Reading is especially challenging for patients with visual impairments: “I am blind in one eye; I can’t do it. Can you help me?” It is also challenging for patients experiencing compromised stability due to illness, dizziness, or who are wheelchair-dependent to approach the self-check-in kiosk and follow the instructions.

In addition, patients who do not speak Dutch, have low literacy, and are unfamiliar with the online world struggle. The phrases used on the screen contain abstract words like “card reader,” “barcode,” and “scan.” The arrow to continue is often not recognized, leading to patients waiting until assistance is provided. “Why isn’t there an OK button instead of an arrow? You have that at the bank, you know,” says a man in his 70s. The registration kiosk adheres to rigid templates, limiting flexibility in terms of color and visual elements. Despite visitors’ different nationalities and migration backgrounds, Dutch and English are the only languages available. “I go where? Very frustrating that I don’t understand this sentence!” states a patient (50–60 years). Finally, the kiosks are surrounded by privacy screens that hinder bystanders from noticing difficulties and assisting.

Many patients encounter difficulty scanning their patient cards, often struggling to identify where or how to scan. Some press the patient card against the screen, others move it back and forth, resulting in unsuccessful scans. Staff often need to instruct patients to adjust the card. Other patients scan their passport instead of their patient card, which is required in other Dutch hospitals, confusing patients receiving treatment at multiple healthcare facilities. In addition, entering data, such as birth dates, can be difficult, especially for patients with sensory or motor impairments. A patient (50–60 years) said: “I have arthritis in my fingers. Typing doesn’t go very well.”

At the end of the procedure, a message with further instructions is shown, for example: “You have checked in; you may take a seat in the waiting area of department 12.” For some, this message is insufficient, making many patients try to re-register or look for confirmation, unsure whether they succeeded. Patients ask staff members questions like: “Did I do it correctly? Is it done this way?” “Am I checked in now?” “Do I need to go to the counter, or can I proceed to wait?” “Do I get a receipt?” A 32-year-old patient said: “When you check in at such a device, you still end up with uncertainties about whether it went well.”

Patients who successfully complete the registration process also face challenges as they cannot always find the right waiting room. The self-check-in kiosks cannot actively guide patients, which is essential because the unfamiliarity and size of the hospital frequently pose challenges for patients in locating the correct department, corridor, or waiting area. Using pointing gestures, a desk employee (R11) explains:

> It's a maze here. Patients should be told: If you walk down this corridor and through the door, you'll find the waiting room on your left. You can sit there. Instead, what appears on that screen is Corridor 8 Waiting Room 3 Route 13 A1.

While many patients experienced practical obstacles, for a button to request assistance is lacking, many were lucky to find a helpful person around. However, this was not always the case.

3.2. Consequences for Patients: Less Interaction, More Responsibility, and More Stress

The success of the new procedure was largely contingent upon the availability of assistance at the kiosk and the counter. Internal policy documents reflect the institutional ambition for personal assistance, for instance: "There is always someone nearby to address any questions you may have" and "you will be well-guided, both online and within the hospital." Due to budget constraints, absence, and a general shortage of personnel, this was not consistent in reality. A frustrated nurse explains: "There is no staff available, and for several weeks, there has been no one at the self-check-in kiosks. Initially, a hostess would greet you upon exiting the elevator and could assist, but we don't have that anymore." Closed counters provided instructions like: "Please check in at the kiosks. The host is happy to assist you" or "Do you have an appointment? Please check in at the self-check kiosks by the elevators. You may then take a seat in one of the waiting rooms." Unfortunately, these self-check-in kiosks were also not always staffed by a host, posing challenges in patient assistance.

The practical challenges outlined above and the fluctuating presence of assistance led to several negative consequences. First, self-check-in kiosks leave little flexibility and room for negotiation, while this is often needed. For instance, if a patient lacks a (digital) pass or a hospital-issued letter, a receptionist can consider the patient's specific situation:

> A pregnant woman forgets her patient card, and a staff member registers her manually, deviating from the protocol, with the rationale: "It's convenient for the patient." Her colleague adds: "I find it sad to send people back to the reception; I can, but it is sad."

Additionally, patients who are more than 15 minutes late for an appointment cannot check in via the kiosk, while desk employees could, in fact, help them. A desk employee (R11) said:

> There's always 1% that arrives slightly late, but there's no one at the counter. How does that work? Then, patients look for someone at the counter, but there's no one there anymore. We placed a note at the counter, allowing them to proceed to this room [office of medical assistants and nurses].

Second, patients are not emotionally supported or reassured during self-check-in processes. Many patients still prefer human interaction on arrival. A policymaker (R3) said: "It's interesting because contrary to our expectations, the number of digital check-ins actually decreased during the time assistance was present [at the self-check-in kiosks]. In all the enthusiasm and hospitality, a lot has actually been taken over." Personal inquiries such as "How are you?" "Were you able to find it?" "Did you manage with the wheelchair?" or simple compliments, like "Hello, little brave boy, you have a nice jacket on," are seen as essential to comfort the patient. A desk employee (R11) said: "If someone is approaching, I can observe if the patient is tense, sad, or very cheerful, and then you can interact accordingly. That's not possible with a kiosk."

Third, while the self-check-in kiosk is convenient for some patients and can be an empowering way to streamline their registration, others feel more dependent on the help of others. If there is no direct help near the self-check-in kiosks, patients are forced to bring a relative or to search for help at a different floor or department:

> Two women with a child were walking around searching and conversing about registration. Researcher IL asked them if he could help them. They explained that they didn't know how to check in and that there was no one at the self-check-in kiosks. The mother mentioned that she is not able to read Dutch well, so she brought a relative for translation, but she also didn't know what to do.

Fourth, self-check-in kiosks do not monitor patients' wellbeing in the waiting areas and cannot provide appropriate assistance when necessary:

> A woman (30–40 years old) asks: "Can you walk with me [to the coffee machine]? I'm feeling a bit out of it." She comes to the pain clinic every four weeks for an injection, and this makes her feel dizzy and unfocused. She says: "Digitization is not good for people who feel a bit out of it." There is no one to chat with her or get coffee. "What if I fall now? There's no one to help me." She feels anxious. She cannot have someone with her every four weeks; besides, she does not want to depend on others.

Fifth, the self-check-in kiosks add stress for some already stressed patients. "Am I doing it right?" asks a lady (70–80 years old). She apologizes for her question: "I'm a bit stressed. I have a second opinion coming up, and if this doesn't go well, I don't know what to do." When individuals are already insecure about their language or digital proficiency, stress tends to occur more readily:

> A man (30–40 years old) steps out of the elevator and asks if I can help with the check-in. He says: "I get short-circuited when you mention that digital stuff. I can get somewhat angry and irritated about it. You're forced to work digitally. I've lived abroad for a while, and I can immediately see that I've missed a lot."

The malfunctions that often occur in the self-check-in kiosk cause further stress. Patients often do not recognize the malfunction (a freezing welcome message from the developer) and try to continue. Patients express relief when the staff informs them of the malfunction: "I thought it was my fault."

3.3. Consequences for Desk Employees and Other Hospital Staff: More (Invisible) Work

The core idea behind self-check-in kiosks is to reduce desk employee workload. In some cases, this holds. A desk employee (R12) said: "It definitely relieves pressure because, if there are two people instead of six at your counter, it reduces the pressure." However, self-check-in kiosks sometimes only take over part of the work and responsibilities, and often cause extra work instead.

Desk employees continue to assist patients at the desk, as registration often involves actions such as filling out a questionnaire, measuring blood pressure, or weighing a patient, tasks that are not yet feasible through a machine. Similarly, desk employees receive numerous inquiries about the registration process, such as "Do I need to register here again?" or "I just registered at the registration kiosk; is that sufficient?" These questions sometimes take just as much time as registration.

Moreover, desk employees increasingly find themselves dealing with unsettled, insecure, or angry patients at their desks. The kiosks sometimes unintentionally expose patients to new medical information, necessitating desk employees to address medical questions. For example, during the observations, the desk employee of the oncology department shared a story about a patient who suspected she had been diagnosed with a form of cancer after seeing various appointments on the self-check-in kiosk:

> When a patient sees multiple appointments like radiotherapy on the self-check-in kiosk, the patient knows something is wrong. Why else would they have an appointment for radiotherapy? They then come to the counter and ask why they have an appointment for radiotherapy, and it's up to me to explain. Patients can also become emotional because of this.

Also, if system errors occur, patients' (angry) responses often end up at the desks. For example, a woman (20–30 years old) checks her father in. After waiting an hour, she returns angrily to report that the self-check-in went wrong. Irritated, she says: "This is not okay."

As a consequence, some desk employees feel that to deal with mistakes by the machines, they should keep track of all patients. A desk employee (R11) said: "We prefer them to come to the counter, and secretly, we keep track of that, even though they might have checked in via the kiosk." In some departments, to avoid issues, the desk employees turn off the self-check-in kiosks. Another desk employee (R12) said:

> Patients assume that both appointments will be quickly registered when they arrive. However, they are only registered for the ultrasound. After the ultrasound, the sonographer says: "You can take a seat in the waiting room." But they haven't been registered for the second appointment yet.

Self-check-in kiosks also cannot actively guide patients, relying on desk employees and passing staff members, including doctors, nurses, and janitors, to direct patients to the appropriate waiting area or search for them in hospital corridors. A desk employee (R10) said: "The doctors keep walking back and forth, searching for patients. That's not really efficient." Searching for patients is inefficient and can potentially negatively influence waiting times for other patients. The belief that self-check-in kiosks alleviate the workload of desk employees is open to question, as are the efficiency gains. Outpatient-department desk employees and other hospital staff are needed to make the kiosks operational, either by conducting the activities the kiosks cannot do (such as reassuring patients or showing them the way) or by addressing the issues caused by them (such as dealing with medical questions or angry patients).

4. Discussion

This study aimed to reflect on the implementation of self-check-in kiosks, particularly in relation to (digital) access to care for more vulnerable patients and the intended efficiency gains of a digital process. The technology-in-practice approach has proven valuable in examining the subtle complexities of interaction between self-check-in kiosks and patients within a complex hospital context that is under pressure due to staffing shortages and budget cuts. We demonstrate that self-check-in kiosks are not black boxes with uniform effects on all patients (e.g., Latulippe et al., 2017; Timmermans & Kaufman, 2020). While self-check-in kiosks are effective for certain patients, it is essential to recognize that the success of kiosks is contingent upon individual preferences, skills, needs, and context. Patients who find the self-check-in kiosks

convenient for streamlining their registration process appreciate the speed and autonomy provided. However, even though a considerable amount of time and energy has been invested in making the self-check-in kiosk patient-friendly, the standardized and uniform self-check-in kiosks create practical and psychosocial difficulties, such as increasing stress or insecurity and reducing autonomy and access, particularly for those already facing multiple challenges in life.

Negative experiences with self-check-in kiosks might heighten existing stress related to illness or feelings of inferiority (Darzentas & Petrie, 2019), meaning patients in more vulnerable circumstances are once again unable to meet the requirements of society and are confronted (again) with their dependence on the assistance of third parties (Goedhart et al., 2022). This can lead to emotions of shame and distrust and potentially worse health outcomes (Greene & Samuel-Jakubos, 2021; Milia et al., 2021). It might also affect consultation dynamics and retention (Westendorp et al., 2021). As Leavitt and Leavitt (2011) stated, stress may cause a patient to forget 40% to 80% of doctor-conveyed information. Long-term consequences of forgetting doctor-conveyed information may extend to patients' mental health and potentially worsen health disparities (Leavitt & Leavitt, 2011; Melita et al., 2021).

4.1. Invisible Work for (Some) Patients and Staff to Make the Self-Check-In Kiosk Work in Practice

The results highlight, perhaps seemingly small, limitations of self-check-in kiosks, often related to the absence of a "human face." This includes the inability of kiosks to provide a warm welcome in a, for many, foreign and uncomfortable environment. Kiosks are also unable to convey information through gestures or monitor patient wellbeing in the waiting room. Even though there was an institutional ambition for assistance next to the machine, budget constraints and a shortage of personnel meant this was not consistent in practice. Without assistance, the machine cannot provide the empathy and psychosocial intelligence necessary to manage patients' emotions and respond to their (complex) social contexts. Suchman (2007) empirically underscores the deficiencies of machines in enacting psychosocial relations and advises against designing machines that imitate humans. Patients are expected to autonomously manage their sign-in process without assistance, thereby assuming greater responsibility. This applies not only to self-check-in but also to all subsequent actions, such as finding the way to the right waiting room or taking care of oneself in the waiting room. As a result, patients are made implicitly responsible for achieving broader systems objectives such as cost reduction or enhanced efficiency (Øversveen, 2020). Patients who fail or refuse to take up these responsibilities are compelled to invest effort and time to ask for help, bring a family member or friend, or find other improvised ways to check in.

Our findings further reveal that self-check-in kiosks also unintentionally create additional tasks for employees. Workarounds to meet patients' needs are developed on the spot, often at the cost of the staff's time and energy, such as incorporating physical signage with patient instructions or resorting to manual patient tracking methods. This aligns with research from the field of science and technology studies of invisible and visible work (Oudshoorn, 2008; Star & Strauss, 1999), as these new technologies first render much of the work of what it means to check a patient in functionally invisible, which then results in the technologies' functioning becoming dependent on the work of various actors, including patients, healthcare staff, and informal caregivers. Since this work was first rendered invisible in the formal accounts of the task of doing a check-in at hand, the burden these kiosks place on patients and caregivers alike could possibly have been prevented. The workarounds needed could, optimistically, be seen as adding "a 'human face' to

the use of new technologies" (Dupret, 2017) but also, more critically, highlight the substantial consequences of there being a mismatch between a technology's intended purpose and its actual use (Mörike et al., 2022). When representations of work scripted in technological artifacts and instructions for users neglect the (in)visible work of healthcare professionals and patients, technologies risk becoming "technological monsters"—technically sophisticated but unable to support their users (Oudshoorn, 2008).

The invisible (extra) work for staff and (some) patients underscores the necessity of considering socio-organizational processes in further evaluations of the effects of medical technologies on inequalities. This consideration extends to digital access to care for more patients in more vulnerable circumstances. Current discourses on digital inequalities often focus on digital participation, assuming that individuals can only engage if they possess basic skills and material access (Smit et al., 2023; Van Dijk, 2020). However, in line with Smit et al. (2023), this study emphasizes that the normative understanding of digital participation, which dictates that individuals can only engage if they possess the requisite digital skills to utilize self-check-in kiosks, is unsatisfactory. Instead, we found that people employ intuitive and pragmatic tactics to use the self-check-in kiosk. In future policies regarding the consequences of medical technology, it is imperative to address digital inequality not solely from the perspective of individual digital capabilities but also by supporting tactics for those lacking sufficient digital access or skills. Considerations should be given to these tactics for health inequalities and organizational efficiency goals.

4.2. From Technology-In-Practice to Inclusive-Technology-In-Practice

Strengthened by the recent Covid-19 pandemic, hospitals in the current healthcare system, struggling with staffing shortages and budget cuts, increasingly prioritize the rapid deployment of health technologies. This research shows that, even in this pressurized context, technologies that promise to contribute to efficiency must be questioned and adapted based on empirical findings. For example, neglecting patient-related aspects such as sensorimotor and cognitive impairments in medical technology design will lead to exclusionary effects for at-risk patients (e.g., Al-Dhahir et al., 2022; Latulippe et al., 2017). Particularly, studies drawing upon theoretical insights from feminist technology studies and/or intersectionality have paid attention to problems in and around designing technologies, including biases in design. These studies highlight that technologies can unfairly discriminate against certain groups (see, for example, Costanza-Chock, 2018).

Although it is undoubtedly important to attend to design practices and make them more inclusive, a technology-in-practice approach remains vital to study technologies beyond the more formalized design stages, as the emphasis is placed on *how* the technology is used in practice (e.g., Timmermans & Berg, 2003; Timmermans & Kaufman, 2020). The focus on the in- and exclusions that happen in this process—the politically and analytically pertinent question of cui bono, who benefits, and who does the dishes (Star, 1995)—is crucial to ensure that this approach is equally sensitive to those who are marginalized through this version of technology-in-practice. To avoid technologies that materialize and prescribe expectations that only the most resourceful patient will be able to live up to, future studies utilizing the technology-in-practice approach should, therefore, continue to place special attention on questioning and adapting the technologies to the needs of patients in more vulnerable circumstances to be able to address exclusions as they happen in use. The approach can thereby help foster feedback loops that continue the design of technological practices well beyond the technology design stage, through which technologies are

continuously evaluated and tailored to meet the diverse needs of various patient populations, thereby fostering inclusivity. This process goes well beyond including patients in the design of digital health tools. In formalized approaches where only a limited number of individuals can verbally articulate their needs in a formal meeting setting, the nuanced challenges in interactions between technologies and patients within complex hospital contexts may remain unseen, as revealed in this study.

This study showed that continued and explicit attention to the invisible (extra) work of staff and (some) patients is needed to minimize the negative effects for some patients, particularly those in more vulnerable circumstances who are highly dependent on good care. Different studies have shown that making invisible work visible can help develop more appropriate and equitable technology (Engeström, 1999; Ming et al., 2022). Ming et al. (2022) studied the invisible work of different home health aides and highlighted their undervalued and underappreciated roles as frontline health workers. They faced invisibility in various aspects of their work, including tasks performed beyond their job requirements, serving as unrecognized conduits of knowledge within the healthcare system.

To avoid these shortcomings in future studies, we advocate for utilizing a technology-in-practice approach that maintains an explicit focus on intersectionality, (in)visible work, and feedback loops beyond the technology design stages. In other words, we propose an emphasis on not just a technology-in-practice approach but an explicitly inclusive-technology-in-practice approach where continued attention is given to how certain health technologies generate, perpetuate, or reduce health inequalities. In practical terms, this means that the pace of digitalization requires careful moderation, and the focus in the evaluation of technology should not be placed on easily measurable outcomes such as the number of online check-ins. Continuous critical examination of the interaction between patients, staff, and the technology is necessary to identify both the beneficiaries and non-beneficiaries of the technology. Explicit budget allocation is thereby needed to facilitate transformative changes in the technology that address the diverse needs of patients and promote inclusivity.

4.3. Strengths and Limitations

Our study was conducted in an academic hospital within the specific context of the Netherlands, and results may vary in other healthcare contexts. Despite this, it contributes to the growing body of knowledge on self-check-in kiosks through a detailed ethnographic evaluation of the patients', caregivers', and staff members' experiences in the registration redesign process. The applied ethnographic action research design facilitated the quick learning circles in practice, enhancing the accessibility of the self-check-in kiosk. The collaborative learning process is still ongoing. Finally, the first author's Moroccan background and proficiency in multiple languages facilitated communication with various patients from diverse backgrounds. This was well-received as "comfortable and pleasant," aiding in recognizing patients' questions, providing assistance, and providing space for more honest accounts of their experiences.

5. Conclusion

While self-check-in kiosks are efficient for some patients and reduce costs in the short term, their efficiency in the long term is questionable. The invisible work of, and easily ignored negative consequences for, patients and staff should be central in monitoring future practices to ensure efficiency and equality. In this case, the promised workload reduction seems elusive or is, at the very least, unequally distributed. This compels us

to reflect on the effects of tasks and processes being digitalized in a given context. While a self-check-in kiosk effectively registers a patient, it falls short in delivering a hospitable, empathetic experience for many patients in a foreign and stressful hospital setting. A more concentrated effort on refining the digitalization of subsequent healthcare processes using an inclusive-technology-in-practice approach has the potential to contribute to better, fairer, and more efficient care for all patients.

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Conflict of Interests

The authors declare no conflict of interest.

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"Periphery-Centric" Approach as a Tactic for Everyday Digital In- and Exclusion of Indonesian Villages

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Abstract

Much has been said about the importance of digital inclusion in reducing the digital divide and ensuring equal access and use of ICTs for all. Generally, inclusivity has a positive connotation, meaning that no one should be left behind by digitalization processes. However, the inclusion of marginalized communities into the digital system could lead to new exclusions within the new system because it amplifies the pre-existing social inequalities that these communities face, creating digital inequality. By observing the implementation of School of Community Networks in 10 Indonesian villages, this article attempts to describe those inequalities and explain how rural communities actively design a strategy to make their involvement in Indonesia's digitalization more meaningful. The conceptual framework developed in this study adopts a "periphery-centric" approach, aligning with the user-centric approach, as it examines from the perspective of marginalized communities how they perceive, understand, and utilize digital technology by generating new forms of innovation that have real impacts on their community, such as tailored applications for public services and local internet infrastructure to reach remote areas. The approach poses the problem and strategic dimension of the issue and puts forward the ownership and locality of these innovations to overcome digital inequality. With the meaningful use of digital technology, the inclusiveness of socially less-advantaged groups into the digital system does not immediately create new inequality; rather, they make themselves the center of their respective bottom-up innovation projects.

Keywords

digital divide; digital exclusion; digital inclusion; digital inequality; Indonesia; periphery-centric; rural digitalization; School of Community Networks

1. Introduction

The digital divide, evident between developed and developing nations as well as within countries along socioeconomic lines such as income, gender, education, ethnicity, and urban–rural disparities, remains a pressing global issue (Alliance for Affordable Internet [A4AI], 2022; The World Bank, 2021). Specifically, approximately 87% of individuals in developed countries utilized the internet in 2019, whereas the corresponding figure for developing countries was 47% (International Telecommunication Union, n.d.). In Indonesia, the government has undertaken initiatives to address this gap, including the Inclusive Digital Transformation program led by the Ministry of Communication and Information. This program aims to enhance digital infrastructure in underserved regions, promote digital literacy and skills development, and enact supplementary legislation to complement existing regulatory frameworks (Setu, 2021).

This principle of inclusivity has been a cornerstone of Widodo's vision, emphasizing the importance of prioritizing attention to historically marginalized regions, particularly the 3T (*terdepan*, *terluar*, *tertinggal* or the frontier, outermost, underdeveloped) regions. This vision, called "building from the periphery," contrasts with the center-centric development approach, which focused heavily on Java and Jakarta, resulting in a development gap between urban centers and peripheral areas (Priyadharma, 2021). The center-centric development, which is marked by the centralized power held by the central government, often overlooks the context and needs of peripheral regions, highlighting the importance of adopting a periphery perspective in digital development initiatives to ensure inclusivity and context sensibility.

In recent years, Indonesian digital connectivity has seen substantial growth, notably through the Palapa Ring project. This project, completed in 2019, involved the construction of submarine and terrestrial fiber optic cable networks spanning over 55,000 kilometers, connecting more than 500 cities/regencies in Indonesia (Medina, 2020). The development of the Palapa Ring has had a significant impact on national internet usage. The number of mobile connections (approx. 370 million) has surpassed Indonesia's total population of 277 million in 2022. Meanwhile, the number of internet users reached 204 million, or 73% of the total population, with the number of social media users reaching 191.4 million (70%; Kemp, 2022).

However, the impressive digital connectivity figures do not reflect the ongoing digital inequality that continues to hinder comprehensive digital transformation in Indonesia. The urban–rural digital connectivity gap remains substantial and even shows signs of widening. Although the number of adults connected to the internet has nearly quadrupled from 2011 (13%) to 2019 (51%), 62% of them are in urban areas, compared to only 36% in rural areas. Additionally, digital disparities also occur across income, gender, education, generation, and other social dimensions (The World Bank, 2021).

The gap still persists because universal access does not always translate into meaningful access (A4AI, 2022; Banerjee et al., 2024). By 2021, only 13% of Indonesia's total population achieved meaningful connectivity, with 35% having basic access and 52% remaining disconnected (A4AI, 2022). Moreover, disparities persist along gender and geographical lines, with a 23% gap in meaningful connectivity between men and women and a 49% gap between urban and rural populations (A4AI, 2022). Despite A4AI's quantitative study, there remains a dearth of qualitative research reporting on community initiatives aimed at combating digital inequality and striving for meaningful connectivity, such as the School of Community Networks (SCN). This study aims to fill this gap.

Adopting the "periphery-centric" approach, this study analyzes issues of digital inequality by prioritizing the perspectives of rural communities. The research seeks to answer the question: How do Indonesian rural communities develop a strategy to navigate their daily digital in/exclusion in order to bridge digital inequalities? Key concepts such as the digital divide, digital inequality (problem dimension), and the periphery-centric approach (strategic dimension) will be elucidated, followed by a description of the SCN, a discussion, and a conclusion section.

