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The rural risk of digital exclusion: A case study of municipal digital health and social care services in Denmark

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A B S T R A C T

Digital solutions have the potential to contribute to a stronger inclusion of the rural population in health and welfare services in times of a more scattered infrastructure. However, in Denmark where there is a strong push towards a digitalization of these services, the demographic profile of the rural population, being older and with lower levels of education, implies that a large part of the population in digitally vulnerable positions resides here. In this article, we therefore focus on the risk of digital exclusion in rural areas. Drawing on interviews with frontline professionals involved in the provision of (partly) digitalized services and a volunteer, and on insights from a stakeholder workshop, we provide an investigation of both the mechanisms of digital exclusion and of how these are (at least partly) mitigated in the context of the provision of digital services by health and social care units of two Danish rural municipalities. Drawing on the concept of digital capital, we identify several preconditions and contextual aspects, such as cognitive impairment, that in combination with missing digital capital leads to digital exclusion, and we show how social capital such as family and acquaintances mitigates digital exclusion and the lack of a high enough level of digital capital in various ways. We demonstrate the analytical potential of digital capital and the capital perspective, as it both can open-up practice-oriented insights as well as clarify how the individual's opportunities for acquiring or compensating missing digital capital are related to societal inequalities.

1. Introduction

Health inequalities between urban and rural areas are on the rise, also in Denmark (Vedsted & Frøhlich, 2023). One reason for this is an ever more centralized provision of care services. Infrastructure in rural areas has become more scattered, and distances to e.g., the nearest clinic are longer than in cities, which leads to unequal access to health and social care services. It has been shown that the urban population uses these services more, even though the rural population is older and characterized by a higher share of chronically ill citizens (Bihrmann et al., 2023). Based on the hope that the incorporation of digital elements may ensure an adequate level of care provided in a cost-effective way, digitalization has been touted as a big part of the solution, also when it comes to combating geographical inequalities.

Solutions such as online consultations with care professionals can be an effective means to overcome distances, and thus can facilitate access to services. Research indicates that, if implemented in a way that is sensitive to social aspects, digital elements can contribute to strengthened services and even strengthened relations between providers and citizens. (Pols, 2012; Schneider-Kamp & Fersch, 2021). However, providing technology and access is not enough to create digital inclusion; users also need to know how to use it in a way that is beneficial (Park, 2017). A recent study shows that 28% of the population in the most rural areas in the region of Southern Denmark do not have such competencies when it comes to digital health solutions, as compared to 11% in the most urban areas (Digitale sundhedskompetencer i Syddanmark, 2023). The demographic profile of the rural population, being older and with a lower level of education (Kirkeministeriet, 2023), highlights a paradox: although digital services can bridge distances (e.g. Schneider-Kamp & Fersch, 2021), a large part of the population in digitally vulnerable positions resides in rural areas and may not benefit from such services.

The risk of *digital* exclusion from health and welfare services, including its rural and spatial dimensions, is, however, very little explored in the research literature. As van Gerven (2022) states in her reflections on welfare state digitalization:

> Although we know about the risks of exclusion and vulnerabilities in the digital age, we know very little about the mechanisms of digital exclusion and inclusion and how and by whom these can best be mitigated. We also need better empirical evidence of new social risk categories and how technological risks are defined as risks (van Gerven, 2022, p. 259).

Since they are at the forefront of public sector digitalization (DESI - Digital Public Services 2020, 2020; DESI - Digital Public Services, 2021; DESI - Digital Public Services, 2022), Nordic countries represent exemplary contexts for studying the impact of this development. The

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Nordic countries provide comprehensive public health and welfare services that have been pushed to adopt and utilize digital tools and technology in the provision of care. In addition, the COVID-19 pandemic served as a catalyst for digitalization. Even among the Nordic countries, the top-down "digital-by-default" approach to public sector digitalization adopted in Denmark stands out as being particularly coercive (Schou & Pors, 2019), thus exacerbating the risk of digital exclusion.In this context, Winthereik and colleagues argue that

> for many people – even in some of the world's most digitalized societies - public services are inaccessible when delivered by or accessed through a digital platform. (Winthereik et al., 2024, p. 19–20)

This describes very well what digital exclusion means in the context of a contemporary Nordic welfare state. Parallel to definitions of social exclusion, which is described as a multi-dimensional process that leads to a lack or denial of resources or rights or the ability to participate (Taket, 2009), digital exclusion[1] can also be described as a multi-dimensional process leading to the lack of certain resources or access. This exclusion is not limited to the digital worlds (e.g., social media participation), but, due to the extensive digitalization of Nordic welfare states, can also lead to social exclusion, e.g., from social rights and services.