2. Conceptual Framework

2.1. From Digital Divide to Digital Inequalities

The Organization for Economic Co-Operation and Development (2018, p. 11) defines the digital divide as "different levels of access and use of information and communication technologies (ICTs) and, more specifically, to the gaps in access and use of Internet-based digital services." Initially, the term referred to the disparity in access to and usage of ICTs, not only between countries but also within countries, including disparities between urban and rural/remote areas, and among different groups or communities (International Telecommunication Union, n.d.; Organization for Economic Co-Operation and Development, 2021; Sastre Reyes, 2019; Ye & Yang, 2020). However, the definition has evolved over time, with scholars recognizing that the term digital divide encompasses multiple dimensions simultaneously.

Tomczyk, Guillén-Gámez, et al. (2023) illustrate various cases of the digital divide occurring in many countries, depicting digital exclusion and strategies toward digital inclusion for disadvantaged groups. Yaqin et al. (2023) outline fundamental strategies for addressing the digital divide in higher education in Indonesia, which encompass enhancing internet infrastructure, ensuring equitable access to technological resources, and providing access to digital devices and facilities. However, Featherstone (2024) argues that closing the digital gap solely through the provision of ubiquitous access may have been a "misguided assumption" because "those experiencing digital exclusion—including people on low income or homeless, elderly, and many in remote and rural areas–were unable to access critical health, education, welfare, and banking services" (p. 14).

The concept of the digital divide as an access problem is understood as digital exclusion, distinguishing between the "haves" and "have nots" (Heeks, 2022; Ragnedda & Gladkova, 2020). Scholars identify three levels of digital divide beyond the access gap (first level). There are differences in technology use due to skills, knowledge, motivation, and purposes (second level), and differences in tangible outcomes or benefits from technology use (third level; Ragnedda, 2020; Ragnedda & Ruiu, 2017). Heeks (2022) categorizes access and technology use disparities within the information value chain and identifies social inequalities, such as income, gender, race, and education, as additional factors contributing to digital inequality.

Van Dijk (2013) identifies four different kinds of inequality related to the digital divide: societal (personal and positional categorical) inequalities, unequal resource distribution, disparate access to digital technologies, and uneven participation in society. He suggests that participation inequality can reinforce existing societal inequalities, deepening the digital divide. Van Dijk associates this divide with the network society, emphasizing the importance of social and media networks for information access and defining three layers within a society: the information elite (15% of the population), the participating majority (50–60%), and the unconnected and

excluded (at least 25%). Heeks (2022) critiques existing literature for focusing too much on digital exclusion and access, advocating for an examination of digital inequality from an inclusion perspective.

The digital inequality perspective shifts the focus from exclusion due to lack of access to digital inclusion, emphasizing pre-existing social disparities based on gender, race, socio-economic class, and cultural backgrounds, as well as urban–rural divide and people with a disability (Bozdağ, 2024; Brown et al., 2024; Karatrantou & Panagiotakopoulos, 2023; Livingstone & Helsper, 2007). While the sustainable development goals and the International Telecommunication Union advocate for inclusive development (International Telecommunication Union, n.d.), studies reveal disparities between intended inclusivity and real-world outcomes, with marginalized groups facing barriers or even increased social inequality in digital realms, particularly during the Covid-19 pandemic (Banerjee et al., 2024; Tomczyk, Mascia, et al., 2023; Yates & Carmi, 2024), which create a "digital inclusion gap" (Featherstone, 2024).

Heeks (2022) warns of "adverse digital incorporation" in the global South, defined as the "inclusion in a digital system that enables a more-advantaged group to extract disproportionate value from the work or resources of another, less-advantaged group" (p. 689). Adverse digital incorporation stems from factors like ignorance, compulsion, or lack of alternatives, resulting in design, resource, relational, and institutional inequalities. This phenomenon aligns with Toyama's (2015) "Law of Amplification," or van Dijk's (2005) reference to the "Matthew effect," where technology amplifies existing human forces, or a lack of them.

Addressing digital inequalities requires attention to both access and social disparities (DiMaggio et al., 2004; Stiakakis et al., 2010). Sastre Reyes (2019) points out the need to ensure the development of teachers' digital competence to renew education in relation to ICT in rural areas. Featherstone (2024, p. 34) highlights the need for a "place-based approach" and to:

> Consider local context and needs, ensure culturally appropriate and sustainable solutions…[he recommends] support for localized digital inclusion plans, with a flexible funding program to enable locally developed strategies to address identified barriers, building community capacity and ownership and greater engagement in the solutions.

A4AI (n.d.) draws conclusions from its survey on meaningful connectivity in nine low- and middle-income countries, including Indonesia, stating that "the new digital divide is not between online and offline but between observer and participant." In summary, finding solutions to digital inequalities necessitates that stakeholders focus not only on "connecting the unconnected" but also on supporting the "already connected" who still face disadvantages.

2.2. The Periphery-Centric Approach

"Periphery-centric" is a concept developed by the author and emphasizes regional and village autonomy to address local issues and fosters Servaes's (1999) idea of multiplicity in development programs. Therefore, it rejects the one-size-fits-all approach to solving development and societal problems. This new concept focuses on user-centric approaches, allowing marginalized communities to innovate and utilize digital technology according to their needs. This approach promotes meaningful and local ownership of technology, as well as inclusivity, without perpetuating inequality. Thus, enabling socially less-advantaged groups to lead bottom-up innovation projects.

The periphery-centric analysis challenges Galtung's (1971) center-periphery model, which portrays fixed and asymmetrical positions of countries and a feudal relationship between them. The proposed model indicates that periphery regions can become centers for others and that centrality and peripherality are not absolute. This perspective offers a new understanding of the center-periphery relationship, emphasizing the potential for change and redefinition of roles.

This conceptualization of center-periphery aligns closely with Mouffe's concepts of "radical democratic citizenship" (Mouffe, 1992a, 1992b), which examine democracy in terms of power and political participation. Power is not inherent to one's identity but articulated through various social and political identities, interests, and values within society. Mouffe also views citizenship as a constructed political identity rather than a legal status, emphasizing the fluidity of power dynamics. Rodríguez and Miralles (2014) note that Mouffe's understanding of citizenship emphasizes the continual effort to access power in specific historical contexts, suggesting that an individual's position in power structures is not static but subject to change. Due to its multiplicity, a subject's position can differ from one discourse to another or from one relational system to another. Therefore, it is highly plausible that simultaneously, an individual may occupy a center position and dominate in one relational system while being in the periphery and subordinated in another relational system, as Mouffe (1992b) does not view social agents as fixed entities in a "closed system of differences."

Figure 1 presents a dynamic view of the center-periphery relationship, departing from Galtung's fixed model. Here, the periphery (P) is not statically juxtaposed with the center (C) but can also function as a center, and vice versa. This is where the intersection between center and periphery (C/P) occurs simultaneously, as the adoption of digital technology places individuals and communities within multiple systems (depicted by circles). It is difficult to master all these digital systems (e.g., communication systems, business and financial systems, programming, applications design, digital literacy, and infrastructure) simultaneously and become an absolute center. This fluidity aligns with Mouffe's concept of citizenship, where power positions are not fixed but subject to change based on various factors. Mouffe (1992b) sees "citizenship as a form of political identity that consists in the identification with the political principles of modern pluralist democracy, namely, the assertion of liberty and equality for all" (p. 378). The periphery-centric strategy embraces this

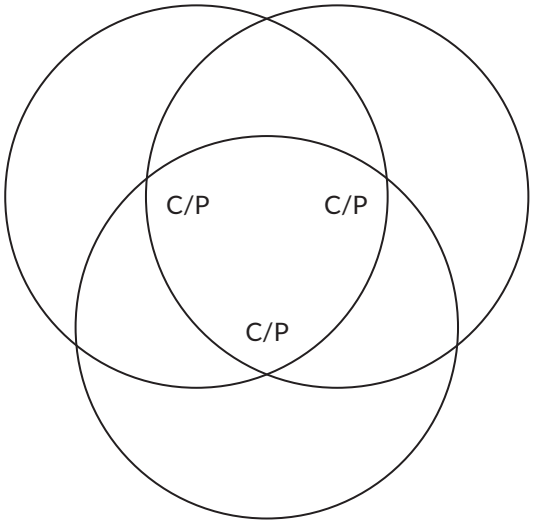

Figure 1. Periphery-centric approach model. Source: Adapted from Priyadharma (2021).

perspective, empowering marginalized groups to become centers by leveraging their unique resources and knowledge as they embrace digital technologies. This approach fosters emancipation by enabling active citizenship and the potential to transform social environments. In the urban–rural dynamic, this strategy frees rural communities from the pressure to conform to urban standards, allowing them to define their own development agendas without competing with urban areas or relying on centralized standards.

The positions of center and periphery become highly fluid and dynamic. This differs, for example, from Frank's (1966) conceptualization of dependency theory, and particularly Wallerstein's (1974) world-system analysis, which views core and peripheral countries in their totality within a one world system (which is capitalistic and hegemonic), thus providing a clear emphasis on "inequality," rather than on "liberty and equality," as argued by Mouffe.

3. Methodology

This study is part of a bigger research project investigating internet policy and regulations in rural areas, which was put together by an Indonesian NGO called Common Room (CR). Initially designed for this purpose, the study expanded to explore various aspects of rural internet development, including funding, technological impacts, and the SCN's unique approach to addressing the digital divide and inequality. While this article concentrates on the latter aspect, which the author is responsible for, findings regarding rural internet policy and funding have been separately documented as policy briefs and research notes.

The selection of SCN as a case study is purposeful, as the author was contracted by CR as a researcher. The study took place from March 2022 to March 2023, during which the researcher, aided by two assistants and a research collaborator, engaged in the SCN implementation across 10 Indonesian villages. Village visits were arranged by CR. Thus, field observations and (semi-structured) interviews were scheduled following CR's agenda. The total number of informants was 57, consisting of participants from various backgrounds, including government officials, SCN participants, ICT volunteers, village enterprise members, activists, indigenous representatives, teachers, students, fishermen groups, and development workers. For this article, selective analysis was conducted on interviews with seven informants, covering a range of perspectives and roles. This was performed solely by the author. The rest of the informants served the general research purpose about rural internet policy, whose analysis was conducted by another researcher.

Observations were focused on understanding village initiatives to address digital inequality, which were manifested in the SCN while considering factors like infrastructure challenges, environmental conditions, and local customs. Researchers documented these observations through field notes, photos, and videos, supplementing them with theoretical reflections and insights from informal conversations with stakeholders. Additionally, this study analyzed relevant documents related to the inception and implementation of the SCN initiative, including activity reports, publications on community networks, presentation materials, and webpages.

All data were stored in a shared online folder accessible to the research team, with most interviews transcribed by the assistants and checked for accuracy by the author. This article employs a conceptual framework divided into two dimensions: problem and strategic. The problem dimension involves debates about the digital divide and digital inequality, while the strategic dimension proposes alleviating these

disparities through a periphery-centric approach consisting of the five pillars of SCN (see Section 4). The coding process, executed independently by the author, involved both inductive (for the strategic dimension, e.g., "ex oriente lux," "meaningful connectivity") and deductive approaches (for the problem dimension, e.g., "digital divide," "digital inequality"), with verification performed through methods triangulation. MaxQDA was used to sort the data and partially for the initial coding. The selective coding was done manually. The data were then reduced based on their relevance to the research question, focusing on seven informants instead of all 57. Analysis results were shared during meeting sessions with CR and the research team.

Ethical considerations were addressed throughout this study by ensuring that each member of the research team was properly introduced to all stakeholders encountered during SCN activities, emphasizing their role in conducting research. CR consistently reminded local parties of the research objectives and obtained their voluntary consent to participate in data collection activities. The research team was equipped with an official letter from CR stating their identity and purpose as a researcher. Informed consent was obtained from all informants for the interviews and the recordings, with their identities protected by using only initials in this article. Not a single village member objected to being observed or interviewed for this research. Had that happened, data concerning the objecting individual would not have been gathered.

4. Findings: SCN or *Sekolah Internet Komunitas*

The SCN was launched in 2021 by CR. It aims to reduce the digital divide in rural Indonesia by providing internet access and digital literacy training. CR asserts that the SCN aims to support "citizen initiatives so that they can build an independent and sustainable community-based internet infrastructure in their area" (CR, 2021, p. 2). The SCN is expected to enhance "affordable and inclusive connectivity for underserved or excluded communities in low-income rural, urban, and peri-urban areas" (Association for Progressive Communications, 2020). The SCN emerged from the Rural ICT Camp series initiated by CR in 2020, with recent editions held in Kasepuhan Ciptagelar (2020 and 2021), Tembok Village (2022), and on Breueh Island (2023).

CR believes that there are five important pillars for addressing the digital divide, namely (a) meaningful equal access; (b) improving the quality, ability, and skills of human resources; (c) locality aspect; (d) a sense of belonging; and (e) the presence of key actors or agents as change catalysts (Indonesia Civil Society Organization of Digital Transformation Task Force, 2022):

> The existence of these five pillars reflects the principle of equity in development. In this case, the development process and efforts to reduce the digital divide cannot be considered equally in every area, including in terms of the need or utilization of the technology used. (Indonesia Civil Society Organization of Digital Transformation Task Force, 2022, p. 13)

These principles constitute the strategic dimension of the periphery-centric concept which draws upon Featherstone's (2024) "place-based approach" and Mouffe's (1992a, 1992b) concept of active citizenship. The examples to be presented in Sections 4.1–4.4 demonstrate how participation in meaningful digital activities (A4AI, n.d.; van Dijk, 2013) is part of enhancing digital capacity to reduce the second-level digital divide and increase the opportunity to gain benefits (third level) from digital inclusion (Ragnedda & Ruiu, 2017), while simultaneously mitigating the intensification of digital inequality.

During the data collection period, CR organized 10 SCNs across Indonesia. By the end of 2023, one additional village had joined, totaling 11 villages. Figure 2 shows the locations of the 11 villages, spanning from the westernmost point in Indonesia at Lapeng Village, Aceh, to the easternmost point in Indonesia at Nimboran District, Papua, covering the major islands in Indonesia. Due to space limitations, only four village initiatives will be outlined here. These four villages were selected based on the unique challenges they face and their creative and adaptive initiatives to address these issues. While other villages may have similar solutions (see Figure 2), these four villages provided the most comprehensive data, making them suitable case studies for this article. Ciptagelar and Tembok were specifically chosen for their significant contributions to the development of SCN, as evidenced by their selection as hosts of the Rural ICT Camp. The author personally attended the Tembok edition of the Rural ICT Camp in 2022 as part of his role as a researcher for this project.

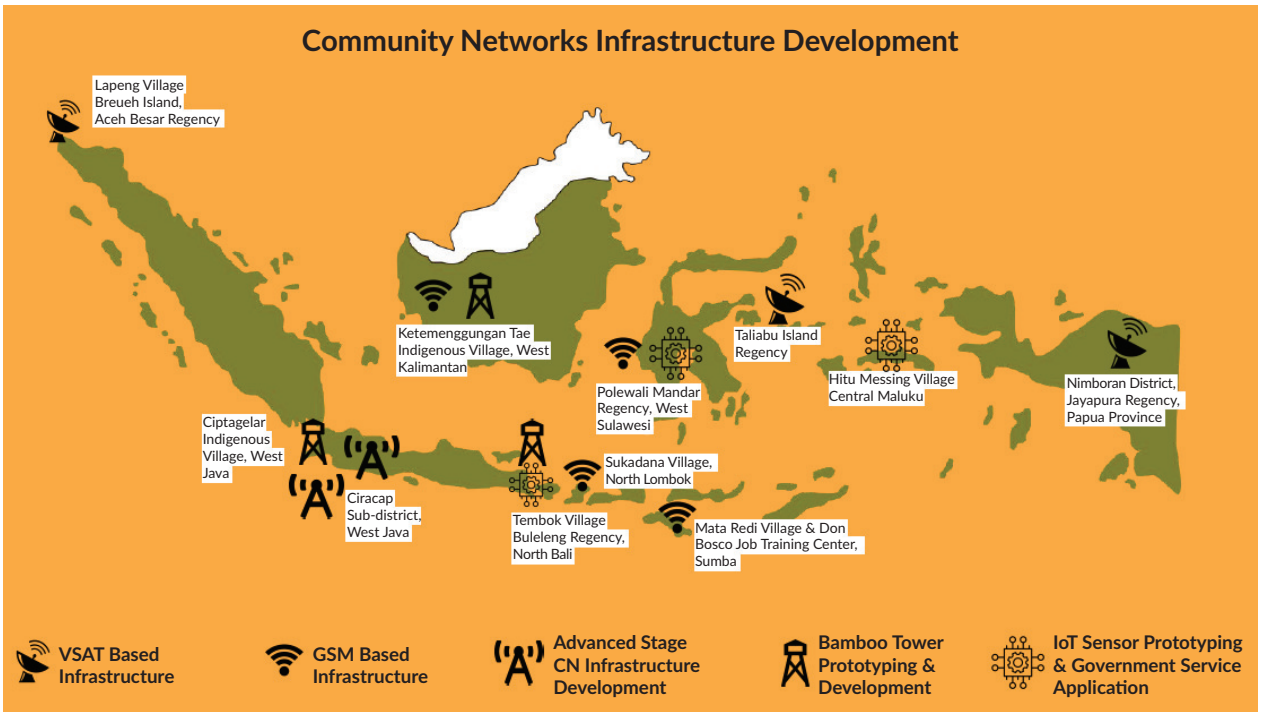

Figure 2. The 11 villages of the SCN in Indonesia with their specific and differentiated internet infrastructure development. Source: CR (2023).

4.1. Sukadana Village, Lombok

Sukadana Village, the poorest in North Lombok, faces significant challenges for women of all ages who are vulnerable and discriminated against. They frequently experience domestic violence, sexual abuse, harassment, early/child marriages, and mental health disorders. Culturally, women lack decision-making roles in the customary community but have crucial roles in household management. The 2018 earthquakes caused widespread devastation and loss of livelihoods in Lombok, particularly impacting men. Displacement in camps, worsened by the Covid-19 pandemic, exacerbates social problems, amplifying women's economic and psychological suffering. Ms. S, chairwoman of the Women's School community, notes that smartphone use among teenagers increases the risk of child marriages through digital contacts:

> Cases of child marriage are caused, firstly, by economic reasons and, secondly, due to the use of smartphones. They meet through smartphones, start dating, and eventually, curiosity and experimentation arise from their peers. Additionally, they are often lured into these situations because the perpetrators of child marriages are adults. For example, someone aged 16, 17, or 15, while the one who elopes is an adult, who may even have a spouse, deceiving them by claiming not to have a spouse, but when they arrive at the man's house, it turns out [he is already married]. (S, interview, May 20, 2022)

The issue described above indicates the existence of social inequality between marginalized groups, specifically women, both adults and adolescents, and adult men who generally hold power as decision-makers within families. It is essential to empower these marginalized groups to address the power deficit that leads to their exclusion from the digital system.

Since 2013, the Women's School has supported victims of various cases and advocated for women's empowerment. It focuses on empowering poor and vulnerable women to enhance their (digital) capacity for income generation. In 2019, the Department of Food Security and Fisheries launched a Vannamei shrimp cultivation program for North Lombok, which was discontinued due to a lack of planning. The Women's School proposed continuing the program by collaborating with community organizations for training. CR provided technical assistance and partnered with the community to improve the productivity of shrimp cultivation by developing Internet of Things (IoT) sensor prototypes for real-time data monitoring. IoT sensors for Vannamei shrimp cultivation may seem insignificant to many people, so it does not become the center of attention for them. But for the Sukadana community, this is a valuable activity, so what may be peripheral to many others can become central for these vulnerable women.

4.2. Nimboran District, Papua

CR's motto "*ex oriente lux*," meaning "light rising from the east," symbolizes the goal of providing internet connectivity to remote villages in Jayapura Regency, Indonesia's easternmost region. In his opening speech at the launch of SCN in Nimboran, GF, the director of CR, emphasized that:

> The SCN program is an important effort to address the challenges of the digital divide in Indonesia, particularly in all areas of Jayapura regency. Therefore, I hope that as our first lesson today, we learn to enhance our knowledge to improve all of our skills because overcoming this digital divide can also address other inequality challenges, such as the development gap between urban and rural areas, between centers and peripheries. (GF, interview, April 19, 2022)

CR acknowledges that digital inclusion must be accompanied by the solution to digital inequality, primarily through the provision of digital connectivity. Thus, by collaborating with a local internet service provider, the SCN trained local ICT volunteers to build satellite-based community internet infrastructure. The initiative was supported by the regency's Head of Communication and Information Office, GG, who emphasized the importance of very small aperture terminal in overcoming isolation, supporting economic empowerment, and facilitating online learning. Simultaneously, this situation illustrates the problem dimension, namely connectivity issues, and the strategic dimension, which involves providing internet connectivity via satellite and enhancing human resources through SCN training.

The Papuans enjoy learning from practical experiences and then delving into the concepts behind those practices. This form of reverse engineering is acknowledged by GG to possibly be influenced by the beliefs of the Papuan Christian community, who learn from what is referred to as the "Thomas Concept." In the Bible, it is recounted that Thomas did not believe in the resurrection of Jesus until he saw the risen Jesus with his own eyes: "The Papua people see first, then believe," said GG (interview, April 22, 2022). This concept was then implemented in SCN training, emphasizing hands-on practice to stimulate participants' curiosity and deepen their knowledge and skills. This approach takes into account Papua's local beliefs, which are adhered to in the periphery-centric model. GF acknowledges that the indigenous Papuans need digital literacy programs, which he considers a "gateway" for broader community participation in the community networks project.

4.3. Tembok Village, Bali

The majority of residents in Tembok, North Bali, have only an elementary school education. DK, the head of Tembok, recognizes this as "one of the factors contributing to their inability to cope with the changes" brought about by digital transformation. DK emphasizes the importance of education and digital literacy in addressing the "internal infrastructure inadequacies" in "responding to or even deriving positive value from the ongoing transformation." The SCN steps in to fill this gap by training villagers and local officials to improve their digital literacy level.

In addition, internet coverage is lacking, particularly in North Bali compared to South Bali, where tourism infrastructure and the economy are more developed. Addressing this deficit, DK implemented three good practices: a bamboo-based internet tower, the Djangkep public service application facilitating document services (e.g., birth certificates, marriage certificates), and a separate waste bank saving app incentivizing waste collection and conversion into bank savings, addressing local needs effectively:

> Regarding efforts to address the (digital) divide that occurs, one of them is by providing the infrastructure first…with the aim that the community can access the internet easily and affordably. Because there is a cost or living expenses that can be minimized. (DK, interview, March, 31, 2022)

Bamboo was chosen as a material based on cultural aspects, its cheapness, its ease of accessibility at the location, as well as its sustainability. Based on field observations, the bamboo internet tower serves at least three functions: (a) as an internet tower emitting Wi-Fi signals to the surrounding area, (b) as a security function as a watchtower, and (c) as a community gathering area at the base of the tower.

For the Tembok Village government, the internet has a crucial function as a public information channel through the Djangkep app. In 2021, Tembok received an award for public service innovations from the Ministry of State Apparatus Utilization and Bureaucratic Reform. Various initiatives in Tembok clearly illustrate the strategic dimension of the periphery-centric approach. In addition to offering solutions to the digital divide problem, these initiatives also demonstrate the locality and ownership aspects of digital infrastructure (internet tower and both public applications), as well as the agency of digital actors, especially DK, the head of the village.

4.4. Kasepuhan Ciptagelar Indigenous Community, West Java

The SCN originated in this indigenous community deep within the Halimun-Salak Mountain National Reserve. Despite its traditional values, the community has embraced digital technology through the Innovation Factory program which focused on ICT for agriculture and aimed to utilize ICT for agriculture sustainability, cultural preservation, forest conservation, and economic development.

According to a CR's report, community-centered connectivity in Ciptagelar now connects 37 out of 568 hamlets and 11 out of 360 villages, serving a population of 30,000 (CR, 2023). As in Tembok, a bamboo internet tower has been erected here, indicating advanced infrastructure development. The community's familiarity with ICT dates to 2008, with the operation of CIGA TV and Radio Swara 107.7 FM. CIGA TV now has a YouTube channel (@cigatvciptagelar6230), promoting ancestral traditions alongside modern concepts so that both values do not contradict each other. KY, the spokesperson of Ciptagelar, stated during the interview that this principle is fundamental and is difficult to replicate in other areas, emphasizing its locality:

> We must be able to balance the development of current conditions through technological parameters without abandoning customs and traditions. The saying "*Kudu Bisa Ngigelan Jaman, Tapi Ulah Kabawa Ku Jaman"* means we need to adapt and follow the developments without abandoning the traditional order. Now, if we look at the neighboring community, for example, the (inner) Baduy tribe, they will never incorporate modern values because of their traditional concept, "*pondok teu meunang disambung, panjang teu meunang dipotong*" (no addition or reduction), that's it. No additions are allowed. (KY, interview, April 11, 2022)

Leadership, particularly that of Abah Ugi, their respected traditional leader, has been pivotal. While upholding traditional values, he encourages technological adoption as long as it aligns with core traditions, especially regarding sacred cultural practices and rice management, which remains unchanged due to its cultural significance. This principle, known as "*ditambah boleh, dikurangi jangan*" (additions are welcome, reductions are not), is significantly different from that of Baduy, which underscores indigenous purity.

When asked whether modern education is a prerequisite for openness to adopting new technological innovations, KY and BU (the treasurer of the Ciptagelar business unit) unanimously said "no." This is an interesting finding because the fact that the majority of Ciptagelar residents have only completed secondary education does not prevent them from utilizing modern technology. BU stated that the main determinant is the traditional leader who has an "open mind that indirectly influences the residents…as long as we firmly uphold tradition" (interview, April 11, 2022).

To ensure sustainability, the community developed a business unit through Ciptagelar Hotspot, in cooperation with local internet service provider Awinet and with CR's support. This unit acts as a reseller of internet access vouchers, offering affordable schemes (hourly, daily, weekly, monthly) starting at 2000 IDR (15 cents USD) per hour and selling 238,320 vouchers within a year through 86 agents. Until 2023, they operated 520 public Wi-Fi hotspots and 10 private ones, employing 10 technicians for continuous service. From August 2020 to July 2023, they generated a total gross income of 353,909.77 USD. Additionally, free internet access is provided for teachers needing to upload data, while SCN supports technicians in maintenance, offers routine monitoring, enhances capacity through workshops, and conducts training for content creation and digital literacy (CR, 2023).

Above, both the problem and strategic dimensions are portrayed in Ciptagelar. The community's isolation in the middle of the forest does not always lead to communication isolation due to their participation in the digital system. This community is cleverly able to build meaningful connectivity through the operation of various media channels and the development of community networks. Moreover, they are able to build a business and profit from this network by serving their community. In addition, the SCN appreciates their local values and culture, making its locality aspect compelling. Although geographically on the periphery, this community has been positioned at the center of digital activity by a strong leader, supported by numerous agents acting as catalysts.

5. Discussion

5.1. The Problem Dimension: Various Types of "Gaps"

No matter how hard we criticize universal access policies, it cannot conceal the fact that, indeed, digital access for rural communities is highly inadequate. However, it turns out there are different types and levels of disparity experienced by these villages. Based on the observations, although not fully detailed in this article, the first level of the digital divide, i.e., the access gap between the "haves" and "have nots" (Heeks, 2022; Ragnedda & Gladkova, 2020), exists in all 10 SCN villages, and the SCN is present to bridge this gap. Figure 2 illustrates how the SCN program attempts to address this access issue by building community networks in the 11 participating villages. Specifically, as discussed in the findings, unique solutions to mitigate this gap can be represented by four villages. Bamboo internet towers were established in Tembok and Ciptagelar, while satellite-based internet connectivity was built in Nimboran. The same applies to the second level of the digital divide in terms of differences in skills and knowledge to utilize digital technology (Ragnedda & Ruiu, 2017). Various SCN training sessions are intended to address this gap. In Sukadana, training in the use of IoT for Vannamei shrimp farming was held with participants from women's groups. In Tembok, the training menu was the development of public service applications. Meanwhile, Ciptagelar's training focused on business management for the Ciptagelar Hotspot, which is community service-oriented and profitable. The success (or failure) of this training will affect the narrowing (or widening) of the third level of the digital divide, i.e., in terms of outcomes or benefits that can be derived from the use of digital technology (Ragnedda & Ruiu, 2017). The activities carried out in the SCN show the efforts of these communities to move from being the unconnected and excluded group to the participating majority in van Dijk's (2013) network society classification.

The four case studies outlined above also show that, indeed, social inequalities have become a factor in the formation of digital inequality (Ragnedda, 2020; Stiakakis et al., 2010). For example, the digital violence experienced by teenagers as victims of child marriage in Sukadana shows the situation of adverse digital incorporation (Heeks, 2022), where the "inclusion in a digital system…enables a more-advantaged group to extract disproportionate value from the work or resources of another, less-advantaged group" (p. 689). In this case, teenagers with low digital literacy and economic levels become victims of cyber and digital grooming (Lorenzo-Dus, 2022). They are manipulated online so that their involvement in the digital world deepens the digital inclusion gap (Featherstone, 2024), instead of reducing it.

In addition to gender and age dimensions, which are factors of social inequality, differences in economic and educational levels (in Tembok and Nimboran) are also indicated as other forms of gaps that can create new

digital exclusion. The SCN is present to address this problem by offering a strategy of digital inclusion for the villagers, thereby resulting in a more balanced power relationship between the center and the periphery. It provides training on digital literacy as well as IoT (knowledge and skill level) in the field of fisheries and encourages community members to adopt the waste bank app to provide a positive economic impact (outcome level), thereby reducing the social disparities which are the factors contributing to digital inequality.

5.2. The Strategic Dimension: The Five SCN Pillars

As an integral part of the periphery-centric approach, the SCN refers to five important pillars that address the emergence of various gaps, as explained in Section 5.1. The pillars allow rural communities to focus on their potential in their digital participation. Their active participation in solving local digital problems can transform their peripheral position into a central one, meaning it becomes relevant for their own community, in line with the principles adopted in the periphery-centric approach. While these pillars apply to all SCN villages, the following sections will illustrate how these principles contribute to reducing digital divides and mitigating digital inequalities, specifically in the four villages outlined above.

5.2.1. Meaningful Connectivity

The CR project aims to bridge the digital divide by establishing last-mile connectivity, addressing the first level of the divide related to access to digital technology. However, the project goes beyond mere access by emphasizing meaningful connectivity through initiatives like bamboo internet towers, the Djangkep public service app, waste bank apps, and affordable Wi-Fi schemes. This approach acknowledges that universal access alone does not tackle digital inequality but rather can exacerbate it by amplifying existing social and structural inequalities in the digital realm. For instance, low community purchasing power may lead to increased expenses for internet data packages or reliance on online loans, worsening the digital divide. Meaningful connectivity is therefore crucial for rural residents to navigate and mitigate these new inequalities amidst growing digitization.

The SCN transcends both initial identification of those left behind and disparities in skills and knowledge, focusing on a user-centered perspective to comprehend and address the impacts of digital inclusion. It encourages bottom-up initiatives tailored to local cultural values, as seen in indigenous villages like Ciptagelar. Inspired by Mouffe's (1992a, 1992b) radical democratic citizenship and her emphasis on the principle of liberty and equality for all, digital inclusion under this periphery-centric approach does not imply the exclusion of traditional values but rather offers a new trajectory for digital citizenship and participation. This is what transforms them from being an observer to a participant in the digital realm (A4AI, n.d.). It suggests that digital exclusion in one domain (e.g., a lack of orientation towards urban development models) may lead to inclusion in another (e.g., distinctive rural digital development models), allowing villages to emerge as new centers, challenging the notion of absolute peripherality or being "left behind" as pictured in Galtung's (1971) model of center–periphery.

5.2.2. Human Resource Capacity

Enhancing the human resource capacity of local communities involves active community engagement in transforming their surroundings and empowering themselves through training and workshops conducted

with vocational schools and training centers rather than relying on external entities. These activities aim to address social disparities and prevent adverse digital incorporation, benefiting participants from various backgrounds and educational levels within the SCN.

Participants, including domestic violence survivors in Sukadana, young people in Nimboran, indigenous community members in Ciptagelar, and government employees in Papua and Bali, engage in these activities to enhance their digital literacy, with SCN offering relevance to their daily lives, such as employing IoT for fisheries in Lombok. This is an emancipatory activity that enhances their value as citizens and strengthens them and their communities through meaningful participation in society, thereby significantly changing their citizenship position from being observers, even victims who are excluded, to becoming participants in the digital system (A4AI, n.d.; Mouffe, 1992a, 1992b; van Dijk, 2013). From a periphery-centric perspective, this is their strategy for daily digital inclusion to empower themselves and elevate the importance of marginalized individuals, particularly those in rural areas, with the help of digital technology.

5.2.3. Locality of Digital Initiative

The SCN operates within a context-specific framework, avoiding one-size-fits-all policy or "packaged interventions" (Toyama, 2015) and tailoring solutions to local needs. For instance, Djangkep and waste bank saving apps collect data reflecting the local context, aiding village administrations in decision-making. This bottom-up data collection contrasts with top-down approaches from the central government. Internet towers were built in Tembok and Ciptagelar using affordable, locally available materials like bamboo, embodying principles of affordability and low maintenance. Traditional/religious values and modern technology coexist in villages like Ciptagelar and Nimboran, reflecting a hybrid community ethos. The periphery-centric approach fosters this coexistence, allowing for simultaneous digital inclusion and exclusion and empowering communities to address digital inequality locally.

5.2.4. Ownership of Digital Technology

The SCN empowers local participants by ensuring that the outcomes belong to them, acknowledging that they may not always be quantitatively measurable and cannot be compared with urban digital development achievements. This decentralized approach helps address the inequality of outcomes resulting from digital technology use (the third level of the digital divide), as it allows rural communities to tailor technology to their needs, for example, the need for improving shrimp cultivation productivity by utilizing IoT sensors in Sukadana. The ownership of material and immaterial capital, such as data and local knowledge (e.g., in Ciptagelar with their traditional principle), enables communities to create relevant outputs, like waste bank and public service applications as seen in Tembok. This ownership grants autonomy and power to manage resources and make strategic decisions for the community's benefit.

5.2.5. Agency

The SCN transforms diverse individuals in the four villages, including village chiefs, government agency heads, ICT volunteers, students, activist mothers, and youth, into change agents. As digital citizens, they actively engage in social and political transformation and are driven by diversity and even conflicting perspectives, embodying "agonistic pluralism" as conceptualized by Mouffe (2020). These individuals reject

top-down digital development initiatives and aim to be central figures in regional projects, constructing the "we" as "radical democratic citizens" (Mouffe, 1992b). They enhanced their agency in digital development through various activities, created demand and supply, proposed funding and legality for their initiatives, designed business models, collaborated with different stakeholders, built networks, and employed good organizational governance.

An interesting observation in this context is how local leaders play a crucial role in a social process that encourages their communities to form this "we" identity and actively engage in enhancing their digital capacity. This phenomenon is observed in Nimboran, Tembok, and particularly in Ciptagelar, where adherence to traditional leaders is a reliable strategy for gaining access to digital technology and addressing disparities in formal education, thereby strengthening the position of indigenous communities in the digital transformation process.

The user-centric approach of the SCN leverages individuals' multiple roles and identities, emphasizing multi-stakeholder collaboration within the periphery-centric approach to optimize network members' potential. This approach recognizes and activates the potential of every agent within the network, including marginalized individuals like domestic violence victims in Sukadana.

6. Conclusions

This article not only acknowledges that digital divides occur among and within countries, such as urban–rural and gender digital divides, but also recognizes that digital inequalities can emerge and even widen due to pre-existing social disparities (Heeks, 2022; Livingstone & Helsper, 2007; Ragnedda, 2020). Marginalized groups such as women, children, or people living in rural areas are the most affected by this digital inclusion, which creates new exclusions within the digital system. Government efforts to eradicate rural digital divides through universal access provision are only sufficient to address the first level of the digital divide, which is the access gap, but insufficient to tackle diverse digital gaps at the local level, such as gaps in skill and knowledge as well as outcome disparities (Ragnedda & Gladkova, 2020). Those are the problem dimensions of this research. Support is needed for bottom-up efforts that aim to solve the problems of rural digitalization.

By examining rural digital development through the SCN project, the periphery-centric model was employed as a strategy to navigate rural communities' daily digital in/exclusion in order to bridge digital inequalities, challenging the conventional center-centric model, which revolves around the government's national digitalization agenda. This new model empowers villages by fostering local participation in developing context-specific digital initiatives. It emphasizes integrating local norms and values into digital technology adoption to enhance community value without depleting resources. This is the strategic dimension of this research.

Strategically, the SCN adheres to the five principles as parts of the periphery-centric approach, namely prioritizing meaningful access, enhancing human resource capacity, addressing localized aspects and ownership of digital technology, and promoting agency. Among the examples of these initiatives in the four villages depicted above are incorporating indigenous and religious values, building bamboo internet towers, developing public service and a waste bank app, as well as designing IoT technology for the fishery.

Additional solutions from other SCN villages not described in this article include satellite-based internet infrastructure to reach the remote islands of Breueh and Talabu, solar-powered GSM connectivity in Mata Redi, where state-supported electricity is non-existent, and an IoT sensor prototype in Hitu Messing, in addition to the one in Sukadana. Furthermore, the integration of bamboo culture and traditional values is being employed to develop local connectivity in Ketemenggungan Tae. These findings support Featherstone's (2024, p. 34) recommendation to:

> Consider local context and needs, ensure culturally appropriate and sustainable solutions…support for localized digital inclusion plans, with a flexible funding program to enable locally developed strategies to address identified barriers, building community capacity and ownership and greater engagement in the solutions.

Therefore, while the findings presented in this article are primarily based on the four exemplified villages, it can be concluded that all SCN villages benefit in various degrees from their orientation towards the aforementioned five strategic pillars of SCN in their fight to reduce digital inequality.

By implementing the aforementioned strategy, numerous centers have emerged, as depicted in Figure 1, aligning with the multiplicity paradigm (Servaes, 1999), which rejects the total and feudal model of center-periphery relations (Frank, 1966; Galtung, 1971; Wallerstein, 1974). These diverse centers are determined by different contexts and discourses, which may occur because individuals can occupy multiple "subject positions," as theorized by Mouffe (1992a, 1992b). The SCN villages, particularly the four ones, have proven that they can transform into centers despite their geographically, politically, and economically peripheral positions. Behind undeniable real barriers such as remote locations, limited internet access, high connectivity costs, and scarce resources such as electricity and finance, they have succeeded in developing meaningful digital initiatives. Digital actors in these villages thereby foster their agency as "radical democratic citizens" (Mouffe, 1992a, 1992b). The SCN exemplifies how rural digital development and citizenship intertwine under this approach. For the broader academic debate on digital inequalities and center-periphery relations, this implies that although various forms of digital divides are found in all SCN villages, these divides can be mitigated with the implementation of periphery-centric principles. As a result, pre-existing social inequalities are not amplified into the digital realm (Toyama, 2015), and new divides do not emerge.

The four case studies above demonstrate that social inequality does not necessarily become an absolute precondition for new digital inequality when these communities participate in global digitalization projects. Rather, it is the meaningful adoption and adaptation of digital technology that provides their peripheral position with added value, thereby altering the power dynamics between the center and the periphery. Complete disconnection from the digital system is not a solution to avoid digital social stratification; rather, the meaningful utilization of digital technology, as embraced in the periphery-centric approach, can prevent these groups from being entirely digitally excluded.

Despite its potential, there are some critical remarks for the periphery-centric model. First, these initiatives cannot be replicated entirely as forms of information and communication technology for development intervention in other locations due to their context-specific nature. Therefore, they are not "best" practices but a series of good practices from which other communities can learn (Unwin, 2017). Second, with its focus

on meaningful access, this approach could overlook the importance of equitable and affordable distribution of digital access and infrastructure. Third, it may provide governments with an excuse to shirk their responsibility to provide fair, equitable, and affordable basic infrastructure and internet access by attributing greater value to grassroots initiatives. Therefore, further research is needed in other locations to capture the variety of initiatives that use the periphery-centric model and the potential differences in research outcomes. Longitudinal research is also advised in both old and new SCN locations to measure the sustainability of these initiatives, especially if there are changes in the issues faced and the possibility of discontinuation of support from external parties such as CR in the project.

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Conflict of Interests

The author signed a contract with the Common Room for the aforementioned project as a researcher. However, the author affirms his independence throughout the research process and confirms that no directives were received that could influence the research outcomes.

Supplementary Material

Supplementary material for this article and the information about the Association for Progressive Communications's project can be explored here https://www.apc.org/en/project/supporting-community-led-approaches-addressing-digital-divide and here https://commonroom.info. As the School of Community Networks project remains in progress, the data set may be subject to modifications.

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Exploring Parents' Everyday Experiences With Digital Media: Barriers and Opportunities for Digital Inclusion

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Abstract

This article presents qualitative research findings on parents' digital media practices. Through 32 in-depth interviews with parents of 0–6-year-olds in French-speaking Belgium, the study addresses digital inclusion by exploring the diverse ways parents experience and benefit (or not) from digital media. Our research uncovers the dual nature of digital media use in parenting, presenting both advantageous and problematic outcomes across four dialectical dimensions. Our work sheds light on how digital media can (a) offer informational support or constitute an informational challenge, (b) provide emotional assistance or cause emotional struggles, (c) grant access to social support or contribute to social pressures, and (d) serve as a tool for the daily organisation or complicate daily life. Our article also investigates the factors associated with either positive or negative outcomes. We show the role of personal, situational, social, and normative factors. To conclude, we identify strategies for childcare and parenting support professionals to promote digital inclusion among parents by addressing barriers to positive experiences and outcomes related to the use of digital media. By integrating the outcomes of parents' experiences with digital media into discussions of digital inclusion, this article contributes to a comprehensive approach to promoting digital equity beyond questions of access and skills. It calls for user-centric strategies that consider the diverse experiences and concrete outcomes associated with digital media use and emphasises the importance of supporting parents and families regarding these tools.

Keywords

Belgium; digital inclusion; media literacy; media practices; parenting support

1. Introduction

Digital media play a crucial role in the ongoing evolution of our societies and the day-to-day experiences of individuals. Interpersonal communication, work-related tasks, administrative procedures, democratic participation, entertainment, and various other endeavours often require or are facilitated by online services. In this context, many studies have been conducted to better understand the complexities of digital inclusion and exclusion. This literature often revolves around access, skills, and practices, frequently entwined with socio-economic determinants. However, there appears to be a significant lack of understanding regarding how individuals actually experience digital media and whether they derive tangible benefits from its use in their everyday lives (Ragnedda et al., 2022; van Deursen et al., 2014).

This article aims to investigate this gap with a specific audience—parents. In a society where digital information is omnipresent and can help individuals achieve their goals and perform their different roles (Glushko, 2016; Jones, 2010), parents increasingly need to navigate among various sources of online information and services. The abundance and diversity of online information sources dealing with parenting are potentially beneficial to parents who can construct meaning (Dervin et al., 2003) when faced with questions or concerns. However, digital information sources can also disrupt parenting practices by generating stress and demanding complex skills (Mikolajczak & Roskam, 2017; Yardi et al., 2018). Parents face a significant challenge in identifying relevant, high-quality resources among the heterogeneous digital resources. Recent developments in the digital media landscape have made this even more difficult. Examples include product placement, advertisements in the discourse of influencers, pseudo-scientific discourse and the proliferation of fake news (Arif et al., 2018; Monvoisin, 2007), the opacity of recommendation mechanisms based on algorithmic processes (Claes & Philippette, 2020; Jacques et al., 2020), the expanding reach of normative prescriptions by influencers, and the facilitated peer-to-peer sharing of information (Beuckels & De Jans, 2022).

There is thus a need to understand better how parents experience digital media, how these information sources affect their parenting journey, how to facilitate parental abilities to benefit from digital media, and how to mitigate any harmful impact. This article seeks to bridge the current gap in the literature by examining the diverse outcomes of parents' interactions with digital media. We draw insights from a qualitative study involving 32 in-depth interviews. Our aim is to assist childcare and family support professionals in guiding parents to benefit from their digital experiences, thereby promoting digital inclusion among parents.

2. Theoretical Framework

2.1. Digital Inclusion

The internet and digital media facilitate the creation and maintenance of social connections, information research and education, entertainment, job research and work tasks, administrative tasks, and civic participation, among others (Boulianne, 2020; Jang, 2005; Kulviwat et al., 2004; Patriarche et al., 2017). Research has focused on the inequalities associated with the internet and digital media, shedding light on digital divides. Policies have been introduced to address these divides, as demonstrated by initiatives from the European Commission. The primary objective is to actively combat digital divides, based on the premise

that individuals need both access to and the ability to use digital media to fully engage with and benefit from contemporary society.

In this context, the first strand of studies on the digital divide and digital inclusion has primarily concentrated on issues of access to ICT, which "adopted a binary perspective in terms of those who have access ('haves') and those who have not ('have-nots')" (Ragnedda et al., 2022, p. 2). This includes both physical access to technologies and internet access. This literature demonstrates that digital exclusion has a significant impact on social exclusion, and vice versa: Socially marginalised groups are often vulnerable to digital exclusion (Helsper, 2012; Ragnedda et al., 2022; Reisdorf & Rhinesmith, 2020).

However, access does not guarantee an effective use of technologies. Consequently, attention has shifted to media and digital literacy skills (Hobbs, 2010; Potter, 2018). Researchers in this domain have focused on identifying such skills (Fastrez, 2010), documenting media literacy among specific groups (Alcalá, 2019; Tilleul, 2023), creating assessment tools (Chetty et al., 2018; Eristi & Erdem, 2017), developing pedagogical methods (Rogow, 2011; Talib, 2018), and analysing factors influencing media literacy (Bunnag, 2012; Martínez-Cantos, 2017). In this regard, findings consistently show that individuals' socioeconomic background tends to influence their digital practices and related media literacy (Hargittai, 2010; van Laar et al., 2020).

A third and often-overlooked aspect of the level of the digital divide is digital outcomes or benefits (Ragnedda et al., 2022; van Deursen et al., 2014), which refer to the ways individuals take advantage of their digital experiences. Among the limited research delving into this aspect, van Deursen et al. (2014) conducted a representative survey of the Dutch population to study who benefits from being online. The study charted benefits across five domains: economic, social, educational, political, and institutional. According to their findings, younger and more highly educated individuals not only possess the greatest access but also derive the most benefits from digital media. Ragnedda et al. (2022) further explored this topic and identified five areas of digital benefits: social, political, economic, cultural, and personal. The outcomes of digital media use were measured using a five-point Likert scale through a quantitative and deductive research approach. The findings indicate that socially disadvantaged individuals in the UK have lower levels of digital competencies and fewer benefits from using the internet. While these previous studies offer valuable insights into the broader impacts of the digital divide across various demographic segments, there remains a notable gap in understanding how these dynamics specifically affect parents and their capacity to benefit from digital media.

2.2. Parent's Digital Media Practices

Becoming and being a parent means dealing with many questions about raising children and caring for their health (Garbutt et al., 2012; Sorbring, 2014). This drives parents to actively seek information and construct knowledge on a variety of topics, such as nutrition, sleep, health, or education models. Numerous studies have examined the digital information practices of parents, particularly concerning children's health. Studies investigated parents' access to and use of digital media for information-seeking purposes (Greyson, 2017; Lupton et al., 2016) their underlying reasons or motivations (Yardi et al., 2018), the types of information they value (Lupton, 2016), and how digital media either aids or hinders their decision-making processes (Neill et al., 2015).

Alongside acquiring information, parenthood leads to additional needs that can be facilitated by a range of digital practices, such as the use of social media to access social support (Haslam et al., 2017). The motivations behind "sharenting" more specifically, which involves parents sharing information, photos, and details about their children on social media, extend beyond sharing experiences and advice (Verswijvel et al., 2019). Parents engage in sharenting to keep friends and family connected with their children, express pride in their children, collect memories, and portray themselves as good parents. Sharenting can also be a form of personal expression within a user's online self-representation (Blum-Ross & Livingstone, 2017). This phenomenon takes commercial aspects for parents who monetise their digital identity, such as influencers (Abidin, 2017). This practice demonstrates significant social motivations: to maintain, strengthen, and create social bonds while offering social support, peer interaction, and fostering a sense of community. Challenging situations, such as dealing with a child's disability (Ammari & Schoenebeck, 2015) or navigating single parenthood (Hartwig, 2016; Kotwal & Prabhakar, 2009), can intensify these needs. Similarly, isolation, fear, and stress can also influence parents' digital media practices and their effects, as observed during the Covid-19 pandemic (Drouin et al., 2020; Prikhidko et al., 2020).