Therefore, in this article we provide an investigation of (1) the mechanisms of digital exclusion, i.e., the interrelation of individual preconditions, practices, and outcomes (i.e. digital exclusion/inclusion) using the concept of digital capital (Park, 2017) and (2) how these are (at least partly) mitigated by other forms of capital in the context of the provision of digital service by health and social care units of two Danish rural municipalities, connecting the concept of digital capital with the other forms of capital (Bourdieu, 2002b). This approach goes beyond the mere identification of who is at risk (e.g., the older citizens with a lower level of education), providing a more in-depth understanding of how this happens and how the risks of exclusion may be mitigated. We identify several preconditions and contextual aspects, such as cognitive impairment, that may, in combination with practices characteristic of missing digital capital, lead to digital exclusion (1) and discuss how social capital such as family and acquaintances may mitigate digital exclusion in different ways, including by being helpers that take over digital tasks or by offering incentives or training for citizens in digitally vulnerable positions to build up their own digital capital (2).

A technical understanding of the terms 'risk' and 'vulnerability' would imply that vulnerability is understood as a weakness where the hazard of risk might predominantly be expected to occur. In contrast to that, in this article we are adopting a critical, sociological view, that emphasizes the social embeddedness of risk and vulnerability, including the important aspects such as power, emotions and social relatedness (Zinn, 2008). In a similar vein, Rozmarin (2021) argues that a critical (and feminist) understanding of vulnerability not only includes the effect of adversity and potential victimhood, but also the potential of agency within social embeddedness and context. The two focal analytical points in this article, namely the analysis of the risk of digital exclusion by employing a digital capital perspective (i.e. one that acknowledges systemic and structural and thus power-related aspects related to the unequal distribution of capitals) and the question of how social capital, i.e. social relational solutions might enable the individual to mitigate the exclusion risk, are very much characterized by these critical perspectives.

Our findings have practical as well as theoretical implications: on an applied level, they can serve to inform care professionals and the social networks of people in digitally vulnerable positions about how to support them in a way that fosters their digital skills; and at the same time, they demonstrate the analytical potential of the concept of digital capital that both can open-up practice-related insights and at the same time makes clear how the opportunities of individuals for acquiring a high enough level of digital capital or to utilize one's social capital compensating for this lack is strongly related to social inequalities within society.

1.1. State of research

Although there had been a strong push towards the digitalization of the welfare state in Denmark and the other Nordic countries since more than 10 years, questions of its potential consequences for exclusionary dynamics have only started to be studied in recent years (Winthereik et al., 2024). While there is a rich literature informed by Science and Technology Studies on emerging practices e.g. in telecare that can be of relevance for questions of exclusion and inclusion (e.g. Kolehmainen, 2024; Pols & Willems, 2011) in this section we focus on the nascent research literature on digital exclusion from health and welfare services.

Since 2013 the Danish approach to public sector digitalization can be described as 'digital-by-default'. This means that any access to the public sector should take place in a digital way "by default", and opting out is an active choice (by clicking a certain field) (Schou & Pors, 2019). Since 2021, the digital gateway to the public sector has been a platform called MitID. As of March 15, 2024, 96% of the population in Denmark over the age of 13 used MitID (Digitaliseringstyrelsen, 2024), thus almost everybody was—at least officially—digital in their access to the public sector.