A review of these studies highlights the same persistent gap regarding the third level of the digital divide. There is still limited knowledge about how parents experience and benefit from digital media. Although some studies have attempted to address such questions, these previous studies often focus on isolated aspects of the outcomes of digital media use. For instance, research indicates that using digital media to cope with childhood illness can either offer emotional support or exacerbate uncertainty and anxiety (Lupton, 2016; Neill et al., 2015). Similarly, social support frequently emerges as an outcome of digital media use, particularly on platforms such as forums and social media (Haslam et al., 2017). Conversely, several studies have identified potential risks of parents' technology use on parent–child interactions, including reduced parental attention and responsiveness (Kildare & Middlemiss, 2017; Knitter & Zemp, 2020; McDaniel, 2019). However, most of these studies focus on parents' use of digital media during times of detached parenthood. More knowledge is needed about their everyday digital practices with parental issues, questions, and practices.

These focused examinations provide only a partial view of the broader spectrum of parents' digital practices. This article aims to address the gap in the literature by examining the diverse digital experiences of parents and their outcomes. The intention is not to prescribe that parents must necessarily engage with digital media, as research shows that individuals can meet their needs and be included through alternative social participation methods (Smit et al., 2024). The focus is rather on investigating how parents can receive support in navigating digital media to maximise benefits. Although parents may seek guidance from relatives or friends, professionals, and traditional or digital media, these resources are generally considered more suitable for addressing non-digital issues (Livingstone et al., 2018). This is particularly true regarding grandparents, who are valuable sources for non-digital queries but are rarely consulted for digital concerns. This reveals a generational divide that leaves parents with limited support in addressing digital concerns. Yet, we argue that childcare, family support, and healthcare professionals can play a pivotal role in providing such support. Extensive research shows that many mothers consider these professionals to be valuable resources for seeking information, constructing their parenthood, and social support (Holappa et al., 2012; Rolfe & Armstrong, 2010). Consequently, this research aims to examine the roles of professionals in mitigating digital inequalities among parents, proposing strategies for them to actively enhance digital benefits for this group.

3. Research Questions and Method

Two research questions constitute the core of this article:

> RQ1: How does digital media use impact the parenting experience, and what are its specific positive and negative outcomes?
>
> RQ2: What hinders and, conversely, promotes positive or negative outcomes?

To address these research questions, this article draws on 32 qualitative interviews that were conducted between March and August 2022, as part of a project carried out within the framework of ONE Academy, an initiative that promotes scientific collaboration between the Office of Birth and Childhood, universities, and childhood fieldworkers (e.g., educators, caregivers, health professionals) in French-speaking Belgium. Interviewees comprised parents with at least one child aged 0–6. Parents came from 32 different households and were recruited through personal contacts, healthcare and parenting support practitioners, and snowball effect. Participants were recruited through theoretical sampling (Butler et al., 2018) to ensure a certain diversity among participants. The goal was to involve parents from diverse socio-economic backgrounds and family situations (Table 1) and with a broad spectrum of digital practices, ranging from limited to intensive use. However, it is imperative to acknowledge that this study was conducted within the Belgian context, which is characterised by a notably high level of digital access. This may influence the generalisability of our results, particularly in regions with varying levels of digital access. Furthermore, challenges in reaching certain demographic segments may imply that our results are not fully representative of the entire range of parenting experiences.

The interviews aimed to document how parents use digital media and whether the digital media each parent uses constitutes a resource or obstacle to their parenting journey. Firstly, the interview guide was inspired by the guided tour methodology (Jacques, 2016; Malone, 1983). Participants were asked to give a "guided tour" of their digital media environment related to their parenthood. This qualitative methodology encouraged respondents to produce a discourse rooted in the concrete reality of their practices. Secondly, the use of the explicitation interview method (Vermersch, 2012) enabled us to assist informants in articulating their actions, emphasising the "what" and "how" aspects rather than the "why." Thirdly, the interviews drew inspiration from the micro-moment timeline interview method (Dervin, 1992). This approach rooted in sense-making theory involves interviewees providing a detailed, step-by-step narration of events in specific situations. These combined methodologies allowed for the exploration of parents' concrete practices, uncovering their underlying motivations, documenting their media literacy competencies as defined by Fastrez (2010), and discerning the effects.

The interviews were conducted face-to-face, recorded, transcribed, anonymised, and analysed using thematic analysis (Miles & Huberman, 1994) on NVivo. The coding process started with a provisional coding grid based on initial questions and a literature review. The codes then evolved as the fieldwork progressed, using both inductive and deductive approaches to explore media practices and literacy in a more comprehensive and nuanced way (Ligurgo et al., 2018).

Table 1. Socio-demographic profile and family situation of the interviewees.

Socio-demographic characteristics	Frequency	Percentage	Family situation	Frequency	Percentage
Gender			**Number of children**		
Male	9	28.1%	1	21	65.6%
Female	22	71.9%	2	7	21.9%
			3	3	9.4%
Age			4	1	3.1%
20–24	4	12.5%			
25–29	4	12.5%	**Parental arrangement**		
30–34	18	56.3%	Coupled parent	21	65.6%
35–39	6	18.7%	Single parent	4	12.5%
			New partner	1	3.1%
Education			Co-parent	2	6.3%
None	1	3.1%	Co-parent/new partner	2	6.3%
Primary school	2	6.3%	Living apart together	2	6.3%
Lower secondary school	4	12.5%			
Upper secondary school	9	28.1%	**Age of youngest child***		
Bachelor	4	12.5%	Pregnancy	1	3.1%
Master's	11	34.4%	<6 months	8	25.0%
PhD	1	3.1%	<12 months	6	18.8%
			1 year old	6	18.8%
Housing status			2 years old	5	15.6%
Social care facilities	5	15.6%	3 years old	1	3.1%
Renting	12	37.5%	4 years old	4	12.5%
Owner	15	46.9%	6 years old	1	3.1%
Monthly income			**Age of other children****		
0€	4	12.5%	2 years old	1	3.1%
<1,000€	1	3.1%	3 years old	1	3.1%
1,000–1,500€	4	12.5%	4 years old	3	9.4%
1,500–2,000€	11	34.4%	5 years old	1	3.1%
2,000–2,500€	9	28.1%	6 years old	2	6.3%
>2,500€	2	6.3%	7–10 years old	2	6.3%
N/A	1	3.1%	11–14 years old	2	6.3%

Notes: * Two sets of twins (one to three months and four years old) were counted as one child each; ** two children (four and seven years old) are stepchildren.

4. Results

4.1. Outcomes of Parents' Digital Experiences (RQ1)

The interviews reveal that participants experience both positive and negative outcomes from their interaction with digital media. Digital media thereby emerge as both a support and a challenge to parenthood. This section outlines four types of outcomes (informational, emotional, social, and practical) of parents' digital engagement. Each type of outcome represents both favourable and adverse experiences.

4.1.1. Informational Outcomes

4.1.1.1. Information Resource

Digital media can provide valuable informational support for parenting as it offers easy and rapid access to a wide range of information: "It's above all practical….The information is available quickly" (Interview 1, father, 37, technician). According to parents, this stands in stark contrast to books, which require longer reading times. Digital media is often considered an easy-to-use solution, regardless of language or literacy barriers, unlike books or consultations with professionals. For instance, a mother reported making verbal inquiries on search engines due to her difficulty writing.

Digital media are also appreciated for their capacity to provide constant information from anywhere, eliminating the need for physical travel, contrary to consulting childcare, healthcare, and parenting support professionals. Another advantage for parents is that the available information is often free. The content covers a wide range of topics presented in different formats and enables parents to address specific questions and fill knowledge gaps. Digital media also provide opportunities to proactively seek information and gain comprehensive knowledge about parenting and education. Armed with this information, parents can develop their perceptions, attitudes, and behaviours: "At the beginning, regarding food diversification, they [online sources] advised to start with vegetables and then fruit. And that's what I did" (Interview 4, mother, 26, housekeeper).

4.1.1.2. Information Overload

Many parents stated that they sometimes feel lost or overwhelmed by the amount of information available. They may struggle to distinguish between relevant and reliable information, especially when confronted with an incessant stream of advice and recommendations of a contradictory nature. This can complicate decision-making in their parenting journey: "There are so many different opinions out there, for example, when it comes to food diversification….So when you have to start this food diversification, you're a bit confused" (Interview 22, father, 31, civil engineer).

Some parents have faced the issue of relying on inaccurate or ineffective information for forming their opinions or guiding their parenting practices: "I made him some chilli, because it was a recipe I'd seen on that blog, adapted without any spices or anything. It had red beans in it. Turns out…he got quite a lot of diarrhoea" (Interview 20, mother, 32, civil servant).

4.1.2. Emotional Outcomes

4.1.2.1. Emotional Comfort

Many informants reported positive emotional effects from the use of digital media as these resources provide information that can alleviate concerns. For example, a mother shared that she turned to the internet when concerned about her child's delayed ability to walk: "It reassured me to read that, to read that some children will walk earlier and others later" (Interview 17, mother, 34, auditor). Additionally, simply knowing they have easy access to information when needed gives some parents a sense of security: "And

I think the fact that I have easy access to it, even if I don't use it, is a bit reassuring, it's accessible" (Interview 16, father, 33, psychologist).

Likewise, the ability to communicate with others, to vent, or to realise that they are not alone in facing a particular or difficult issue provides comfort for many parents. Many participants fear feeling judged when seeking direct advice from acquaintances or health- and childcare professionals. In this context, they value certain digital media sources as safe spaces. The anonymity of some digital media platforms constitutes a valuable alternative. Lastly, digital communication with the caregivers of their child, whether acquaintances or professionals, enables parents to be informed of their child's wellbeing, which also alleviates their concerns.

4.1.2.2. Emotional Challenge

On the other hand, online readings can raise concerns or anxiety, particularly when researching medical information:

> I've got to stop! I've looked on the internet but…the big problem is that the symptoms we can see are symptoms that can be exaggerated, and that are very common….And so I have to stop looking at that because otherwise, I won't be able to sleep. (Interview 13, father, 31, educator)

Parents may experience stress when using digital media not only regarding their child's well-being but also due to feelings of incompetence and guilt. This often occurs when they encounter idealised models of parenting presented online through testimonials or images: "Today, parents are expected to be everything, to be super-parents…to be perfect. And I think multimedia really plays a major role in that…because everyone posts their perfect pictures" (Interview 27, mother, 34, social worker).

4.1.3. Social Outcomes

4.1.3.1. Social Support

Information retrieved from digital media is commonly exchanged and deliberated among partners, friends, and relatives, shaping their perspectives and choices in parenting. Moreover, these media platforms have an impact on the relationship between parents and health-, childcare and parenting support professionals, providing a foundation for discussions and initiating exchanges: "I'd base my questions [to the doctor] on what I read online. I'd made my little list and say: I've read lots of things in lots of different places. What do you think of it all?" (Interview 7, mother, 34, civil servant).

Online communication tools like Messenger and WhatsApp not only enable the exchange of information but also help maintain and strengthen social support networks, which many participants highly value. Social media platforms also provide parents with a venue to display their parenting abilities and their children and to engage socially by sharing experiences that might help others. In addition, digital media can provide an alternative source of social support for parents who are distant from family or have few parental acquaintances. This enables parents to access other parents' experiences, but also to share their own, creating a sense of community: "I think this forum is mainly about feeling less alone and telling yourself: 'Wow, I'm not the only one struggling.' That helps to feel better" (Interview 9, mother, 36, student).

4.1.3.2. Social Difficulties

Discussing digital media with child- and healthcare professionals can be difficult for some parents. The interviews revealed numerous instances in which parents hesitated to discuss their online research with professionals, sometimes because they were afraid that their digital practices might be viewed as inadequate: "No, I don't tell [the doctor about what I read on the internet], I do it for myself….If I tell the doctor, he'll say: 'You don't trust me'" (Interview 30, mother, 32, unemployed).

Navigating social dynamics on digital media can be challenging, particularly with contentious topics like breastfeeding, co-sleeping, or positive parenting, which often spark debates or disagreements. Furthermore, interactions on digital media platforms like social networks can contribute to feelings of guilt among parents. Different parents stated that they encounter messages they perceive as "judgmental" or "blaming": "Because that's the danger of social networks, you quickly come across women saying: 'Oh, you shouldn't do this, you shouldn't do that!'" (Interview 19, mother, 32, florist).

4.1.4. Practical Outcomes

4.1.4.1. Facilitated Daily Management

Firstly, messaging applications facilitate childcare coordination with (ex-)partners or relatives. Tools such as shared calendars and shopping lists also facilitate parents' collaboration in planning daily tasks, like medical appointments. Secondly, digital media are used for administrative tasks related to children, such as enrolling in daycare or acquiring health insurance. Thirdly, certain digital media offer features specifically designed to simplify parents' daily lives (e.g., finding a babysitter or locating a nearby playground). They also provide convenient and accessible entertainment options for families and means to occupy, distract, or soothe children: "Oh yeah, when she has trouble falling asleep, I put on a little music from YouTube and off she goes to sleep" (Interview 25, mother, 22, unemployed).

Digital media can facilitate the preservation of sentimental moments, for example, by posting pictures on social media. Some media are specifically designed for collecting memories, such as apps to record children's first words. Digital media can also serve as a daily memory support:

> We use this app which allows us to record every time we change him, whether he's had a wee, whether he's had a poo, when he feeds at the breast, for how long and on which breast. It's very useful….He's supposed to alternate breasts, so when there are three/four hours between two feeds, it helps to keep track. And the paediatrician also asks questions like "how many times a day does he eat," "how many times does he poo," and if you don't write it down, it's impossible to remember. (Interview 14, father, 27, cycling instructor)

Finally, participants identified the economic benefits of digital media, which enable product comparisons, price checks, and the identification of discounts, leading to efficient budget management.

4.1.4.2. Daily Life Risks

Digital media can harm the daily lives of parents and pose potential risks. One of the main risks brought up by participants is associated with posting photos on social media:

> My Facebook account is not completely made public. Only my friends can see a lot, I'm careful about that….Well, so that not everyone can see what I publish, the photos of my kid, and maybe use them without my consent. (Interview 3, mother, 31, childcare worker)

Participants also highlighted the risk of a potential loss of time due to the use of digital media, which can affect the time available for other activities:

> With these Facebook pages, I come across small articles…."Your child doesn't like solid food?" with a couple of little tips on how to get them to eat solids. I'm making this up…but it ranges from practical stuff like this to…sometimes it's just a battle over first names: "What do you prefer between Julie and Ophélie?"….It's completely stupid. And I feel like I'm really wasting my time on it. (Interview 16, father, 33, psychologist)

4.2. Factors influencing Outcomes (RQ2)

The frequency of digital media use varies widely among parents, with some using it sporadically and others using it daily. The upcoming analysis does not imply that scarce or extensive use of digital media is inherently good or bad unless experienced that way by the parent. Instead, our analysis outlines factors that, whether linked to a limited or frequent use of digital media, are associated with positive or negative outcomes for the parent. Our study found that personal, situational, social, and normative factors can influence parents' ability to derive benefits from their digital media practices.

4.2.1. Personal Factors

Parent-specific characteristics that shape their confidence in their parenting abilities play an important role in their ability to achieve positive outcomes from digital media. These include anxiety levels which seem to influence parents' emotional outcomes from online information, especially when related to health. It also includes prior childcare experience (e.g., caring for younger siblings, having had other children) and the age of their current child. As parents gain experience in childcare, they tend to develop increased confidence in themselves and their parenting skills, coupled with a better understanding of their children. These factors influence their capacity to contextualise and make sense of the encountered information.

According to the matrix approach to media literacy (Fastrez, 2010), interviewed parents demonstrated sufficient technical competence in terms of their reading and navigation skills. They were most of the time able to access and use digital tools and find information when needed. Conversely, disparities emerged in terms of informational competencies, which refer to the reader's ability to make sense of content and use media and information based on their intellectual and cultural resources. Differences were also noted in the social competencies necessary for understanding and navigating digital media. These competencies include the ability to identify and evaluate the institutional context of media productions, the intentions of content

creators, and the cultural stereotypes perpetuated by the media. Among those, we observe varying degrees of content evaluation skills. The strategies implemented by participants varied among relying on search engine rankings, checking the website's name, checking for spelling errors, identifying scientific terminology, verifying the authors' identity, assessing the presence of references, and cross-referencing multiple sources. Mastering higher levels of informational competencies is important as it enables parents to effectively interpret information, discern reliable sources, make informed comparisons, and avoid feelings of confusion or being overwhelmed. An example is a mother whose capacity to contextualise information found on Instagram prevents her from feeling incompetent: "When you come across those Instagram pages where folks only share their good side, you might start thinking, 'Oh, I suck.' But once you realise they're only posting what they choose to, it's cool" (Interview 21, mother, 31, NGO project assistant).

4.2.2. Situational Factors

Media literacy not only varies among individual parents but also from one situation to another. Some parents may exhibit strong media literacy skills in specific situations, especially in evaluating sources, but show less proficiency in other contexts. Online readings driven by anticipation or curiosity, rather than in response to immediate questions, appear to result in fewer negative emotional outcomes. Factors such as fatigue, stress, and time constraints can hinder the effective application of media literacy skills. Paradoxically, the same factors are cited by parents as reasons for resorting to digital media: "Because when you're exhausted, and your baby won't stop crying, in the beginning, it's something I could type in easily on the internet, on Google" (Interview 2, mother, 32, special needs teacher). However, a sense of urgency can also prompt parents to bypass digital media in favour of other sources such as healthcare professionals.

4.2.3. Social Factors

Positive experiences are often reported by parents who have a supportive social network available to discuss and reflect upon their digital findings. This network enables parents to interpret encountered information, evaluate it, and make collective decisions. While partners play a primary role, discussions about online content also extend to other close individuals, particularly those who are fellow parents: "I didn't discuss my readings about food diversification with doctors, but I did discuss it with people close to me, and of course with my partner, the baby's dad, to figure out what we were going to do" (Interview 8, mother, 39, media animator).

Simultaneously, having significant social support can reduce digital media use without necessarily increasing negative outcomes. This support serves as an alternative avenue to address parents' informational, emotional, material, and social needs. Digital media thus yields positive outcomes for parents with lower social support (e.g., being distant from family or having few friends who are also parents), bridging social and informational gaps and addressing feelings of isolation: "So, between friends and family, I've basically got my answers and I've got my parental support for pretty much everything" (Interview 15, mother, 33, administrative manager).

4.2.4. Normative Factors

The interviews reveal that many parents seem to perceive expectations regarding their media practices. Parents shared instances where they felt judged by healthcare professionals regarding their use of digital media:

> I've kinda of brought it up a little before, but they quickly get all defensive when you mention the internet. I get it because there are a lot of people who fancy themselves a doctor because of the internet now. So yeah, I don't really go into it with them. (Interview 19, mother, 32, florist)

The apprehension of judgment, or the experience of feeling judged, diminishes parents' willingness to share their digital experiences with professionals, consequently limiting their ability to fully benefit from these resources. In contrast, parents who are at ease discussing their media consumption with professionals can validate or converse about their online findings. Such interactions facilitate their understanding and decision-making processes regarding the information gathered from digital media.

5. Discussion and Conclusion

This study contributes to the literature on digital inclusion by focusing on how parents use and experience digital media. The main objective was to gain a nuanced and contextualised understanding of the way parents benefit from digital media and to provide insights into the digital divide among this group, beyond questions of access and skills. The findings align with past research, which indicates that digital media can have both positive and negative effects on parenthood (Lupton, 2016; Neill et al., 2015). However, this study is the first attempt to examine the full scope of parents' digital practices and their outcomes via a qualitative methodology that combines inductive and deductive approaches.

Previous studies have suggested how digital media can lead to social, political, economic, cultural, and personal outcomes (Ragnedda et al., 2022; van Deursen et al., 2014). This study, for its part, highlighted informational, emotional, social, and practical outcomes of digital media use in the context of parenthood. The interviews revealed that digital media can provide parents with valuable opportunities, such as convenient childcare purchases, efficient daily organisation, and access to informational resources, social connections, and emotional support. These findings support prior studies that indicate that failing to derive benefits from digital media can be viewed as a form of digital exclusion that can reinforce social exclusion (Helsper, 2012; Ragnedda et al., 2022). The results also confirm previous findings that digital media may lead to certain negative outcomes, such as the well-documented effects of information overload or anxiety related to health information (Gage & Panagakis, 2012). This study adds that parents may also experience feelings of incompetence or guilt when using digital media. These negative outcomes frame digital media as a potential challenge in the context of parenting.

Secondly, this study sought to document the factors that may contribute to positive or negative outcomes. The literature on digital inclusion has shown that individuals, including parents, possess varying levels of media access and skills (Hargittai, 2010; van Laar et al., 2020). This study did not address access from a statistical point of view given its qualitative nature. However, it is worth noting that all interviewees had access to a smartphone and the internet, even those with comparatively more limited socio-economic conditions. Differences in levels of access (e.g., number of technological devices) were nonetheless observed. Our findings on media literacy are consistent with existing literature, indicating varying levels among parents. One key contribution of this study is its demonstration that media literacy and digital outcomes are influenced not only by socio-economic factors, but also vary for the same parent depending on personal, situational, and normative factors, which have received limited attention in the literature.

The theoretical framework underscored two other key points: the lack of support for parents regarding digital matters (Livingstone et al., 2018) and the pivotal role of healthcare, childcare, and family support professionals as resources for parents seeking information, constructing their parenthood, and obtaining social support (Holappa et al., 2012; Rolfe & Armstrong, 2010). This potential role is further reinforced in the Belgian context, where parents can easily access these professionals. For instance, prenatal consultations and consultations for children under the age of seven are provided free of charge. This article therefore suggests ways professionals can support parents in avoiding negative outcomes while deriving benefits from their digital media practices. Two factors emerge as particularly pertinent and actionable: parents' media literacy and normative issues. Addressing these elements can positively influence parents' self-confidence and emotional well-being, which in turn could contribute to a positive digital media experience. Two lines of action can address these factors: adopting a comprehensive approach to digital media and promoting media literacy.

The societal norms surrounding digital media use, as perceived by our participants, and the pressure to adhere to these norms can lead parents to conceal information or misrepresent their practices due to fear of judgment or seeming incompetent. The interviews align with prior research, unveiling that parents' information-seeking behaviours go beyond factual needs to include a fundamental need for reassurance. Findings also highlight a double bind that parents face. While many childcare and parenting support professionals commonly encourage parents to trust their instincts, parents simultaneously perceive the need or the importance of seeking information. In today's digital age, many parents resort to online resources. Society, including professionals, may criticise these resources and their use. This can destabilise parents and undermine their self-confidence and their willingness to discuss their digital practices. This situation presents a challenge for professionals in effectively assisting parents with their digital experiences and in mitigating negative outcomes. By embracing a positive, holistic, and proactive stance towards digital media, professionals can establish themselves as accessible and open-minded conversational partners in discussions about digital media usage. This requires challenging and deconstructing the prevailing belief that media primarily exert negative and immediate effects. Rather, digital media should be recognised as a societal phenomenon, one that brings both challenges and opportunities. Overcoming biases, avoiding judgments, actively listening to parents' needs and experiences, and dedicating specific time during consultations on digital matters represent valuable avenues to address the complexities of digital media. This includes addressing online medical information by acknowledging that parents' information practices extend beyond mere factual needs to encompass emotional and social needs. We also suggest that organising meetings for parents to specifically discuss their digital practices could help break the taboo surrounding digital media in a supportive environment. By facilitating exchanges on digital tools and resources, these meetings could encourage parents to explore alternative practices and reconsider their approach to digital media, while aligning with their consistent need to connect with others, share insights, seek support, and find reassurance.

However, formally addressing parents' media literacy skills may also prove beneficial. This study highlights significant variations in digital media skills among individuals and across different situations. It underscores the need to enhance parents' information and social literacy skills (Fastrez, 2010), which are crucial in overcoming challenges that diminish the positive outcomes of digital media practices. Improvement in these areas should focus on developing parents' abilities to understand media messages, evaluate sources, and interpret encountered information. This objective could be addressed through the development of tools aiming to help parents autonomously engage with and evaluate digital media. For example, a comprehensive

step-by-step guide could be created, offering essential insights and practical tips for navigating digital platforms and promoting critical attitudes and behaviours when interacting with diverse content.

Moreover, childhood and parenting support professionals can play a crucial role in enhancing parents' media literacy through educational initiatives. Professionals would benefit from essential knowledge, tools, and expertise in adult media education. Consequently, addressing the media literacy needs of these professionals becomes just as important, and effective solutions could involve the implementation of training programmes, media literacy workshops, and the creation of digital media-centric support groups involving both parents and professionals. Media education initiatives could be organised in partnership with specialised organisations. These initiatives can include separate programmes tailored for professionals to feel equipped to support and engage with parents, as well as joint initiatives targeting both parents and professionals. Professionals could not only gain insights into unfamiliar media but also find reassurance in observing firsthand the digital practices of parents. In this context, enhancing the media literacy of both professionals and parents can facilitate productive dialogues between them, thereby enhancing support within the community. This could help foster digital inclusion by empowering parents to maximise the benefits of digital engagement.

In conclusion, this study has shed light on the multifaceted dimensions of parents' experiences with digital media, providing valuable insights regarding their digital inclusion beyond access and usage. It contributes to an under-researched branch of digital inclusion literature by focusing on the tangible outcomes of digital media use, here in the context of parenthood. Moreover, going beyond documentation and conceptualisation, this study proposes actionable plans to address digital inclusion in practical settings. Despite the qualitative and contextualised nature of this research, it offers an opportunity to comprehend the intricacies of parenting in the digital age and paves the way for targeted interventions that can improve the digital and social inclusion of parents.

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Conflict of Interests

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ARTICLE

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Examining the Interplay of Sociodemographic and Sociotechnical Factors on Users' Perceived Digital Skills

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Abstract

The rapid pace of technological advancements of the last decades, accelerated during the Covid-19 pandemic, has increased the importance of digital skills for individuals, businesses, and society. However, despite efforts to increase digital ownership and educational initiatives, the digital divide remains a persistent issue and a barrier to social inclusion. Digital exclusion is not limited to access vs. no access but encompasses a spectrum of participation influenced by factors such as geographical location, skills, motivation, and identity. The study explores what sociodemographic and sociotechnical aspects shape users' digital skills. It is based on an online survey of English internet users aged between 20–55 with school-aged children (N = 2,004), to measure their digital skills across six dimensions and analyzes the relationship between these skills and sociodemographic and sociotechnical variables. Results show that among the sociodemographic aspects, including gender, age, education level, employment status, income, and residential area, only income significantly contributes to distinguishing groups per level of digital skills. The study also shows that motivation gap, access gap, usage gap, and social support, are all associated with individuals' digital skills.

Keywords

digital divide; digital inequalities; digital poverty; digital skills; internet users

1. Introduction

This article explores the relationship between sociodemographic and sociotechnical aspects and people's digital skills, considering the inseparability of social structural factors (imposed by the configuration of

society) of the digital experience and individual agency (individual transformative power) in defining patterns of internet usage. Despite van Dijk's (2005) theorization of motivation as a key determinant of physical access, skills acquisition, and use of technology, how and why users choose the internet, beyond structural conditioning, has been understudied. Studying the "non-users," Reisdorf et al. (2012) and Reisdorf and Groselj (2017) found that attitudes, defined as the trigger for motivating the use or non-use of the internet, have the same weight as socioeconomic factors in defining (non)-user categories. Further developing this line of studies, the originality of this article relies on investigating how the possession of digital skills is affected by various sociotechnical mediators (motivation gap, access gap, usage gap, and social support) that result from the combination of both individual properties and structural constraints. Therefore, in addition to the determinants examined in the existing literature, such as those influenced by established policies and users' social positions within the social structure, this study also investigates factors related to motivation, confidence, and various types of activities. These elements are closely linked to individuals' choices regarding their access to and use of digital technologies. We regarded these factors as indicators of users' agency when navigating the digital sphere, as previous research has shown they impact digital access, skill acquisition, and engagement in digital activities (Calderón-Gómez & Kuric, 2022; Reisdorf et al., 2012; Reisdorf & Groselj, 2017; van Dijk, 2005).

By contrast, the literature mainly focuses on structural determinants that affect digital experiences, emphasizing the role played by existing inequalities in shaping the digital stratification of uses and benefits deriving from the internet. The interconnections between digital capitalism (Fuchs, 2019; Fuchs & Mosco, 2015) and socioeconomic, educational, racial, linguistic, gender, and health inequalities have been largely recognized both theoretically and empirically (Allman, 2021; DiMaggio et al., 2004; Robinson, Ragnedda, & Schulz, 2020; Witte & Mannon, 2010). Besides, the Covid-19 pandemic and the subsequent digital acceleration significantly impacted the way individuals work (Bonacini et al., 2020), socialize, access health care, learn, and communicate (van Deursen, 2020). Access to essential services, such as healthcare, education, government services, and financial resources, has increasingly shifted towards digital platforms, making individuals with limited access to digital resources face obstacles in developing digital skills. As a result, individuals lacking digital skills struggle to adapt to evolving job requirements, impeding their employability and career advancement prospects.

In 2021, as pointed out by Caroline Dinenage (minister for digital and culture in the UK), there is still "lots to do, with over 9 million people lacking foundation level digital skills, while vulnerable people are more likely to be digitally excluded" (Lloyds Bank, 2021, p. 6). The British context is relevant given the high number of internet users who already have basic skills and connectivity (Hutton, 2021), which does not necessarily mean that all internet users have the same competencies (National Institute of Economic and Social Research, 2019). Ofcom (2021) suggested that even though the proportion of UK households with internet access increased in the first year of the pandemic, older and financially vulnerable individuals remained more likely to be digitally excluded, and vulnerable children struggled for remote learning. Although the UK government (Foreign, Commonwealth, & Development Office, 2024) recognizes the importance of digital technologies to compete globally, in 2022 the UK has dropped two places (from 13th in 2020 to 16th in 2022) in the World Digital Competitiveness Ranking developed by the Institute for Management Development (Institute for Management Development, n.d.), an assessment of 63 economies' "capacity and readiness to adopt and explore digital technologies as a key driver for economic transformation in business, government and wider society."

Therefore, digital inequalities persist as a societal issue and a barrier to any agenda for social inclusion, notwithstanding an increase in digital ownership and educational initiatives (Robinson, Schulz, et al., 2020). The digital divide should be interpreted as a spectrum of participation that varies depending on a variety of different aspects related to both structural context and individual transformative agency. The literature on the digital divide has gone beyond the dichotomic division between those who have vs. those who have not access to ICTs (Ragnedda, 2017; Scheerder et al., 2017) by highlighting: (a) inequalities in accessing the internet (the first level of the digital divide), (b) inequalities in internet usages and skills (the second level of the digital divide), and (c) inequalities in concrete benefits deriving from using the internet (third level of the digital divide). Specifically, the second level of the digital divide (Attewell, 2001) captures the "usage gap" (van Dijk, 2004) and inequalities in those digital skills necessary to support a proficient internet experience (Hargittai & Walejko, 2008; van Dijk, 2006). Some studies have shown how digital expertise intersects with the frequency of certain types of online activities, reinforcing the second level of the digital divide (Ruiu & Ragnedda, 2020). This article pays particular attention to this second level of the digital divide by investigating the influence of sociodemographic (gender, age, educational level, employment situation, economic situation, income, and residential habitat) and sociotechnical mediators (motivation gap, access gap, usage gap, and social support) on the digital skills of English parents. It is organized as follows. First, it provides the theoretical foundations, combining social structuration, appropriation, and resources theory to interpret the second level of the digital divide and formulate some hypotheses (Section 2). Secondly, it describes the methods used (Section 3). Next, we present the results of the analysis (Section 4). Finally, we discuss the results considering the English policy context and provide some conclusions (Section 5).

2. Theoretical Framework and Hypothesis

The theoretical foundation of this article relies on the second level of the digital divide (Attewell, 2001), which interprets the possession of up-to-date digital skills as essential to a proficient experience of the internet and its benefits. We interpret the second level of the digital divide as a result of the duality of structure, at the core of the structuration theory (Giddens, 1984), which relies on the mutual dependency of rules and practices. This can influence the appropriation and acceptance of technologies (van Dijk, 2005). The volatile nature of digital experiences requires constant monitoring of sociodemographic traits and structural conditions, which are at the core of digital technologies' appropriation, but they simultaneously depend on and trigger digital agency and behavior. Giddens' theory helps conceptualize structure and agency as "a mutually dependent duality" (Rose & Scheepers, 2001, p. 8). Van Dijk (2017) emphasizes that network approaches (Kadushin, 2012; Wellman & Berkowitz, 1988) to the appropriation of technologies consider the positions of individuals and their social networks, rather than individual attributes. These groups appropriate technologies in certain ways that reinforce their position concerning other groups. However, such approaches shift the focus from individual to group demographics and are still characterized by certain degrees of determinism in defining how users will access or use the internet in relation to their social position. Van Dijk (2005) suggests adopting a combined approach that is summarized in the resources (expression of the structuration theory) and appropriation theory (acceptance theory). Following this model motivation is at the basis of access (together with the characteristics and properties of ICTs) and subsequently the acquisition of skills, which generate certain usages and domestication of the technologies (Haddon, 2007). However, such motivation is embedded in a specific context which is affected by personal attributes (such as age/generation, sex/gender, race/ethnicity, intelligence, personality, and health/ability), and positional categories (such as labor, education, household, and nation), which influence the distribution

of resources (temporal, material, mental, social, and cultural) and in turn the access to technologies. This process influences participation in society, reinforcing social stratification and the unequal distribution of resources. We add to this conceptualization the need for considering the rules that define the field of digital action, which is conditioned by the policy context in which the appropriation of resources happens.

The scientific debate has increasingly recognized that the use of digital technologies tends to remain stratified despite increasing internet penetration (Büchi et al., 2016; Ragnedda, 2020; Ragnedda & Ruiu, 2020; Willis & Tranter, 2006). This suggests that digital skills may be both an outcome of pre-existing socioeconomic structures and the individual interest in acquiring them. Changing capacities, attitudes, motivations, dispositions, and resources can contribute to shaping the digital identity of users and their "transformative capacity" (Giddens, 1984). Therefore, the acquisition of digital skills needs to be contextualized in a social context characterized by rules and certain opportunities/resources for action and constraints, which "bound" agency (Shanahan & Hood, 1998). However, it also needs to consider how digital "bounded agencies" are intentionally motivated to respond to such opportunities and obstacles dictated by the social setting. Using the strong structuration theory, Ruiu et al. (2023) argue that using a deterministic approach to technology might not entirely capture the intertwined relationship between societal dynamics and technologies. By contrast, they conceptualize social-digital structure and human-digital agency in the form of an inextricable relationship. Digital users behave online according to how they digest external structures (Greenhalgh & Stones, 2010; Ruiu & Ragnedda, 2020; Stones, 2005) and this, in turn, contributes to reshaping social patterns through certain digital practices.

The idea that digital skills influence digital inclusion is not new. Van Dijk (2005, p. 88) at the beginning of the millennium, stated that "goal-oriented behavior and strategic skills for using computers and networks are vital in the information and network society," reinforcing the idea of interdependence between structural bounding and individual motivations to become digitally literate. Nevertheless, digital skills have become integral to daily life activities, with a strong acceleration during the Covid-19 pandemic that has continued afterward. From a sociological perspective, while technology has enabled numerous activities, it has not produced the same benefits for those who experience economic and social disadvantages (Castaño, 2008). Digital disparities are inextricably linked to social inequalities in the political, social, and cultural contexts in which they originate and contribute to social stratification (Helsper, 2012). Consequently, the digital divide contributes to inequality and impedes social mobility for marginalized communities, exacerbating existing societal disparities (van Dijk, 2013). However, Ruiu et al. (2023) emphasize that the individual component of the digital experience, especially in terms of attitudes and perceived relevance toward technologies (Horrigan, 2010), might have been obfuscated by the digital acceleration imposed by the Covid-19 pandemic. By contrast, while digital policies and infrastructures together with existing social inequalities have been shown to impact the ability of individuals to access and experience the internet, it might be reductive to explain both access and the acquisition of digital skills solely recurring to structural determinants.

Digital inclusion is no longer only seen as "access" vs. "no access" but rather is interpreted as enhancing the well-being of individuals, communities, and society (Ragnedda, Ruiu, & Addeo, 2022). The capacities of technological tools, length and intensity of internet use, resources sent via the networks, digital skills, and online activities all play a role in being included or excluded from the digital society. For full involvement in the digital society, especially in education, public safety, public health, and access to local services, mastering digital skills is crucial. The UK government's digital strategy highlights how "for the UK to be a world-leading

digital economy that works for everyone, everyone must have the digital skills they need to fully participate in society" (Department for Science, Innovation, and Technology & Department for Digital, Culture, Media, & Sport, 2018). Several studies have shown the influence of sociodemographic traits on shaping both the uses and benefits of the internet in relation to age (Asrani, 2020; Büchi et al., 2016; van Deursen & van Dijk, 2014), education (Asrani, 2020; Helsper & Galacz, 2009; Scheerder et al., 2019), socioeconomic status indicators (DiMaggio et al., 2004; Ragnedda, Addeo, & Ruiu, 2022; van Deursen & van Dijk, 2014), residency area (Asrani, 2020; Song et al., 2020), and gender (Asrani, 2020; Castaño, 2008; Elena-Bucea et al., 2021; Scheerder et al., 2017).

Against this background, to explore the stratification of digital skills, we assume that the level of digital skills is interrelated with sociodemographic and sociotechnical variables. This general assumption is split into three main hypotheses. First, we hypothesize that considering sociodemographic variables:

> H1: Men who are young, highly educated, employed, and living in urban areas with good economic conditions and higher incomes tend to possess higher levels of digital skills.

While sociodemographic variables can influence the type of skills and activities users do online, both digital skills (Correa, 2016; Shaw & Hargittai, 2018; Tirado-Morueta et al., 2018) and technological characteristics of digital access (Correa et al., 2020; Pearce & Rice, 2013; Wang & Liu, 2018) can impact the internet experience. However, the type of access and tools used to navigate the internet (e.g., mobile phones vs. computers) are connected to certain skills. For example, some studies (Correa et al., 2020; Pearce & Rice, 2013) found that, while smartphones allow access to the internet for those who traditionally have not this opportunity, mobile-only use is related to lower levels of skills and limited types of uses of the internet compared to users who also access via the computer.

The literature has started to consider factors that, while can be still connected to the structural configuration of inequalities, are also connected to the agentic power of users, such as motivation to use, intentions, attitudes, and dispositions towards technology (Calderón-Gómez & Kuric, 2022; Ragnedda et al., 2019; Reisdorf & Groselj, 2017; van Deursen & Helsper, 2018; van Deursen & van Dijk, 2014; Wang & Liu, 2022). Van Dijk (2005) refers to motivational access, arguing that digital access is preceded by motivation, attitude, and expectations. Moreover, the appropriation of technologies also passes through the intentional acquisition of skills and competencies to ensure appropriate access and usage (van Dijk, 2017).

Considering this, we hypothesize that sociotechnical aspects influence the level of digital skills. More specifically, we formulate three sub-hypotheses:

> H2a: Users who are more interested and confident with digital technologies (motivation gap) possess higher levels of digital skills.

> H2b: Users with better accessibility (access gap) possess higher levels of digital skills.

> H2c: Users who deploy a wider diversity of digital activities (usage gap) possess higher levels of digital skills).

The scientific debate expanded the investigation of the determinants of digital skills by also including social support as a contributing factor (Jung et al., 2005; Ruiu et al., 2023). Harper et al. (2022) found that digital skills may mobilize social support networks in times of crisis such as the Covid-19 pandemic (for example, by using digital skills to substitute for in-person contact) and technical support. During the pandemic, the technical support received by social networks encouraged the acquisition of new skills (especially for older adults) to communicate and engage in social relationships. At the same time, the lack of digital skills represented a barrier for older adults, making them more reluctant to learn new skills compared to younger users. In terms of social support for the use of digital technologies, we expect that:

> H3: Users who provide social support possess higher levels of digital skills, whereas those receiving social support have lower levels of digital skills.

3. Methods

We conducted an online survey of English internet users aged between 20–55 with school-aged children. The focus on parents is relevant because they have been identified as particularly vulnerable to digital inequalities related to lack of skills amid the Covid-19 pandemic (Ruiu et al., 2023). It used an online survey of citizens who already use the internet. This is related to the study's aim, which is exploring the second level of the digital divide, namely determining the different levels of digital skills. A stratified sample was used according to the age, education, gender, income, and family status of the respondents. The final sample size (2,004 respondents) was calculated with a 2.15% margin of error at a 95% confidence level. We used Lucid to recruit respondents and collect data in March and April 2022. We pilot-tested the survey with 25 internet users and some changes were made in response to the feedback. The survey took an average of 25 minutes to complete.

3.1. Measures

All the scale variables have been normalized in Z scales, while qualitative variables have been recoded as dummy variables to be used in the following multivariate analysis. The complete array of tables and statistical models are provided in the Supplementary File.

Regarding digital skills, we based on the Essential Digital Skills Framework (Department of Education, 2018), developed by the British government, in which six dimensions of digital skills needed to participate in digital society are proposed, from a list of 34 digital skills (quantitative range from 0–10): foundation skills (seven variables), communication skills (six variables), transacting skills (five variables), problem-solving skills (two variables), handling information and content skills (six variables), and safety skills (eight variables). These six indexes of digital skills have been built by weighting the punctuations of the variables associated with each dimension and have been normalized in Z units. This framework is similar to the *European Digital Competence Framework for Citizens* (known as DigComp; Vuorikari et al., 2022), but in the case of the UK, a distinctive dimension of foundation skills is proposed, regarding basic competencies needed to operate digital devices.

Concerning the sociodemographic profile, we included the following variables: gender (dummy: man/woman), age (scale), educational level (dummy: high school or less/some college/superior studies),

employment situation (dummy: working/not working), perception of the economic situation (dummy: bad/neither bad nor good/good), annual income (dummy: under £26k/between £26k and £50k/over £50k), and residential habitat (dummy: urban areas/suburbs/small towns/rural areas).

The motivation gap was incorporated into two measures. Firstly, we include a scale (normalized in Z units) about the level of confidence using digital technologies (Confi1). Secondly, we performed a principal components analysis (Fmotiv1) from a list of four variables related to motivations and interests to use digital technologies and forced a 1-factor solution (variance = 71.5%; KMO = 0.817; Bartlett significative at 95%). We asked about the levels of agreement on a scale from 1 (*strongly disagree*) to 7 (*strongly agree*) about four statements: (a) I don't enjoy trying out new and innovative technologies, (b) I prefer not to use technology unless I have to, (c) technologies make my work harder, and (d) my digital skills don't fit my everyday needs.

Regarding the access gap, three different measures were included. Firstly, a dummy variable measuring the accessibility of broadband connection at home. Secondly, a variable measuring monthly expenses on digital technologies. Thirdly, a principal component analysis based on six variables of frequency of use of digital devices, grouped in a 3-factor solution (variance = 70.8%; KMO = 0.724; Bartlett significative at 95%): Factor 1 (Fdev1)—other devices (tablet, smartwatch, and smart TV); Factor 2 (Fdev2)—personal computer (laptop and desktop); and Factor 3 (Fdev3)—smartphone.

As to the usage gap, we performed a principal component analysis based on a list of 11 variables of uses and activities of the internet, which were grouped in a 5-factor solution (variance = 66.6%; KMO = 0.748; Bartlett significative at 95%): Factor 1 (Fuse1)—administrative and institutional uses; Factor 2 (Fuse2)—gaming and gambling; Factor 3 (Fuse3)—consume, payments, and shopping; Factor 4 (Fuse4)—professional use; and Factor 5 (Fuse5)—social and leisure activities.

Finally, social support was incorporated in three different measures (scales from 0–10, normalized in Z units): (a) Need for support to carry out digital tasks, (b) asking for support to use digital devices during the pandemic, and (c) giving support to family to use digital devices during the pandemic.

3.2. Analysis

Statistical analysis has been developed in three sequential phases. In the first phase, a typology of people's digital skills was built using a *K*-means cluster analysis based on the six indexes of digital skills, establishing a solution of three-clusters (low, average, and high level of digital skills). In the second phase, we performed a descriptive bivariate analysis of the cluster, comparing it with sociodemographic and sociotechnical variables. For qualitative variables, we used percentages, chi-square, and Cramer's *V* tests, whilst, for quantitative variables, we used means and two-side tests of means for comparing significative differences. Finally, in the third phase, we performed a multinomial logistic regression to measure the specific significance of each independent variable (odds ratios) in the conformation of each cluster.

K-means cluster analysis is an interdependent multivariate technique that forms groups of cases (clusters) from a set of quantitative variables (Jin & Han, 2011). It is useful to build typologies from a sample of cases, once the analyst decides the number of clusters formed.

In our model, we employed standardized indexes of digital skills, which had a strong correlation between them (see Skills2 in the Supplementary File). This choice was based on the compatibility of *K*-means with quantitative variables based on the same scale, such as standardized indexes. After experimenting with models involving four and five clusters, we opted for the three-cluster solution because it better aligned with the distribution of cases, and the interpretation of the clusters was clearer (Table 1). The model is significant considering the ANOVA test (see Cluster in the Supplementary File).

Multinominal logistic regression is a multivariate dependence technique in which the dependent variable must be categorical (three or more attributes) and the independent variables may be quantitative (covariables) or categorical (independent factors; McNulty, 2022). We introduced the cluster of digital skills as a dependent variable to estimate two distinctive models: In the first model (M1), we estimate the probability of having low digital skills (Q1), whilst in the second model (M2) we estimate the probability of having average digital skills (Q2). In both models, having high digital skills (Q3) acts as the reference category for the interpretation of the results. We introduced the independent variables in two steps. Step 1 included the sociodemographic variables, achieving a low level of determination of digital skills (Cox and Snell $R^2 = 0.031$; Nagelkerke $R^2 = 0.035$) although model fitting was significant at 95% (Chi-Square contrast). This model is described in the Supplementary File (Logit_step1). In Step 2, the independent variables were the predictors described in Table 2: motivation gap, access gap, usage gap, social support, and sociodemographic variables. This analysis achieved a high level of determination of the dependent variable (Cox and Snell $R^2 = 0.605$; Nagelkerke $R^2 = 0.690$) and model fitting was significant at 95% (Chi-Square contrast). The prediction capacity of the model is high in the case of Q3 (89.2% of success) and Q1 (78.7% of success), but lower in the case of Q2 (43.4% of success). To control the biases associated with logit regression models, we have also included a discriminant analysis between the digital skills cluster (dependent variable) and sociodemographic and sociotechnical variables (independent predictors). The results of this analysis closely align with those of the logit models (see Discriminant in the Supplementary File).

4. Results

The results section is divided into two parts: Firstly, we include a descriptive analysis of the typology of digital skills to present a general overview of the three types of users and their characteristics; secondly, we present the main results of the multinomial regression model to study the significance of the determinants of digital skills.

Table 1. Cluster analysis.

Variables	Q1 Low digital skills	Q2 Average digital skills	Q3 High digital skills
Dimension: Foundation skills	−1.299	−0.176	0.730
Dimension: Communication skills	−1.452	0.020	0.694
Dimension: Transacting skills	−1.495	0.077	0.683
Dimension: Problem-solving skills	−0.998	−0.163	0.577
Dimension: Handing information and content skills	−1.388	−0.146	0.756
Dimension: Safety skills	−1.266	−0.236	0.748
Total cases (*N*)	477 (23.8%)	547 (27.3%)	980 (48.9%)

4.1. Descriptive Analysis

We focus on the sociodemographic and sociotechnical profiles of the three groups of digital skills by using bivariate comparisons. Qualitative variables are presented in column percentages, whilst quantitative factors are measured in standardized Z units (see Tables 1 and 2 in the Supplementary File, for more information).

The Q1 low digital skills cluster represents 23.8% of the cases and shows punctuations below average in all the dimensions of digital skills. Considering their sociodemographic profile, we find a higher presence of men (59%), people with annual wages below £26k (35.2%), and living in urban areas (40.8%). Considering the different technological gaps, low digital skills users are mainly affected by the motivation gap (one point below average in factorial punctuations) and usage gap (particularly consumerism, social, and leisure activities show punctuations below average). In terms of the access gap, 34.4% of low-skill users do not have reliable broadband access at home, although one-third of them spend more than £150 a month on technology. They tend to use devices such as tablets, smartwatches, and smart TVs ($Z = 0.27$), in contrast with the lower use of smartphones. Finally, they usually depend on the social support provided by others to use digital technologies ($Z = 0.9$) whilst being more reluctant to provide social support to others ($Z = -0.2$).

The Q2 average digital skills cluster represents 27.3% of the cases and shows punctuations around the average in communication and transacting skills, and slightly below the average in the rest. Considering their sociodemographic profile, we find a significative higher presence of people in bad economic conditions (24.9%). Considering the technological gaps, in terms of the motivation and usage gap average skills users punctuate around average; in terms of the access gap, they use devices such as tablets, smartwatches, and smart TVs below average ($Z = -0.13$), while computers and smartphones are used around the average. Finally, they also require social support to develop digital tasks and are reluctant to provide digital support to others, but the statistical differences are much lower than in the case of Q1 ($Z = 0.1$ in receiving social support and $Z = -0.15$ in providing it).