However, there is growing evidence that despite this, certain groups in society have difficulties using digital technology and accessing welfare and care services. Between 17 and 22 per cent of all adult citizens in Denmark can be characterized as being in a digitally vulnerable position (Digitaliseringstyrelsen & Kommunernes, 2021). The group of citizens in digitally vulnerable positions includes older people, young citizens with social, financial, and mental problems, citizens with an immigrant background, and citizens with low or no education. (Schou & Pors, 2019). However, the exact characteristics of and circumstances that apply to citizens in digitally vulnerable positions, particularly when it comes to access to digitalized care services, are not yet fully understood. The following aspects have been emphasized by the research literature:

Ragnedda et al. (2022) argued that there are three dimensions of the digital divide, i.e., dimensions that may lead to digital exclusion, namely access to technology and networks, the competencies to use them, i.e. digital skills, and the meaningfulness of the use of technology, including reaping its benefits. In their survey-based quantitative analysis of the two latter dimensions in the UK, Ragnedda and colleagues found that the parts of the population that are faced with social exclusion, characterized by lower education, higher age and lower income, are also at a higher risk of digital exclusion both regarding skills and meaningful use. Buchert et al. (2024) focused on a particular group of the population faced by risks of social exclusion, namely female migrants in Finland. In their study on this group's risks of exclusion from public and private digitalized services, they found three barriers of inclusion, namely the lack of comprehensive digital skills, the lack of comprehensive (Finnish) language skills, and the lack of skills to navigate the health and welfare system. Vercruyssen et al. (2023) studied the lack of basic digital skills among older people in digitally vulnerable positions in Belgium with no or very limited prior digital knowledge, drawing on experiences of digital skills instructors. Their findings indicate that the older people studied have a considerable need for very basic digital skills instruction, which is underestimated in most studies.

As Lupton (2013) argued, the incorporation of digital elements into health and care services often contains necessary user practices, such as self-monitoring of diseases and their treatment, and self-care, e.g., under the guidance of screen-consulting care professionals, a certain level of active user involvement is necessary. Thus, a lack of the latter may also have an exclusionary effect. In sum, it is not enough to provide

[1] In this article we use the term 'people in digitally vulnerable positions' to name those who are at risk of digital exclusion.

technology and access to create digital inclusion; users need to know how to use it in a way that is beneficial (see also Park, 2017). Barriers for that are manifold and range from a lack of various skills, mainly digital but also other context-dependent skills, and practices of meaningful, benefical uses of technology. In order to be able to conceptually grasp these multifaceted aspects, we will adopt a capital perspective (Bourdieu, 2002a) with a main focus on digital capital (Park, 2017; Ragnedda & Ruiu, 2020).

1.2. Digital capital and the capital perspective

The research literature indicates that digital inclusion does not merely depend on the simple possession of the necessary devices; neither, it seems, is the required device and a simple intro class (that is, the teaching of digital skills) necessarily enough to provide digital inclusion. Rather, a whole set of knowledge, routines, and practices appear to be needed, and this can be captured by the concept of digital capital. Following Bourdieu, capital accumulates over time and can create benefits for individuals. Capital can be tangible (physical objects such as products or buildings) or intangible (wisdom or social relations). Bourdieu distinguishes among economic, cultural, and social capital, each of which is an important source of power and resources in society. Economic capital includes money and various forms of assets. Cultural capital consists of forms of knowledge and education and includes tangible forms such as educational degrees and books on a shelf as well as intangible forms such as wisdom and understanding. Social capital consists of social contacts and networks, both formal and informal. In this context, digital capital can be described as a specific form of cultural capital with both tangible (hardware and devices) and intangible (knowledge on how to use it) aspects (Bourdieu, 2002b). We are adopting a Bourdieusian perspective of capital as his approach is based on a systemic and structural understanding of the reasons for how capital is distributed; rather than seeing a lack of capital as an individual shortcoming, the unequal distribution of capitals is conceptualized as a consequence of inequalities in society; this can e.g. be seen by the strong link between educational background and digital capital; digital capital (similar to other forms of cultural capital) appears to be systematically tied to more privileged positions in society. In this way an accelerated digitalization of the welfare state has the potential to amplify existing inequalities in health, and the concept of digital capital provides an analytical lens to understand these inequalities.