The Q3 high digital skills cluster represents almost half of the sample (48.9%), showing punctuations above average in all the dimensions of digital skills. Considering their sociodemographic profile, among Q3 there is a slightly higher presence of women (54.6%), people in good economic situations (48.7%), and earning over £50k a year (29.8%). Also, the proportion who live in suburbs is above average (36.8%). Considering the technological gaps, high-skill users show motivation above average ($Z = 0.5$) and use smartphones more frequently than other groups ($Z = 0.2$). Besides, 90.1% of them have reliable access to broadband connection at home (eight points above average). In terms of the usage gap, they stand out in all the dimensions of use considered, particularly in consumerism practices ($Z = 0.25$) and social and leisure practices ($Z = 0.17$). Finally, they are less likely to receive social support to use digital technologies ($Z = -0.5$) and more likely to provide social support to others ($Z = 0.19$ above average).

4.2. Determinants of Digital Skills

To study the determinants of digital skills, in Table 2 we include the odds ratios and significance of the multinomial regression model (Step 2). In M1 we predict the probability of having a low level of digital skills (Q1), in comparison with having a high level of skills (Q3). Considering sociodemographic variables, age and income present a significant effect on Q1: age slightly reduces the probability of having low skills (odds

Table 2. Multinomial regression model (Step 2).

Independent variables	M1 Q1 Low digital skills		M2 Q2 Average digital skills	
	Odds ratio	Sig (0.05)	Odds ratio	Sig (0.05)
Age (scale)	0.97	0.030*	0.99	0.581
Gender: Woman (dummy)	0.64	0.067	0.75	0.064
Studies: Some college and superior studies (dummy)	0.79	0.368	0.99	0.940
Working condition: Not working (dummy)	0.80	0.492	1.06	0.792
Income: Under £50k (dummy)	1.91	0.018*	1.36	0.047*
Economic situation: Not bad (dummy])	0.03	0.924	0.85	0.324
Habitat: Not living in rural areas (dummy)	0.87	0.631	1.14	0.507
Broadband: Without access at home (dummy)	2.49	0.001*	1.91	0.001*
Expense on ICT: Under £50 every month (dummy)	0.70	0.200	0.82	0.281
Factor of motivation (Fmotiv1): Motivation and ease of using digital technologies	0.22	0.000*	0.50	0.000*
Confidence (Confi1): How confident do you feel using the internet on your own?	0.08	0.000*	0.22	0.000*
Devices—Factor 1 (Fdev1): Other devices (tablet, smartwatch, and smart TV)	1.35	0.008*	0.97	0.666
Devices—Factor 2 (Fdev2): Personal computer	0.96	0.767	0.96	0.563
Devices—Factor 3 (Fdev3): Smartphone	0.90	0.355	0.96	0.583
Uses—Factor 1 (Fuse1): Administrative and institutional uses	0.86	0.165	0.91	0.178
Uses—Factor 2 (Fuse2): Gaming and gambling	0.94	0.566	0.96	0.588
Uses—Factor 3 (Fuse3): Consume, payments, and shopping	0.56	0.000*	0.88	0.151
Uses—Factor 4 (Fuse4): Professional use (work/study)	0.95	0.650	1.03	0.732
Uses—Factor 5 (Fuse5): Social and leisure activities	0.78	0.021*	0.88	0.094
Support needed (SuppNeed1): I need support to carry out some tasks on the internet/use my digital devices	1.14	0.004*	1.07	0.029*
Support needed (SuppNeed2): During the pandemic, I asked for support to use my digital devices	1.12	0.000*	1.20	0.000*
Support given (SuppGiv1): During the pandemic, I helped my family use their digital devices	0.83	0.000*	0.92	0.001*

Notes: Reference category Q3 (high digital skills); * significant at 0.05.

ratio = 0.97), whilst wages under £50k a year increase it (odds ratio = 1.91); therefore, the effect of income is stronger than age in terms of odds ratios. Considering sociotechnical variables, the following significant effects are present:

(a) Motivation gap: Feeling motivated (odds ratio = 0.22) and confident (odds ratio = 0.08) to use digital technologies both reduce the probability of having low digital skills.

(b) Access gap: Not having access to broadband at home (odds ratio = 2,49) and using other devices such as tablets, smartwatches, and smart TVs (odds ratio = 1.35) increase the probability of having low digital skills.

(c) Usage gap: The high frequency of digital practices related to consumption, payments, and shopping (odds ratio = 0,56), as well as social and leisure practices (odds ratio = 0.78), reduce the probability of having low digital skills.

(d) Social support: Needing support to carry out digital tasks (odds ratio = 1.14) and asking for support to use digital devices during the Covid-19 pandemic (odds ratio = 1.12) increase the probability of having low digital skills, whilst providing support to others reduces it (odds ratio = 0.83).

In M2 we predict the probability of having an average level of digital skills (Q2), in comparison with having a high level of skills (Q3). Considering sociodemographic variables, there is only a significant effect of having annual wages under £50k, which increases the probability of having average digital skills (odds ratio = 1.36). Considering sociotechnical variables, the following significant effects are present:

(a) Motivation gap: Feeling motivated (odds ratio = 0.50) and confident (odds ratio = 0.22) to use digital technologies both reduce the probability of having average digital skills.

(b) Access gap: Not having access to broadband at home (odds ratio = 1.91) increases the probability of having average digital skills.

(c) Social support: Needing support to carry out digital tasks (odds ratio = 1.07) and asking for support to use digital devices during the pandemic (odds ratio = 1.20) increase the probability of having low digital skills, whilst providing support to others reduces it (odds ratio = 0.92).

5. Discussion and Conclusions

This research focused on investigating digital skills, which are the basis for the second level of the digital divide. Given the duality of the structure described by Giddens (1984), we conceptualized the second level of the digital divide as resulting from the combination of agency and structural configuration of society which can both contribute towards shaping the digital patterns of users. While structural conditions are the foundations for digital technologies' advancement, they simultaneously depend on and trigger digital agency and behavior. Following van Dijk's (2005) approach, we understood motivation as a key element to access (together with the characteristics and properties of ICTs) and acquire skills. Motivation is embedded in a specific context and is affected by both personal attributes and positional categories, which can influence the distribution of resources (temporal, material, mental, social, and cultural resources) and the access to and use of technologies.

Therefore, in addition to the traditional determinants considered by the literature, which might result from existing policies and social positions held by users in the social structure, this study also considered factors related to motivation, confidence, and different types of activities. These are, in turn, also connected to individual choices to access and use digital technologies. We considered these factors as indicators of the

agency of users when approaching the digital realm since the literature showed how motivations and dispositions of use can become primary determinants of digital access, skills acquisition, and digital activities (Calderón-Gómez & Kuric, 2022; Reisdorf et al., 2012; Reisdorf & Groselj, 2017; van Dijk, 2005).

H1, which assumes that men who are younger, highly educated, employed, and living in urban areas with good economic conditions and higher incomes tend to possess higher levels of digital skills, is only partially supported in relation to higher economic incomes. Considering the sociodemographic characteristics, contrasting the literature about the gender digital divide, which generally identifies women as more disadvantaged than men (Acilar & Sæbø, 2023), a higher presence of female users in the cluster with high digital skills was observed. However, the study is based on personal perception of expertise and, therefore, conclusions cannot be drawn on the actual skills. No significant differences were determined by traditional predictors of digital inequalities such as age (Asrani, 2020; Büchi et al., 2016; Scheerder et al., 2017; van Deursen & van Dijk, 2014), and education (Asrani, 2020; Helsper & Galacz, 2009; Scheerder et al., 2019). In line with the literature, higher incomes are associated with higher digital skills (DiMaggio et al., 2004; van Deursen & van Dijk, 2014), but no significant differences were observed between employed and unemployed users. However, those who perceive to have average or higher incomes prevail in the clusters with low/average digital skills, whereas those who perceive a bad economic status tend to perceive that they have higher digital skills. Further research is needed to understand the reasons behind this perception.

Surprisingly, we observed that those who live in urban areas are also more likely to be in the low digital skills cluster, whereas a high number of those who live in rural areas fall into the high digital skills cluster. This might be partially justified by the potential persistence of the first level of the digital divide in differentiating rural and urban contexts. Rural areas might suffer more markedly from lack of access. For example, a report by Vodafone (2023) found that rural areas in the UK lack the essential infrastructure for connecting to the internet (such as 5G spots). Therefore, since the survey only included those who can already connect, these users might have cultivated their digital skills to keep up with digital acceleration. These structural conditions might have, therefore, affected the opportunities for users to access the digital realm.

However, considering those factors that are not entirely attributable to the pre-existing conditions of the users or infrastructure status, but also connected to individual power and choices, motivation to access (van Dijk, 2005), and ease in using digital technologies positively contribute to defining the high digital skills cluster. Moreover, also confidence boosts average and higher digital skills. This supports H2a related to the motivation gap, in line with previous literature (Calderón-Gómez & Kuric, 2022; Reisdorf & Groselj, 2017; van Deursen & Helsper, 2018; van Deursen & van Dijk, 2014; Wang & Liu, 2022). Not surprisingly, users with access to broadband at home tend to have higher digital skills, and this supports H2b related to the access gap. At the same time, spending more money on ICTs does not necessarily equate to higher digital skills, as shown in bivariate analysis (see Supplementary File, for more information). H2c, related to the usage gap, is also supported. In fact, engaging in different activities (such as administrative and institutional uses, gaming and gambling, consumption, payments and shopping, professional activities, and social and leisure activities) is associated with higher digital skills.

Finally, H3 assumed higher levels of digital skills among users who provide social support and a lower level of digital skills among those receiving social support during the pandemic. In line with the literature (Harper et al., 2022; Jung et al., 2005; Laar et al., 2020; Ruiu et al., 2023), this hypothesis is confirmed. The results show

that those in need of support to carry out tasks on the internet fall into the low digital skill cluster, whereas those who provide help to others belong to the high digital skill cluster.

Tackling digital inequalities has become more urgent as a result of the Covid-19 pandemic. Due to digital acceleration, online platforms have become the primary means of accessing services, and individuals without the necessary digital resources and skills are increasingly marginalized. Being digitally integrated is quickly becoming a new civil right and a vital life skill. However, in addition to the traditional factors connected to sociodemographic distribution, identified by the literature as differentiating both access and acquisition of skills among users, it is also important to consider other variables that are connected to users' agency, such as motivation and range of online activities. We highlighted how these factors are also tied to the availability of opportunities that the social and policy context can offer. Limited access to digital skills, devices, and connectivity presents significant barriers for individuals in accessing essential services, learning new skills, and pursuing employment opportunities. However, in addition to addressing the challenges related to access, tackling inequalities in digital skills becomes a priority for policymakers attempting to reduce social inequalities. Efforts to bridge the gap and promote digital inclusion through training programs improved access to devices and connectivity, and supportive policies are essential in fostering social equity and enabling inclusive development. Governments in the UK have put in place digital inclusion plans to get every citizen, business, and school online since the turn of the millennium (Cabinet Office et al., 2012). The overarching goals of these policies were to equip all individuals with the digital skills necessary to participate fully in a digital society. However, efforts to bridge the digital divide and improve digital literacy should also consider factors related to motivating citizens to engage in multiple digital activities that could produce benefits in terms of improving both the online and offline experience. Even though the number of items used as indicators of motivation was limited, they captured the willingness of users to experiment with technologies and their skills. Therefore, the policy implications of this finding, when combined with other aspects highlighted in this study, indicate that fostering confidence and "digital curiosity" (here intended as the propensity to engage in various digital activities) should be integral components of digital education initiatives. This approach can motivate users to become self-reliant digital consumers and enhance their capabilities.

Some limitations of the analysis need to be considered. Firstly, the sample composition consists solely of respondents with school-age children, limiting the generalizability of the findings to the broader British population. Certain demographic groups, such as younger individuals, are underrepresented, potentially impacting the conclusions drawn and highlighting the need for further empirical investigations. Additionally, the voluntary nature of participation in the online survey may introduce bias, with participants likely possessing higher skill levels, potentially resulting in an underrepresentation of users with lower skills.

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Conflict of Interests

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Supplementary Material

Supplementary material for this article is available online in the format provided by the author (unedited).

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ARTICLE

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The Double Burden: The Digital Exclusion and Identity Crisis of Elderly Patients in Rural China

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Abstract

The rapid digitalization of China's healthcare system, a phenomenon that accelerated during the Covid-19 pandemic, had two negative consequences for a significant portion of elderly persons in China. The first is an unfortunate practical outcome: their exclusion from many health services such as online medical appointment platforms, e-prescription requests, obtaining e-referrals, and sharing electronic medical records. The second is an emotionally debilitating identity crisis as elderly persons' former status as knowledgeable senior mentors was replaced with social perceptions of them as helpless and ignorant souls reliant on more youthful persons for guidance and assistance. This article adopts a grounded theory to explore the phenomenon from the perception of excluded elderly persons using participatory observation and in-depth interviews of 44 elderly clients of a rural hospital in the Shandong province in eastern China. The study shows that the current focus on direct practical aspects of digital exclusion may fail to capture the impact and ancillary consequences such as a painful loss of self-esteem by the digitally excluded. As the study illustrates, the practical aspects can all be overcome through intervention by those who aid the digitally excluded but this help may exacerbate the rarely considered ancillary harms of digital exclusion. Studies of digital exclusion will make more significant contributions to our understanding of the phenomenon if they look beyond the obvious direct consequences of digital exclusion to consider possible ancillary and flow-on effects.

Keywords

digital divide; digital exclusion; e-health; elderly; health care app

1. Introduction

If the vision of an omnipresent digital interface offered by Negroponte (1995) had not fully materialized prior to the global Covid-19 pandemic, it was surely realized during the lockdowns and shift to online communications during that episode, particularly in China. Even prior to the pandemic, the Chinese government had prioritized the use of digital technology in the public healthcare system (Jha et al., 2009; Schickedanz et al., 2013) and apps came to rule almost all aspects of citizens' lives in the course of the world's strictest lockdowns. Confined to their residential compounds except for limited excursions, residents of China were reliant on a green health pass on the government health app for any travel outside the home or access to services once outside a residential compound (Yu et al., 2023) and for access to almost all health services (Ke & Hsiao, 2022). By the end of the pandemic, communication for almost all aspects of health services had shifted to digital modes, including booking health appointments, gathering information from and providing information to patients, and demonstrating health status.

Central to the shift to a digital interface for patients to connect with health services in China was the adoption of a "smart hospital system," a program integrating hospital care with digital phone app technology. Hospitals in China are responsible for both primary care that would be handled by general practitioners in many other countries as well as emergency and other hospital services and are, therefore, the first and only port of call for almost all health services, particularly outside major urban centers (Cai et al., 2023). Digital apps have become the gateway to admission at hospitals and medical care and those unable to readily access and use the necessary apps face severe hurdles when trying to obtain medical care.

The study commenced as a conventional investigation of the impact of digital exclusion on elderly healthcare users in China. Originally used in the early days of the internet to signify the divide between those with computers and internet access and those without (Erdiaw-Kwasie & Alam, 2016), the notion of digital exclusion is now commonly employed to refer to groups such as the very poor and the technologically challenged, a group often populated by elderly persons who struggle to access services available exclusively or primarily through digital communication. The phenomenon fits into the wider conceptual notion of a digital divide, a topic that has been the subject of considerable conceptual analysis (e.g., Ragnedda & Muschert, 2018) and that has spawned a vast array of studies (e.g., Lythreatis et al., 2022) that have looked at the impact of the divide between the digitally literate and those who struggle to move past the analog world. Sophisticated studies distinguish up to a dozen different measurements of digital exclusion.

In broad terms, studies of the digitally excluded fall into four camps. The largest group comprises studies that look at the loss suffered by those excluded from the digital world; it was assumed initially that the present study would fall into this collection, with a focus on the impact of digital exclusion on access to health care in China. Rapid urbanization (Yi & Vaupel, 1989) and the dramatic impact of decades of an enforced one-child policy have led to an aging population profile in China (Tatum, 2021), not dissimilar from that of very advanced economies. The increase in life expectancy aligns with a greater incidence of chronic and infectious diseases (Chen et al., 2022), which in turn increases demand for healthcare resources (Chomik & Piggott, 2015; Tsai et al., 2021; Wang et al., 2023), a development amplified by growing levels of multimorbidity (Zhang et al., 2019). The elderly in China, particularly in poorer and more remote rural areas, were assumed at the beginning of the study to be a cohort particularly at risk from the adoption of a digital health system interface, and the focus of the study was further narrowed to digital exclusion in this group. In particular, it was assumed,

consistent with previous studies, that the problem is much greater for the rural elderly than for the urban elderly in China (He et al., 2022).

A second set of studies looks at how the impact of digital exclusion can be mitigated, particularly for the elderly left outside the digital world (e.g., Holgersson & Ellgren, 2020). Often studies in this group consider the possible role of organizations, particularly government bodies, in filling in the gaps and providing information and support for those unable to access services by digital means such as alternative communication and identification formats—that is, hard copy substitutes—for use by the digitally excluded elderly (Y. Song et al., 2021). The general conclusion is that, with respect to the digital divide in China on access to health care at least, these programs, such as government directions to service providers to develop simpler user-friendly apps for the elderly (Chen et al., 2022), have had very limited impact. These studies were considered in the design of interview questions used in the study with the findings largely confirming the conclusions of earlier investigations that suggest little has been done by institutions to provide workarounds to digital exclusion.

A third group of digital exclusion studies investigates the role of family, particularly children, in overcoming barriers faced by the digitally excluded. A range of variables that might affect the level and value of support provided are considered, including children's gender (Yi et al., 2016), the number of children (Warmenhoven et al., 2018), children's education level (Cui et al., 2021; Lei et al., 2023), internal migration of adult children (Q. Song, 2017), and a country's position as developing or developed (Mubarak & Suomi, 2022). This group of studies played an important role in the design of the current study, prompting a deeper investigation into the role of family in assisting the digitally excluded.

Finally, a further group of studies reviews the ancillary benefits of digital literacy available to the elderly who master access to digital health services. These include the role of digital media in maintaining closer intergenerational relationships that contribute to elders' subjective well-being (J. Li & Zhou, 2021) and the psychological satisfaction that comes to elderly users who can take pride in their technological mastery (P. Ren & Klausen, 2023). However, few studies seek to explore the ancillary negative consequences of digital exclusion apart from ageism, the phenomenon that rises when the digitally literate shun the elderly who are unable to communicate with them through digital devices (Seifert, 2020).

Based on the existing literature, the initial intent of the present study was to investigate the impact of the digital divide on a particular subset of elderly health patients, those residing in a poorer non-urban area of China, taking into account the studies that discussed the role of children in mitigating digital exclusion in the health sector. The focus of the study was thus on the outcomes of the digital divide rather than its causes or illustrations of its manifestation, a topic that has been referred to as the third level of the digital divide (Scheerder et al., 2017). Also excluded from the study were parallel exclusions such as the social exclusion of digitally excluded elderly in long-term care facilities (Seifert et al., 2020). As explained in the methodology section that follows, the study was based on interviews with patients at a district hospital. Where information in the study is directly attributable to a patient's comments, the patient is identified in brackets by reference to their number in the table of interviewees in the Supplementary File, followed by their age and gender.

At the commencement of the study, it became obvious that the digitally excluded had not been excluded from health care—as the cohort of interviewees at the regional hospital chosen for the study demonstrated,

the digitally excluded have found ways to overcome the hurdles. The initial interviews suggested, however, that the solutions may have led to unanticipated and not insignificant personal costs, namely a serious, and potentially very unhealthy, loss of esteem by the elderly forced to rely on others for assistance with access to almost all aspects of basic health services. This revelation led to the adoption of a new focus for the study, to investigate whether the digital health divide caused a loss of self-esteem and pride for digitally excluded elderly health patients in rural China.

There was, certainly, support for the supposition regarding this ancillary consequence in the key literature on gerontology and aging. An elderly person's perception of themselves as aged and what that encompasses depends to a large extent on the spatial setting in which they find themselves, with views of those living in diverse urban environments likely to be different from those living in homogenous environments far from large urban centers (Enßle-Reinhardt & Helbrecht, 2022). It would be expected that long-time residents in a relatively poor and very homogenous regional environment would have much stronger ties to traditions (Y. Ren, 2023), particularly Confucian traditions of respect for and veneration of the elderly (Muyskens, 2020) in this case. Notwithstanding two violent and comprehensive revolutions since China's millennia of feudalism, many cultural norms persist and one of the most enduring is the concept of filial piety, a notion embodying both responsibility for supporting the elderly and recognition of the elderly as the primary source of wisdom, knowledge, and advice (H. Li & Wu, 2022). The revised direction of the study thus directly considered the possibility that reliance on others, particularly the young, for the most basic communication tasks, could not only lead to feelings of cultural impotence but could trigger feelings of disassociation as elders lose what they may perceive as crucial aspects of their societal roles.

2. Methodology

The study utilized qualitative research methods based on participatory observation and semi-structured interviews with 44 elderly patients attending a regional county hospital in Shandong Province, a province in the east of China stretching from a poorer hinterland to a more prosperous coastal area. The participants were all over 60 years of age (the mean age was 72.7 years), had relatively low literacy levels, were in poor health (details of their health problems are set out in the Supplementary File), lived in geographic areas several hours by train from a large urban center, and were socially disadvantaged with no access to commonly available urban amenities. The research was conducted over three non-consecutive time periods—June–August 2022, February 2023, and June 2023—to capture data from a range of calendar points. Audio recordings collected by the investigators were transformed into text and imported into Nvivo 12 software (Woolf & Silver, 2017) to build an analytical framework for elucidating the behavior of smartphone health app use among elderly patients.

Both one-on-one and focus group semi-structured interviews were conducted in the study, with each interview lasting more than 30 minutes. The group interview sessions catered to interviewees who felt more comfortable in a group of fellow patients. Similar questions were asked in both types of interviews and the similarity in responses suggested the alternative formats had no impact on the views offered by respondents. Both the identification of interview subjects and interview locations were randomized to cover all possible activities of elderly patients and activity areas within the hospital, including wards, hospital corridors, consultation halls, cafeterias, waiting rooms, plazas, and nearby waiting areas. One-on-one interviews provided privacy which in turn encouraged frank and confidential communication and opportunities to

explore in depth issues of interest to interviewees (Muraglia et al., 2020). Focus group interviews provided opportunities for interviewees to discuss broader topics among themselves and bring up issues not anticipated by the investigators (Barbour & Morgan, 2017; Kitzinger, 1995).

With the consent of the interviewees, interviews were recorded to ensure the accuracy of post-processing content and the authenticity of the data. Interviewees were informed of the intended use of the interview content both during and after the interviews. They were assured that if they decided to withdraw from the study in the course of the interview, the interview would be suspended and the recorded information deleted, but none of the participants withdrew. To assess the conditions and behavioral orientations of elderly patients regarding smartphone app use in the context of hospital services, in addition to statistical information about the interviewees such as age, education level, area of residence, health status, and occupation, the interview process covered issues such as intergenerational support, social interaction, daily media use, payment habits, medical accompaniment, independence of the diagnostic process, and smartphone use during the visit to the clinic.

The data content analysis used a grounded theory methodology (Glaser & Strauss, 1967; Heath & Cowley, 2004). The methodology is designed to derive accurate findings from qualitative data by adopting a bottom-up approach in which the explanatory framework and most plausible theory emerge from the process of collecting, inducting, deducing, and validating texts rather than from established concepts and theories. The text of interviews was transcribed, organized, proofread, and checked against the recording before being imported into the Nvivo program, where the text content was coded at three levels (open coding, axial coding, and selective coding) using nodes that formed the hierarchy of the coding to form a subordinate relationship.

A potential risk of grounded theory methodology is that the theoretical framework derived from the collected data may be distorted by incomplete data that was collected before the final theory or vision was known. In other words, the outcome might have been different if the questions were asked of respondents after the theoretical framework had been developed—a case of "if we had known then what we know now, we would have asked different questions." The solution to this risk is to revisit some interviewees with revised questions and discussion to see whether the new information would lead to a revised theoretical framework, exploring issues that had not been dealt with in depth initially but which had been raised by other interviewees. This was done by random selection of four patients (just under 10% of the cohort) for revised interviews. The revised interviews were then coded and analyzed to test for possible new significant categories and relationships. None were revealed and it can be assumed that the theoretical model obtained from the initial interviews represented a comprehensive model supported by available evidence.