Like the other forms of capital, digital capital is accumulated over the course of one's life. Park (2017). argues:

> Digital capital captures the essence of how people are exposed to, acquire, and accumulate the capital that is necessary to thrive in a digitalised society. It emphasises that capital creates value. Therefore, by engaging with digital technologies, the individual accrues benefits from their purposeful use. By linking uses with outcomes, digital capital can provide a useful theoretical background to how digital engagement is related to digital inclusion. (Park, 2017, p. 74)

This also emphasizes the longevity of digital capital, meaning that the use and mastery of a previous technology assists the learning of a new one in the future, and skills and engagement will be fostered over time. Thus, like any other aspects of cultural capital, building digital capital requires effort; but once established, it can self-replicate. Bourdieu remarked that because of the transmission forms of cultural capital, it is the capital on which inequality of social background will have the biggest effect, as it will almost invisibly be accrued from the start of one's life in, e.g., access to one's family's bookshelf (Bourdieu, 2002b). This can be transferred to the case of digital capital, as individuals with a higher level of education are likely to, e.g., be confronted with digital technologies in their working life to a higher extent than individuals with a lower level of education, and hence, they are "automatically" accruing digital capital.

The concept of digital capital has been introduced in two books (Park, 2017; Ragnedda & Ruiu, 2020), however it so far has not reached a widespread use in the field of digital exclusion and inclusion despite its potential to offering a differentiated view: It can encompass various necessary dimensions needed for digital inclusion, skills but also practices and intuition etc., as well as it also offers a perspective on the unequal distribution that goes beyond individual reasons. One reason for this might be that both Park (2017) and Ragnedda and Ruiu (2020) offer a quantitative perspective and understanding of digital capital, which might be a hindrance to be adopted by qualitative studies in the emerging field of digital exclusion from the welfare state. Thus, additionally to demonstrating its usefulness for the analysis of digital exclusion, we aim to add qualitative dimensions and interpretations to the concept of digital capital.

Importantly, particularly for the question of how exclusion risks can be mitigated, it must be stated that according to Bourdieu's conceptualization, the forms of capital can be converted and exchanged with each other to gain a specific benefit (Bourdieu, 2002a). For instance, economic capital may be converted to digital capital by, e.g., paying for classes in particular digital skills. For the purpose of our investigation, context-related cultural capital, such as, e.g., forms of health capital (Schneider-Kamp, 2021), may play a role, as described in the research literature (Buchert et al., 2024) where for instance the combination of a lack of digital and a lack of skills regarding how to navigate health and welfare institutions has been shown to contribute to the risk of digital exclusion. Finally, the role of social capital for the mitigation of risk of digital exclusion will be considered, as it has been shown that particularly support by family members is important for digital inclusion (Fersch & Schneider-Kamp, 2025). We are thus in this article analyzing how digital exclusion from health and welfare services emerges, applying the concept of digital capital, and how other capitals are used to mitigate the risk of digital exclusion in the case of a lack of sufficient own digital capital.

2. Methods

The main empirical material of this article is based on two case studies of digitalized services, located in two different municipalities[2] in the Region of Southern Denmark. Both municipalities have fewer than 30,000 inhabitants in their largest city and are characterized by rural areas. Specific services and their implementation were selected as cases because they are seen as representing digitalized services as a social context (Walton, 1992). This enables us to gain insight into concrete practices by citizens and frontline employees, and thereby into concrete instances of how and why these services may have an exclusionary effect. The empirical heart of these case studies comprises two group interviews with frontline professionals and employees directly involved in the provision of the selected (partly) digitalized services in each of the two cases. These interviews were approximately 1 h long, they were conducted during summer 2023, and they centered around the interviewees' experiences with the digitalized services and their users.

The empirical material also includes an interview with a very experienced volunteer who provides health-related volunteer services to older people in several villages and rural areas in one of the municipalities involved in the project. This 1.5-h interview was conducted in January 2024. The latter material provided more general insight into exclusionary dynamics concerning digital health and welfare services.