3. The Cohort of Contributors to the Study

There is, to be sure, no single definition of the "elderly" and, clearly, chronological age alone does not accurately identify a group whose members perceive their age in relative terms drawing on personal experiences and narratives (Baars, 2007). However, the combination of chronological age and health conditions necessitating hospital visits was considered sufficient to identify an appropriate cohort for this study.

A total of 44 elderly patients participated in the interview process including 25 females and 19 males. Fourteen participants were in the age group of 60–69 years old, 21 participants were in the age group of 70–79 years

old, and nine participants were in the age group of 80 years old or above. The average age of all participants was 72.7 years. Twenty-six of the subjects were involved in one-on-one interviews and 18 subjects were involved in focus group interviews. Most of the participants (84%) were suffering from chronic illnesses such as gastroenteritis, heart disease, bronchitis, hypertension, etc.

Twenty-three elderly patients used smartphones, 14 elderly patients used older-style feature phones (mobile phones with press-button-based inputs and a small non-touch display), five elderly patients used both smartphones and feature phones, and two elderly patients did not have a cellular device.

4. Findings: The Three Cohorts of Elderly Healthcare Users

The study sought to investigate, first, the extent to which patients accessing health care had suffered digital exclusion and consequently been forced to rely on others to obtain the care they needed and, secondly, the extent to which the revelations of their limitations and digital ignorance in turn would lead to a significant loss of self-esteem. The findings revealed a much more nuanced set of relationships between the elderly and digital health services than originally anticipated, particularly with respect to those wholly excluded from the world of digital communication.

There is no universal test for digital literacy and scholars in different contexts rely on a variety of benchmarks to determine levels of digital literacy (Oh et al., 2021; Padilla-Góngora et al., 2017). The survey found, however, that it was possible to divide elderly patients attending county-level hospitals in China into three broad groups: adopters, partial adopters, and wholly excluded persons. The three groups corresponded, respectively, with persons able to use apps related to their hospital visit and other apps, those able to use the apps related to the visit with assistance, and those wholly reliant on other persons to navigate app usage. Of the 44 persons interviewed for the study, nine were considered adopters, nine partial adopters, and an overwhelming majority, 26, wholly excluded persons. The third group in turn comprised three distinct camps, each with its own reasons for exclusion. While the study looked only at the impact of digitalization and shifts to mobile apps on health care for the elderly outside large urban centers, the findings could likely be extended to all other services that have shifted or are shifting to app-based programs or to any of the other life challenges faced by the elderly (Whitbourne, 1999).

We did not find a significant correlation between adoption categories and age or gender, but correlations were noted between digital app use and child companionship, literacy, health status, and socio-culture. The latter is a commonly used Chinese notion referring to the extent insular individuals are wholly integrated into the historical local rural culture (Fei, 1992), used in contradistinction to those who have been exposed to and adopted attributes of the broader urban society. A further important determinant for smartphone app usage was cost, with the digitally excluded generally aligning with the poorest segment of hospital users.

An interesting and unanticipated observation drawn from the study was a differentiation in learning approaches between respondents with some digital skills and those who taught them. It is commonly assumed that the learning process postulated by Bandura (1962), one of learning through observation, imitation, and modeling, applies to learning across the board. The quick mastery of digital technology by the very young, freed from inhibitions and assumptions and able to apply learned logic to self-learning by trial and error, revealed new ways of acquiring skills in the digital era. References to help by children and

grandchildren by full and partial adopters suggest the digital device education of these participants was similar to that used to learn non-digital life skills, a process consistent with that described by Bandura. Quite likely, the youngest teachers cited by participants mastered their technology skills through a very different learning process.

4.1. Adopters

A common characteristic of adopters of digital interaction for health care is their prior use of smartphones and digital communication for other reasons. Not all elderly persons are retired, and the self-employed in particular may be comfortable with digital communication from business use (42-65M). Better-educated persons with white-collar backgrounds such as teachers were also included in the group of prior users (40-82F). More common, however, are elderly persons who were taught how to use smartphones for various purposes by children (12-76M).

Those familiar and comfortable with smartphones and digital apps used them for common smartphone purposes apart from health features, including online shopping, managing finances, and social communication. The non-health and health purposes merged to an extent for those facing lengthy hospital stays, with digital entertainment and family video conversations being important tools to break the monotony (12-76M). An important sentiment reported by some smartphone users is the feeling of self-empowerment, with users able to directly participate in their health care by taking responsibility for aspects of their care such as arranging appointments, registration, and so forth, rather than relying on health administrators (6-67F). A further source of self-esteem derives from the ability to assist and tutor those less familiar with digital technology.

4.2. Partial Adopters

The common feature of partial adopters of digital apps for healthcare purposes is the general lack of use or interest in the digital app features of smartphones other than for health purposes. But for the need to access services via smartphones, these users would likely not exploit the app features of the devices. Two factors in particular have driven the take-up of digital technology by this group. One is a practical concern—obtaining access to services such as doctor appointments or prescriptions is very problematic without the use of digital apps (44-74M). Much of the health system is predicated on patient initiative (Chen et al., 2022) and, for those without access to close family support, mastering health-related apps is a prerequisite to getting health service. Absent access to services, the partial adopters envisage a genuine, and possibly fatal, risk to their health care.

The second factor driving partial adoption is concern over the burden on children who would otherwise assume responsibility for the organization of healthcare services if the respondents did not move to a degree of digital self-sufficiency. Confucian responsibility norms prevail in Chinese society (Zhao, 2022) and elderly parents strive to minimize burdens for care imposed on children. A prime motivation for the partial adoption of digital apps for health care was to reduce children's responsibilities for the adopters (12-76M).

4.3. Digitally Excluded

The disadvantages for older adults resulting from digital exclusion have been well documented globally (Friemel, 2016; Jaarsveld, 2020; Loges & Jung, 2001). At the same time, and somewhat ironically given the ability of the internet to overcome the tyranny of distance and isolation for rural communities, the growth of the medium may exacerbate these phenomena for the disenfranchised digitally excluded rural dwellers (Warren, 2007). The rural respondents in this study experiencing this double whammy readily rationalized the reasons for their failure or inability to adopt digital communication but differed in their stated views on the extent to which they were emotionally impacted by the exclusion.

As noted, the digitally excluded fall into three camps. The first, a small minority in the group, seems to genuinely believe they are not disadvantaged from their exclusion, asserting it is possible for them to rely on other means to acquire services usually available by app (23-70F).

The second cohort, accounting for most of the digitally excluded group, comprises the digitally abandoned—elderly facing what they perceive as unscalable barriers to digital access. Financial constraints were an obvious factor for some of these—ironically, the impact of the high cost of medical care on the limited budgets of the rural poor left them with little disposable cash for what would be the luxury of a smartphone and digital access to programs that could aid their access to health services (3-70F). Unfamiliarity with technology and a perceived inability to learn new digital skills is cited by others (13-80F; 1-71F), a factor that might be compounded by fading vision and consequent difficulty reading small screens (14-78M).

A much smaller group are the digital rejecters, elderly persons not faced with the attributes of the excluded but deliberately rejecting the use of digital media to access health services. This group makes a conscious calculation (or possibly an after-the-fact rationalization) that the benefits of the use of digital apps do not outweigh the cost of learning. The time lost mastering the skills needed is time lost to actual in-person socialization with friends or neighbors while the benefits may be inaccessible in any case in the event of severe illness and hospitalization (18-81F).

5. Findings: The Personal Identity Crisis of the Digitally Excluded

Max Weber once described traditional Chinese villages as autonomous areas without officials, and village autonomy as the rule of "custom" (Weber, 1951). The social and political revolution that ultimately saw the overthrow of the feudal system and feudal norms at the national level did not percolate down through all parts of Chinese society (Meng, 1969), with significantly different impacts in large cities, in which intellectuals and political leaders lived, and rural areas (Johnson, 2009). Prominent among the feudal ethics that persisted in rural society was the principle of "filial piety," a concept that goes beyond responsibility to care for parents materially and spiritually (Yeh & Bedford, 2003; Yeh et al., 2013) to include demonstrations of respect for the wisdom and guidance of the elderly. The interviews revealed a sharp divide in views between digital adopters and the digitally excluded about the flow of generational responsibility.

Digital adopters, as noted above, viewed their self-sufficiency in accessing and managing health care services through digital apps as a positive aspect of their relationship with children, ensuring they would not be a

burden for the children and freeing the children to pursue their own achievements and goals. The view of digital avoiders was more complex and dialectic in nature. While the group includes some fatalists who have simply resigned themselves to a life of exclusion and perceived suffering the result of fate (7-65F), the starting point for most in the group was their relationship with children, the group that could have a direct impact on the exclusion of elders. Almost all affirmed a traditional view that children have a primary responsibility to look after their parents (15-77F; 26-67M). At the same time, however, interaction between child and parent must respect that duty in a way that does not require parents to admit to their limitations or shortcomings. As one respondent explained, it would be fine for a child to take the initiative and show a desire to demonstrate and explain the use of an app needed by the parent, but it would be an inexcusable loss of face for the parent to have to take the initiative and ask for help (26-67M). As one interviewee explained, "if we bow down to our children, we will not be able to hold our heads up outside the home" (33-67M).

The despair of the digitally excluded unwilling or unable to turn to children for instructions and assistance with the request initiated by the parents extends beyond the breakdown of filial norms in their view. It reaches a much broader sense of loss, the dismantling by the internet of "thousands of years of cultural traditions" (2-71F; 19-80M; 9-78F). This despair over the loss of tradition and rural social norms was a theme that emerged time and again in interviews. Its impact was significant for respondents.

6. Limitations

The study is not without limitations. One is the exclusion of the very elderly from the inquiry. While interviewees were limited to a minimum age of 60 years, no maximum age was set. However, both doctors and family intervened to prevent interviews with elderly patients over the age of 90, suggesting extended interviews might carry some risk. It might be assumed that digital capabilities and the social role of the very elderly will differ from their younger counterparts. Given the views of doctors and family, collecting data from those over the age of 90 through interview methodology is not possible. Future researchers might explore alternative means of communication with this group, perhaps by enlisting family members as aides.

The second limitation of the study is its geographic reach. The study was conducted within a county-level hospital in Shandong Province and the findings may not apply to similar non-urban center locales across China. Excluded from the study were other non-urban elderly such as nomadic and mountainous populations. The logistical challenges in extending the study to groups such as these would be significant.

7. Conclusion

This study explored digital health services app use and consequential views of elderly patients at a county hospital in Shandong Province, China, that had adopted digital apps for many aspects of its services. The hospital and most allied health services have turned to digital apps as a means of extending services to healthcare users in a semi-rural county setting. An important target of the digital services is the elderly who are also, ironically, the group most likely to be excluded from the services, with potentially serious compromises to their healthcare access. Equally, and perhaps more significantly, excluded elderly persons often experience (sometimes severe) dislocation as the foundations of the social and cultural system they grew up with and expected to see for their lifetimes crumble. As digitization provides younger generations

with newer and very expanded sources of information, the position of the elderly as senior respected authorities falls away and the social constructs that brought comfort disappear.

The loss, as well as the challenge of accessing health services available only through smartphone apps, in effect creates a double burden for the rural elderly. Possibly, the phenomenon will diminish over time as current internet users who are not only familiar and comfortable with digital communication, but also accustomed to confronting and mastering new and continuously evolving digital communication challenges, age and become the next generation of elderly persons. There are no obvious easy fixes for the double burden. Changes or simplifications of apps will not lead to behavioral change by persons who have not acquired smartphones or are resolute in their opposition to mastering their use. Nor is it likely there is any reason to presume the government will restore old systems for this one segment of the population when it has pursued digitization as a strategy to provide health services more efficiently in rural areas. This may simply be a case of observing a previously undisclosed cost of the shift to digital communication for the benefit of many causing compounded harm for the few.

The findings do provide a useful lesson for future digital exclusion research. Research on this topic most often focuses on aspects of the phenomenon itself, particularly who is excluded (for example studies of exclusion by income levels or age or other demographic features nationally or country development levels internationally) and the consequences of exclusion. Rarely does it look further into the possible consequences for the excluded as a result of the methods they use to overcome the constraints of exclusion. The particular consequence that participants in this study attributed to their inability to master digital apps—personal loss of self-esteem suffered by the elderly in a more remote non-urban part of China—may be restricted to persons in a similar situation in this particular culture and area. The study alerts us, however, to the importance of looking further down the results trail to identify all flow-on effects from digital exclusion and responses to that exclusion.

Conflict of Interests

The authors declare no conflict of interests.

Supplementary Material

Supplementary material for this article is available online in the format provided by the authors (unedited).

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ARTICLE

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Frontline Knowledge: Digital Media Literacy of Older Adults in Ukraine

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Abstract

Digital media literacy becomes crucial in modern conflict zones, as conflicts are increasingly digitized and hyperconnected. While a dangerous environment raises the need for orientation, propaganda and fakes discourage audiences' sense-making efforts. Older adults often experience digital and social exclusion and might be vulnerable to mis- and disinformation. Previous research, focusing mostly on Western Europe, has studied digital media practices of older adults, however, there is very little knowledge on digital media literacy skills and needs of older adults in conflict zones. Drawing on eight focus groups, this article explores Ukrainian older adults' challenges and compensation strategies during the digitized war. An inductive-qualitative analysis identifies three main factors that shape digital practices and dictate the literacy needs of Ukrainian older adults: (a) (lack of) access, grounded in material infrastructure and social ties; (b) self-(in)efficacy that often stems from pre-convictions about one's agency and position in society; and (c) resilience that becomes crucial in the situation of continuous exposure to (mediated) violence. This research contributes to the understanding of the media literacy needs of older adults and lays the foundation for developing digital literacy study programs in conflict zones.

Keywords

conflict; digital literacy; media literacy; older adults; Russian-Ukrainian war

1. Introduction

Digital media literacy becomes a crucial skill for citizens in modern conflict zones, as conflicts are increasingly digitized and hyperconnected (Merrin, 2018). When relatively controllable and contained mainstream

media ecologies break down, audiences need to keep up with an increasingly complex information environment, where a wide range of actors are networking immediately and continuously (Boichak & Hoskins, 2022). The orientation problem during a violent conflict is exacerbated by propaganda and misinformation that promote fear and distrust in official information and mainstream news sources (Pasitselska, 2022). While the need for orientation and digital media literacy exists among all age groups, older adults can be especially vulnerable to digital exclusion and its negative consequences. Some existing research points to older people's lack of ability to understand, analyze, and evaluate media content, including news on social media platforms (Allen et al., 2020; Guess et al., 2019) and algorithmic news curation (Zarouali et al., 2021). However, we lack comprehensive research on older adults' media literacy (Rasi et al., 2021) to draw any substantial conclusions about the vulnerability of older adults in a disrupted information environment. While we have some understanding of the audiences' fact-checking practices and media perceptions in a conflicting environment (Fiedler & Kovats, 2017), we need more research on older adults' media literacy needs in such contexts.

This study explores existing media literacy practices, skills, and perceived needs of older adults during war in the digital age. Taking a user-centric approach, it draws on eight focus groups and descriptive data from the national survey with Ukrainian older adults (60+) across the country. Importantly, the study involves both internet users and non-users to understand the barriers to internet access, as well as more advanced practices of social media and messaging app use. Given its exploratory nature, the study adopts a comprehensive definition of media literacy that covers a wide range of technical and critical skills and competencies. The results of this study, conducted in cooperation with a local NGO, will be used to develop digital literacy study programs for older adults in conflict zones.

2. Theoretical Framework

2.1. Older Adults and Media Literacy

Engaging with the question of older adults' media literacy requires defining two contested concepts in two recent scholarly debates. First, the study needs to define "older adults" and justify singling out this age group when it comes to media literacy needs (Rasi et al., 2021). Second, the study needs to explain the meaning of "media literacy," since this umbrella concept covers several subset literacies and provides a list of competencies constantly expanding in the new media environment (Swart, 2021).

In pan-European surveys of attitudes towards and the use of digital media, older people are commonly defined as being 65 years and older (e.g., European Union Agency for Fundamental Rights, 2023; Eurostat, 2023). National surveys in Central and Eastern Europe treat older age groups somewhat differently: For example, they distinguish "mid-age" (55–63) from "older" generations (64–75; Rožukalne, 2020), distinguish between younger (60–69) and older (70+) adults (Kanižaj & Brites, 2022), or use a 60+ margin (Ivan & Cutler, 2021). Additionally, it is important to account for the national retirement standards: The minimal retirement age in Ukraine is 60 years old for both men and women, and the average life expectancy is 65 for men and 74 for women (with an apparent decrease due to the Russian aggression; see Ministry of Social Policy of Ukraine, 2024).

Current studies of digital technologies and media use indicate the existence of an age-based digital divide (Ivan & Cutler, 2021; Kanižaj & Brites, 2022; Nguyen et al., 2022). The general tendency is that younger age

cohorts are the most intensive internet users and tend to be more computer savvy than older cohorts. However, the studies that consider socio-demographic differences within the "older adults" social group point to intersectional, and not merely age-related divides (Hargittai et al., 2019; Hofer et al., 2019). Education, gender, social class, living situation, and other factors affect digital in- and exclusion: Those in advantaged social positions are more likely to use the internet and do so for activities from which they may benefit (Ivan & Cutler, 2021; Nguyen et al., 2022; Raycheva et al., 2018). Altogether, these studies advise against addressing "older adults" as a homogeneous group. Acknowledging the need for contextualized study of technology and media use in later life, this study accounts for regional (including urban and rural) differences, separately addresses the practices of internet users and non-users, and differentiates between two "older adults" age groups (60–69 and 70+).

Media literacy research and practice are inherently interdisciplinary, drawing on studies in literacy and culture, media education, human–computer interaction, and social studies of technology (Livingstone et al., 2005). The variety of perspectives makes the definition and the research agenda, as well as interventions and policy initiatives contentious. This is exacerbated by the necessity to deal with a hybrid media environment, where the news is an increasingly blurred concept (Edgerly & Vraga, 2020), and the supply and variety of content often become overwhelming (Toff & Kalogeropoulos, 2020). The growth in available platforms, devices, and access points for media content demands from users to acquire new technical skills, including algorithmic curation (Zarouali et al., 2021). Additionally, a distorted information environment increasingly demands that users intervene and actively correct mis- and disinformation (Gagrčin & Porten-Cheé, 2023). Overall, we see a tendency to raise the normative expectations from individual media users (Swart, 2021). From the users' perspective, growing empirical research suggests that there is a discrepancy between competence and performance, so awareness of distortions does not necessarily translate into the application of media literacy skills (Tully et al., 2020). Moreover, in polarized and conflicting environments, users' decisions about content dissemination and correction might be based on normative, ideological, and identity-driven rather than epistemic considerations (Pasitselska, 2022). Finally, the application of media literacy is rarely a solitary endeavor: It is always contingent upon collective perceptions and socially negotiated norms and practices (Gagrčin & Porten-Cheé, 2023; Pasitselska, 2022; Swart, 2021).

Most media literacy-related studies targeting older age groups have focused on older people's access to and basic use of digital technologies and media (Rasi et al., 2021). Instead of taking a holistic approach to media literacy, digital inclusion is often prioritized from a research and policy perspective. The European Union Agency for Fundamental Rights (2023) regarded digital literacy and digital skills of older adults as an important civic competence, however, active digital participation of older adults is often under-emphasized in research (Reuter, 2021). Recent literature reviews find that older adults are mostly regarded as "passive" consumers of digital technology (Serrat et al., 2020), neglecting their abilities for content creation (Reuter, 2021). This perspective also underplays the importance of social connections in information sharing and news consumption: Older adults often act as nodal points in their social circles (Duque & Peres-Neto, 2022). In the framework of the "grey" digital divide, older adults have been mostly studied within the premise of their greater vulnerability to misinformation (e.g., Duque & Peres-Neto, 2022; Kanižaj & Brites, 2022), although empirical evidence is contested (e.g., Erlich & Garner, 2021; Mandache & Ivan, 2022). Some studies also claim that older people have more algorithmic misperceptions (Zarouali et al., 2021). In this framework, digital literacy was positioned as a solution to the "misinformation" and "fake news" problem (Allen et al., 2020; Guess et al., 2019).

During and in the aftermath of the Covid-19 pandemic, multiple studies investigated how older adults were coping with misinformation and lack of digital skills during the health crisis (e.g., Ivan & Cutler, 2021; Kanižaj & Brites, 2022; Mandache & Ivan, 2022). Some of these studies show that, contrary to expectations, seniors regard online and social media sources critically and cautiously (Mandache & Ivan, 2022). This is allowed, in part, by the versatile media consumption of older adults. With that, older adults' established beliefs and stereotypes based on long life experience can impede their critical media reception (Raycheva et al., 2018). Reliance on stereotypes, especially given seniors' formative years during Soviet stagnation and the Cold War (Rožukalne, 2020), might amplify the influence of Russian propagandistic narratives (Alyukov, 2023; cf. Erlich & Garner, 2021). In general, however, Central and Eastern European older adults' media literacy skills and needs are severely under-researched. In these contexts, research as well as NGO- and government-led educational interventions are scarce (Kanižaj, 2017; Ukrainian Media and Communication Institute, 2023).

This study adopts a broad approach to media literacy based on two considerations: First, the focus on digital literacy would be limiting in an area of scholarship where little is known; and second, digital media use represents only a fraction of the versatile media practices of older adults. The most general and widely used definition of media literacy is the ability to access, analyze, evaluate, and create media content (Aufderheide, 2018). The definition, however, should be adapted to the precarious war context (Fiedler & Kovats, 2017) and hybrid Ukrainian media environment (Hoskins & Shchelin, 2023; Nedozhogina, 2019; Yanchenko et al., 2023). Next, the study recognizes the importance of the "media locus of control" that foregrounds audiences' agency and ability to exercise at least some control over their information environment (Tully et al., 2022). Finally, in the digital age, it is necessary to account for a skills component of media literacy (Guess & Munger, 2023; Hargittai et al., 2019): A user often must access and navigate multiple devices, apps, and programs, whether for routine media consumption or specific informational needs. Access to devices might also be restricted due to blackouts, power shortages, internal displacement, and the absence of a permanent place to live—when people find themselves "in-between spaces" (Neag & Berger, 2020). Material access, as a precondition for staying digitally active and informed, is critical here (Bozdağ, 2024; Pavlova & Rohozha, 2023). Therefore, the study synthesizes several previous definitions of media literacy as *the ability to partially control one's information environment through access to diverse and reliable sources, technical skills, and adaptive sense-making practices.*

2.2. Media Literacy During the Russian-Ukrainian War: Overview of the Challenges

The Ukrainian population remains the primary target for Russian disinformation campaigns and psychological warfare (Hoskins & Shchelin, 2023). With that, the impact of Russian disinformation is sometimes exaggerated (Bokša, 2022; Erlich & Garner, 2021). Interestingly, when compared with the rest of the EU, the societies in Central and Eastern Europe are highly aware of disinformation while being less concerned about its potential implications (Bokša, 2022). These societies also often view the authorities as responsible for taking the lead in tackling disinformation (Bokša, 2022). According to the Media Literacy Index, Ukraine traditionally gained lower ranks, joining other Central and Eastern European countries in the 4th out of five clusters. However, in 2023, Ukraine was ranked in the 3rd cluster, demonstrating improvement in media literacy skills (Lessenski, 2023). This might also indicate growing awareness and resilience to disinformation of Ukrainians during the full-scale war.

Before the regulatory changes following the Russian invasion in 2014, the Ukrainian media landscape was to a large extent shaped by oligarchic ownership and political power struggles, as well as by Russian efforts to penetrate and control the Ukrainian media market (Ryabinska, 2017; Szostek & Orlova, 2023; Yanchenko et al., 2023). The persistence of contested narratives and profound media distrust (Pasitselska, 2022) played into the efforts of Russian propagandists, whose goal is to confuse the Ukrainian and international publics and to persuade them of the justness of Russian state narratives (Pomerantsev, 2019). In response to a massive propaganda effort, Ukrainian authorities restricted access to media content and websites (including social media and search engines) of Russian origin and sanctioned some "pro-Russian" Ukrainian news sources (Szostek & Orlova, 2023). After the full-scale invasion, together with a state of emergency and martial law, the news programs of the main Ukrainian TV channels were unified into a daily, single, hours-long news broadcast focused on the war. This new platform balances the wishes and needs of the state in times of war with journalistic integrity and the trust of the audience and provides a large share of official information about the war and the economy (Ekman & Nilsson, 2023). Consequently, media literacy education should adapt to the conditions where enemy propaganda disguises under "the alternative point of view" (Yanchenko et al., 2023), and where state censorship can be justified if it protects national ontological security and democracy (Szostek & Orlova, 2023).

The Russian-Ukrainian war is a digitally networked war on an unprecedented scale, shaped continuously through personalized information feeds across multiple platforms (Hoskins & Shchelin, 2023). The news media environment is increasingly hybrid, with (anonymous) Telegram news channels gaining a multi-million audience at the beginning of the full-scale invasion (Ukrainian Media and Communication Institute, 2023). Citizens can constantly check the official news broadcast against social media, messaging groups, and word of mouth from the increasingly connected soldiers (Horbyk, 2022) and relatives living close to the frontline (Pasitselska, 2022). This mediatized context links people's everyday practices to the war unraveling in their smartphones (Boichak & Hoskins, 2022). Witnessing digital war means using (or refusing to use) multiple digital and mainstream sources; knowing what kind of media ecology is represented by each of these; and being able to adjust this ecology to one's own needs.

The Ukrainian hybrid media environment's unique characteristics, along with propaganda, confusion, and censorship in times of war, present a constellation of media literacy challenges for Ukrainian older adults. In these circumstances, the key aim is the control over the information environment: First, the users need control to stay informed, and second, they need control to avoid manipulation and disinformation. In this light, the study asks:

> RQ: What media literacy practices and skills (would) allow Ukrainian older adults to exercise and retain some control over their information environment during the war?

3. Method

3.1. Survey

The survey was conducted by the Kyiv International Institute of Sociology (KIIS) from May to July 2023, as a part of a national public opinion poll: 1,186 respondents aged 60 and older, residing in all regions of Ukraine, were polled via computer-assisted telephone interviews based on a random sample of mobile phone numbers.

The statistical sampling error does not exceed 3.2%. Due to budget constraints, the number of questions was limited, and the scales were not applied. Thus, the survey can demonstrate only a descriptive overview of the participants' media literacy competencies, as a supplement to the focus group data. The survey design was based on the Deutsche Welle Akademie media literacy program questionnaire. Some variables were also adapted from Hofer et al. (2019). Supplementary File A contains the table (Table 1) of average percentages and the table (Table 2) of percentages by gender, age group (60–69 and 70+), type of dwelling (urban or rural), and macro-region (West, Centre, South, East).

3.2. Focus Groups

3.2.1. Participants and Recruitment

The study draws on six online and two offline focus groups, conducted in eight Ukrainian oblasts (regions), involving 65 people (31 men and 34 women) aged 60 to 77. Two offline focus groups (in the Kyiv and Ternopil oblasts) were convened of internet non-users and six online groups involved participants with different levels of internet use proficiency. The recruitment of participants and focus group discussions were organized by KIIS. Prospective participants were contacted based on the KIIS pool of mobile phone numbers. The screening procedure was used to ensure gender and background diversity within groups and to assign the participants to online and offline groups. During the screening, participants were asked about their gender, age, financial situation, regional location and settlement type, displacement status, as well as their news consumption and digital technology (computer, smartphone, and internet) use. The respondents represented Kyiv (8), Ternopil (8), Mykolayiv (9), Dnipro (8), Kharkiv (8), Odesa (8), Khmelnytskyi (8), and Cherkasy (8) oblasts in Ukraine. Some of the focus groups' participants were displaced from other regions. To protect their privacy, the information from which region they were displaced was not collected in the study. The author participated in online focus groups as a second moderator. Participants received remuneration (± 15 USD).

3.2.2. Data Collection

After getting acquainted with educational materials (e.g., about types of devices and digital platforms), focus group participants discussed their news consumption, digital devices and app use, and attitudes towards journalistic media. They were also asked to conduct a sorting exercise to choose which news pieces they trust more, including a newspaper article, a Facebook post, a post in the anonymous Telegram channel, and a mock message from a WhatsApp group (participants were asked to imagine that this is their WhatsApp family chat). There was no graphic content or descriptions of violence in the news items. The average focus group duration was around two hours. The focus groups were videotaped.

The videos were transcribed by the KIIS and checked by the author, then the videos were deleted, and the transcripts were pseudonymized. Pseudonymization retained information on the gender, region, and displacement status of the participants. The study design was approved by the Institutional Review Board at the University of Groningen.

3.2.3. Data Analysis

Qualitative-inductive analysis was employed to identify central themes relying on the grounded theory iterative procedure (Corbin & Strauss, 1990). Analysis was conducted with the Atlas.ti software. The first round of reading included familiarization with the data and formulation of codes and categories (Braun & Clarke, 2006). During the subsequent iterative coding and comparison of the codes within and between the categories, five final categories were formed: digital literacy, infrastructure, news consumption, information search, and privacy. The "digital literacy" category describes participants' broad understanding of the internet, their perceived needs, and feelings about digital inclusion/exclusion. The "infrastructure" category describes technical aspects of internet access, for example, the distribution of devices in the family. The "news consumption" is the broadest category, further divided into "news routines," "news fact-checking," "news values and folk theories," and "news overload." The "information search" category describes the available sources of information and search procedures across platforms. Finally, the "privacy" category describes attitudes towards privacy and measures undertaken to protect personal data in banking, social media, devices, and messaging apps. As a next step, the categories were synthesized, and three central themes (access, efficacy, and resilience) were identified. Each theme includes obstacles, coping strategies, and needs of older adults.

4. Findings

The study found that news plays a central role in the everyday lives of Ukrainian older adults, especially since the full-scale invasion. The survey data shows that respondents use the internet predominantly for news (88.5%), keeping in touch with family and friends (85.1%), and information search (83.2%). In focus groups, participants similarly shared the experience of perpetual news consumption and information overload since the start of the full-scale invasion, and the impression that the news and politics became much more central in their daily lives. This forced participants to come up with new "filtering" strategies and more sophisticated news consumption routines. While the challenges were similar across the sample, the practices and coping strategies differed between village and city dwellers, as well as between older (70+) and younger (60–69) participants. Older and rural study participants tended to consume traditional media sources (mostly TV and radio) and more often relied on family and relatives to provide them with additional information. Younger and urban participants were more eager adopters of new technologies, including messaging apps. While many of them also relied on their children and family members to install the apps and to choose the news channels for them, they gradually got used to the new media environment and often further tuned it to their needs (e.g., reducing the number of channels, adding local or national channels). The findings overall demonstrate the partial autonomy of Ukrainian older adults in their media use and point at several "weak" or "blind" spots that can be addressed with media literacy interventions. In what follows, I will discuss media literacy obstacles, coping strategies, and self-assessment of needs in three key domains: access, efficacy, and resilience.

4.1. Access

On the level of access to devices and sources, the study found two sets of obstacles to exercising informed and autonomous control over older adults' information environment: material conditions and preconceptions about the internet.

The first set of obstacles comes from the problematic material and infrastructural conditions, exacerbated by the war. The obstacles include the absence of electricity (especially on the previously occupied territories), lack of certain devices (some people have only a radio or a TV set, or a "dumbphone"), weak TV broadcasting signal and weak bandwidth connection, limited number of TV channels, and high costs of internet connection or newspaper subscription. According to survey data, two-thirds (60.6%) of Ukrainian older adults have access to a mobile phone with an internet connection and 39.2% have access to a personal computer or tablet. A mobile phone is the device most frequently used to connect to the internet (43.1% use a mobile phone, compared to only 17.8% who use a computer). Access to the internet is significantly lower among older (among 70+ 50.1% do not use the internet) and rural respondents (50.1% do not use the internet). In the focus groups, some participants emphasized that they do not consider the internet a survival need, and so they do not spend their limited resources on it. These obstacles cannot be resolved with media literacy interventions and should be addressed on a societal level.

The second set of obstacles concerns people's understanding of the internet as unsafe or unworthy of time or attention. These "folk theories" or collective perceptions were especially prominent in the two non-user focus groups. Among these perceptions, the following categories were identified: fear of scammers, awareness of surveillance, fear of addiction, and belief that the internet is an "information junkyard." Awareness of surveillance specifically pertains to the living experience of hybrid warfare where, according to the participants, domestic and foreign security are constantly monitoring civilian communication channels:

> M, Ternopil oblast: I think that Viber is not securely protected. The program [software] is written in this way. When I hear on the radio how they record those rus-shists' phone talks and then put them on air…

How would participants compensate for the lack of (especially digital) access when they need to find or check information? The two most common solutions are distributed access and reliance on close others' help. In the first case, older adults typically use the devices available at home (their children's or grandchildren's smartphones or laptops); in the second case, they either ask their family, friends, or neighbors to find certain information for them or just wait to be informed. For example:

> F, Kyiv oblast: Once I needed an address, urgently, and I have this "dumbphone," so I asked my son, and he sent me an SMS where this address is.

However, in times of war, the system of distributed access and mutual help is especially precarious. Families are often separated, and extreme situations require fast and reliable information (for example, from governmental services or local administration), which is sometimes disseminated through grassroots digital networks (see Pavlova & Rohozha, 2023). Autonomous connection and navigation of digital devices and communication channels therefore can be considered as one of the critical media literacy competencies in times of war.

How do participants reflect on their lack of access? Some are satisfied with having their support networks in place, so they feel no need to improve or diversify their media access. In a few cases, participants limit their internet access out of the conviction that the internet or online news exposure is harmful to them. In most focus groups, however, participants concluded that not simply access, but autonomy should be a priority when it comes to media literacy education (see also Reneland-Forsman, 2018). For instance, the Kyiv oblast focus

group (non-users) agreed that while family assistance is available for them, they do not always feel comfortable asking for it:

> F1: …So not to bother them, because my son is always busy, "leave me alone."
>
> F2: They have no time.
>
> F1: Nor willingness. They have their own lives.
>
> F3: Yes. They also show me so fast. Here, one-two-three, everything clear?
>
> M1: If it's your son or grandson explaining, they have no patience.
>
> M2: If you live together, it is doable. I don't have anyone, my niece is far away, and she's always…Vilnius, Brussels, here and there. How will I manage?
>
> F1: Only courses can help.
>
> F4: Only courses.

4.2. Efficacy

After gaining stable and autonomous access to digital media, older adults should also be able to navigate the media environment. The study shows that the participants' perceived ability to control their media environment affects their motivation to use the media and the effort they invest into fact-checking. Following Ashley et al. (2017), the study further distinguishes between the participants' internal and external efficacy. Internal efficacy here means the ability to control one's own media use (e.g., by having the right skills), while external efficacy means the ability to influence the broader public sphere with one's activity (e.g., by voicing opinions online). In terms of external efficacy, if one thinks their informed opinions do not matter to society, they will not invest their time and effort to consume or fact-check news (see also Pasitselska, 2022). Hence, perceiving oneself as a citizen would entail using the media's civic and not only domestic functionality (see also Caliandro et al., 2021).

4.2.1. Internal Efficacy Obstacles: Gender Roles, Censorship, and Disrupted Media Sphere

Survey respondents were overall rather confident in their ability to distinguish false from truthful news (70.2% in traditional media and 60.5% on the internet) and to assess the quality of information (71.3% in traditional media and 62.7% on the internet). The focus group discussions confirmed these findings, demonstrating awareness of propaganda and censorship and understanding the differences between opinions and facts. Study participants mentioned a range of fact-checking techniques, including cross-checking sources (e.g., comparing TV and Telegram news), consistency heuristics, and diversification of sources. With that, there were some factors, such as gender, that seemed to influence the level of confidence. The survey finding that men are more confident in their internet use than women (see Supplementary File A, Table 2, Q7–8) was also reflected in the responses of some of the female focus group participants:

> F, Kyiv oblast: Well, we are girls, let's put it that way. We don't want to go deep into it.

Statements about not having enough time for news and media use were also coming predominantly from female participants:

> F, Odesa oblast: I don't have time to sit and watch TV. We live in the village, so we need to dig up potatoes and harvest, and water everything….My vegetable garden is 12 "hundreds" [0.12 hectares]. I need to harvest and feed my grandchildren and great-grandchildren.

Having to care about their families and their homes, some women consider media consumption as a leisure activity. While traditional media consumption can accompany household duties (e.g., listening to the radio or TV while cooking), digital media consumption requires attending to screens and hence is incompatible with other household activities. Podcast is still a medium largely unexplored by older adults in Ukraine.

Perceptions of censorship affect older adults' news consumption as well as expression online. On the one hand, older adults are acutely aware of state censorship of TV news and feel the need to augment this limited picture by using alternative sources:

> F, Ternopil oblast: Before the war, there were other TV channels, and I could compare. Now it looks like—I understand that there is a war, but it's not an argument for me—it looks like "Glory to the Soviet Union and the Labor Union, and the head of the Labor Union."

On the other hand, the respondents in many instances agree that state censorship is necessary, and they wish to join the collective effort to keep the enemy blind. For instance, they would refuse to communicate information about their neighborhood being shelled online or to talk about Ukrainian military affairs with their relatives in Russia or Belarus. The tension between the willingness to be informed and to comply with the state regulation of wartime is sometimes resolved by letting go of the control over their information environment:

> F, Ternopil oblast: We are allowed to know as much as they give us this information. We don't have another choice, and we all understand perfectly well that it's not the whole picture. We should not know the whole picture either. We must believe what we are told. And the truth we will find out many years later.

This coping strategy might be a viable alternative to extensive fact-checking, especially given the challenges of information overload and exposure to large amounts of emotionally triggering content. In any case, media literacy educators need to account for the informed choice of "governmental censorship care" and to respect such choice.

Lastly, the perceptions of the disrupted media sphere make respondents more reluctant to invest their time and energy into news consumption and fact-checking:

> F, Kharkiv oblast: When the war began, I started to watch the news, and I felt such apathy, so I stopped. I switched off Telegram channels and stopped watching anything.

These perceptions might be exacerbated by the abundance of Telegram and Viber news channels (many of them anonymous) that do not adhere to any journalistic standards (see Ukrainian Media and Communication Institute, 2023). While users can sense that the channels are not trustworthy, they often continue using them, because they need to stay informed:

> F, Dnipro oblast: I think that in Telegram there is a lot of disinformation [*vkidov*]. And I filter some of them. I deleted the app three or four times during the war already but then installed it again.

Some users, though, while acknowledging the ongoing disruption (due to the Russian propaganda efforts, information influx, or abundance of different media and platforms) also establish filtering techniques that they apply consistently in their media use:

> M, Kharkiv oblast: I throw away bloggers and some dubious Telegram channels, and Facebook channels. I throw away all the "analysts" because they are just self-appointed experts. I will go to some online news websites, Ukrainian ones, or if it's about foreign news, then BBC if it's about Britain, or Washington Post and New York Times if it's about the US.

These users have established a routine that enables them to regain control over their information environment. Other users, however, might distrust journalistic and official sources, and then find themselves amidst the "information junkyard" where "everything can be fake." Such perceptions foster helplessness and disconnection from the news. Potentially, these perceptions also influence the way older adults see their role in society—as "an ordinary person" who cannot judge the information well and by extension cannot participate in a political process:

> M, Mykolayiv oblast: There's a lot of information, too much. We can't in our heads…how to say, filter it, right? Whether it is true or not—I am not an analyst, I can't tell. I am an ordinary person, an ordinary retired person.

4.2.2. External Efficacy Obstacles: Lack of Agency, Surveillance, and Algorithms

External efficacy assessment decides whether a more extensive media use (like expressing one's opinions online or taking measures to ensure one's privacy) is worth the effort. Except for a few civically active participants (i.e., who defined themselves as "activists"), older adults in this study did not talk much about their experiences of creating content or expressing opinions online. In most cases, they were "passive" consumers of information. Online fora were perceived as spaces imbued with uncivil and negative expressions, and unfit for sharing private thoughts and experiences:

> F, Kharkiv oblast: I do not stop myself from writing something. I just don't have a negative mindset, so I don't have anything to write. Political issues are all open now. I don't have any deep political insights; I don't have any intelligence information. I don't have anything to sell, and I don't worry about it. So, it's just my domestic….Or my thoughts. It's nobody's business.

This general attitude corresponds with survey findings, where only 31.2% of respondents acknowledged expressing their opinions on social media, and even less (18.6%) said they commented on materials on news

websites. However, many older adults are active Viber and Telegram group users, and not just in a "lurking" capacity. For example:

> F, Cherkasy oblast: The first thing I do in the morning, I open Viber, and check whether my brother was online. He is at the frontline….If yes, then thank God everything is fine. Then I turn on the news….I talk to my former classmates, we send each other messages on Viber about what happened, and about the news.

Another consideration that limits participants' expressions online is the awareness of the pervasive enemy and domestic surveillance. Most of the respondents were sure that they should limit their war-related communication on electronic devices because they can be hacked. Some also had theories regarding the protection of specific apps, for instance, given the origin of the apps' creators:

> M, Kharkiv oblast: I don't chat at all on WhatsApp and Viber, only about kittens and flowers. Because WhatsApp is a Belarusian-made app, and Viber is Russian-made.

However, the perception of pervasive surveillance can also lead to feelings of helplessness when trying to protect their online privacy, and some of the respondents might just give up on trying to protect their devices:

> M, Cherkasy oblast: I'm not afraid. I know and I am sure that they can listen to information, track, and hack. If you use the internet, everyone can know it.

Almost all the respondents were vigilant when it came to protecting their bank accounts and other financial information. In contrast, respondents were rather indifferent towards protecting social media accounts, or their devices. Many responses to the question about the measures they take to ensure their privacy sounded the same: "I am an open person; I do not have anything to hide." This unanimity might point to a generational norm according to which protecting and hiding personal information is perceived as suspicious. Additionally, some participants were sure that since they are "just pensioners" who do not possess "secret information" or large sums of money, nobody can have malevolent intentions toward them:

> M, Odesa oblast: Nothing is password-protected, neither smartphone nor Facebook, nothing. Only if it requires a password, my children will put in something and I'm content with that. I don't see any point in it. I'm not a millionaire.

Another "blind spot" for the respondents was the algorithmic curation of search engines and social media. According to the survey, information search is among the highest priorities for internet use among older adults (83.2% use the internet for the search of information and advice, and 67.9% use search engines). However, most of the focus group participants could not come up with clear strategies for information selection from their search. The only criterium concerned the origin of the source: whether it was a Ukrainian or a Russian source, since many of the participants recognized that Russian sources are blocked on Ukrainian territory. The most common strategy was to click on the first link on the page, then the second, and so forth. Nobody acknowledged, though, that the first link can often lead to sponsored pages and advertisements. While 74.9% of the survey respondents agreed with the statement "I understand that social

media suggest information for my news feed," only 49% could agree that they understand how to set up their social media feed to get the information they need. In focus group discussions, participants acknowledged frequent use of recommendations from their YouTube feed, but they seldom questioned or reflected on the algorithmic selection of these recommendations.

4.3. Resilience

Navigating the media during the war is mentally exhausting. It requires developing strategies and techniques to stay up to date with the news about attacks on a civilian population and other war crimes while taking care of one's safety under lack of sleep due to constant air raid alarms. The participants shared very similar accounts about the beginning of the full-scale invasion, when they were "glued to their phones" and experienced anxiety and information overload. For example:

> F, Dnipro oblast: When the war started, I switched off work completely. I couldn't do anything; I was just sitting in front of the TV and on my smartphone and watching how it would evolve.

During this time many of the participants started watching the news (some of them ignored political news before the full-scale invasion) and installed Telegram or Viber on their devices or added broadcasting news channels and local groups to family chats they had before. Some also installed a home internet connection. Gradually, the participants elaborated coping strategies that they often refer to as "filtering." Filtering includes selecting trustworthy sources, excluding suspicious sources, diversifying the sources, reducing the sources to strictly official information, or reducing the time for consuming news:

> F, Kharkiv oblast: All these events in Kharkiv, we live so close to everything that was happening, and there was no other information. This [Telegram] channel quickly informed us. Then I got disappointed, I don't like this swiftness. One second, and they already write about what has been destroyed, how many killed….Even before the explosion the information is already coming, and who knows.

However, even after filtering the sources and reducing news exposure, some participants still find it challenging to cope with the inner demand to be constantly attentive to news, especially during the air raid alarms. Perpetual news consumption is a notable practice among many of the study participants, which sometimes leads to negative effects on their mood:

> F, Ternopil oblast: But when air raid alarms sound across the country, I can turn my phone on even at night, because…I'm worried. This feeling…not of guilt, but of helplessness that I can't change anything, can't help.

These feelings can lead to disconnection from the news, which entails redistributing news-watching responsibilities in the family (e.g., "I live with a relative, she watches the news and retells me what's going on"), limiting news channels to only local news, watching only the censorship-approved news program, or reading only "positive" news (e.g., based on emojis responses under posts in the Telegram feed).

To sum up, the study participants came up with a range of strategies and techniques that enabled them to cope with information overload that followed the beginning of the full-scale invasion. However, they would

still benefit from resilience-boosting interventions that would address the tension of staying both informed and sane, especially as the full-scale war keeps citizens constantly alert.

5. Discussion

This research set out to explore media literacy practices and skills that older adults apply to control their information environment in times of war and to assess their existing needs. It demonstrates that Ukrainian older adults developed fact-checking routines, limited their consumption, and increased reliance on governmental sources to cope with information overload, anxiety, and grief, while also keeping up to date with the news. In the following, I discuss the study's takeaways in the domains of access, efficacy, and resilience.

Confirming that media literacy, in practice, is a distributed competency (Rasi & Kilpeläinen, 2015), this study emphasizes the precarity of mutual help networks. It points to the need to further develop older adults' autonomy when it comes to "borrowed knowledge" (Reneland-Forsman, 2018). Autonomy should be prioritized to mitigate the risk of (digital) disconnection and its consequences for older adults' physical safety. Importantly, media literacy training cannot solve material and infrastructural problems: Sometimes governmental investment is needed to provide older adults with devices, internet access, and time and safety to focus on anything beyond immediate survival.

Complementing previous studies that focused on digital divide determinants, such as education and socio-economic status (Ivan & Cutler, 2021), the study shows that gender stereotypes and the lack of civic agency can affect older adults' application of media literacy skills (see also Caliandro et al., 2021; Pasitselska, 2022). With that, this study points to overall older adults' self-efficacy in the face of swarming disinformation (cf. Rasi & Kilpeläinen, 2015; Reneland-Forsman, 2018). Their described practices and competencies, such as general skepticism, cross-sources consumption, knowledge about media ownership, and understanding of journalistic norms, demonstrated a good level of media literacy (Erlich & Garner, 2021; Mandache & Ivan, 2022). Despite that, from the descriptive survey and (partially online) focus group discussions, we cannot fully understand the application of media literacy (Tully et al., 2020). A broader survey and experimental or ethnographic studies should be conducted to confirm these conclusions and expand our understanding of older adults' competencies.

Older adults' media literacy knowledge and skills can be improved by transferring existing competencies from the traditional to the new media environment. Participants' confidence may be partially unfounded when it comes to the use of social media, messaging apps, and search engines as information sources. The abundance of Telegram and Viber channels, and the need to develop filtering techniques to distinguish between governmental, journalistic, and anonymous sources were challenging for many. Similarly to Zarouali et al. (2021), the study found older adults' weak understanding of algorithms, including those that operate search engines. Search engines have been recently identified as a source for spreading disinformation and conspiracies, especially when googling in Russian (Toepfl et al., 2023). These threats, together with older adults' inability to explicate their information search and validation criteria, necessitate adding search engine use to media literacy curricula. While it is clear that older adults perceive search results as a bundle without differentiating page outline elements such as advertised content, future studies should unpack other aspects of their intuitive use.

Information overload and the pressure to constantly keep up with gruesome news required an additional set of skills, related to informational and psychological resilience. Importantly, Ukrainian older adults are not traumatized only due to exposure to mediated suffering (Pinchevski, 2019), they are experiencing shelling, air raids, and forced displacement as embodied witnesses. From the media literacy point, affective proximity to conflict clashes with the need to verify information from an objective distance (Al-Ghazzi, 2023). Moreover, collective witnessing of war creates a shared existential situation of a community "linked by their common predicament of subjection to a fate they cannot control but have to endure" (Chouliaraki, 2010, p. 70). In this state of mind, normative, ideological, and identity-driven readings are prioritized over epistemic considerations (Pasitselska, 2022). But even when epistemic engagement is possible, can we demand from citizens to fact-check, considering that verification can result in additional traumatization? As everyday media saturation forces citizens into a perpetual state of crisis-readiness (Frosh & Pinchevski, 2009), installing barriers to media exposure might be necessary. The tension between epistemic and affective engagement poses a specific challenge for media literacy application during crisis and war. Staying informed while staying sane is one of the most important and complex tasks for Ukrainians in times of war, and media literacy programs have yet to design interventions that could tackle this challenge.

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Data Availability

The survey data is available in the supplementary material.

Supplementary Material

Supplementary material for this article is available online in the format provided by the author (unedited).

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