The empirical material also includes insights from a stakeholder workshop that was held in January 2023 with the aim of exploring possibilities for and challenges of decreasing digital exclusion in rural areas. Recently developed participatory methods such as stakeholder workshops are inspired by participatory design and are based on the idea of including the people who experience or work with the issues at hand as co-researchers, for instance with the aim of generating new ideas

[2] From here on referred to as municipality A and B.

through a creative process, and are thus future oriented (Clemensen et al., 2007; Lupton, 2017). Following this tradition, the stakeholder workshop aimed to generate input for creating stronger digital inclusion in rural areas. However, to achieve this aim, the stakeholders' ideas, and insights regarding what the problem is were also discussed during the workshop. It is mainly the outcomes of the latter discussion that will be included in this article. We have documented the outcomes of the stakeholder discussions (post its by participants and notes, see Fig. 1) and included them in the analysis (see below).

2.1. Overview over informants

Table 1 provides an overview of the research material, and the stakeholders and interviewees involved.

The insights from the stakeholder workshop were documented (see above) and used as input to create the interview guide for the interviews. The interviews were transcribed, and the interviews as well as the input from the stakeholder workshop were coded in NVivo. Codes were derived both beforehand from the research literature and the stakeholder workshop input and bottom-up, in vivo from the interviews. The analysis followed an abductive process (Timmermans & Tavory, 2012), which means that we started the analysis with a broad theoretical understanding of exclusion and developed the theoretical repertoire with a main focus on digital capital after an initial, bottom-up coding and overview. Concerning the abductive process, we started the reading of literature and theory in the field that is concerned with exclusionary dynamics, looking at concepts like digital divide (Ragnedda et al., 2022) or digital literacy (Hartley, 2017) at the same time that we started the analysis with open coding. However, several aspects in our empirical material, like feeling or intuition, or the aspects of language described reminded us as trained sociologists of what we knew about Bourdieu (2002b) 's concept of capitals, especially cultural capital. This led us to search for literature about the use of this perspective to questions of digital exclusions and to digital capital. Further analysis that emphasized the importance of family and social network contacts for digital inclusion confirmed our choice of the capital perspective through emerging insights of what we could understand as the role of social capital.

2.2. Researching the impact of digital capital in practice

For decades, it has been debated how to best study capital forms, and various methods have been applied (e.g. Lareau & Weininger, 2003; Silva et al., 2009; Johs, 2018). One advantage of qualitative methods, such as those applied in this article, is that they enable in-depth insight into how the types of capital work in practice through descriptions of how, e.g., a lack of certain skills plays out in a way that makes meaningful use difficult. In this article, we include qualitative data on individuals who lack capital in one way or another and are faced with exclusionary dynamics. One challenge in this situation is that the people who lack the capital often are unaware of what they are lacking and how. Thus, our analysis is mainly based on interviews and other data from informants who deal with or are in a network with people in digitally vulnerable positions. We recognize that using proxy informants, such as frontline professionals and volunteers, to narrate episodes experienced by citizens in digitally vulnerable positions requires a critical consideration of what motivates such second-hand informants to highlight certain things. Defensive mechanisms—as a form of self-defense—and prioritization, categorization, and control (Lipsky, 1980) may influence to varying degrees how staff present episodes and their degree of self-interest or altruism in this (Grand, 2010). This may also be true to some extent for volunteers (Hustinx & Lammertyn, 2004). The instances we observed, where we had been suspicious of defensive mechanism, however, concerned the presentation of their own behaviour, e.g. when it came to the question if they ever saw personally sensitive information by helping citizens with the log-in in through MitID, which they rigorously denied. This practice is prohibited by data protection regulation, but might in practice sometimes be hard to avoid. Here we can see a potential glossing-over of (legally) questionable practices, that however can be evaluated to not distort the view of the citizens.

Table 1
Overview over research material and participants.

Stakeholder workshop	
Participant type	Number
Municipal stakeholders, municipality A	5
Municipal stakeholders, municipality B	2
Voluntary organizations, volunteers and citizens	4
Researchers	7
Participants, total	18
Group interview case 1: Online (screen-based) out-of-hospital rehabilitation training	
Physiotherapist	1
Occupational therapists	2
Group interview case 2: Digitalization of home care	
Home care workers	3
Individual interview	
Volunteer in the field of health-related services, municipality B	1
Interviewees, total	7
Participants (both stakeholder workshop and interviews)	25

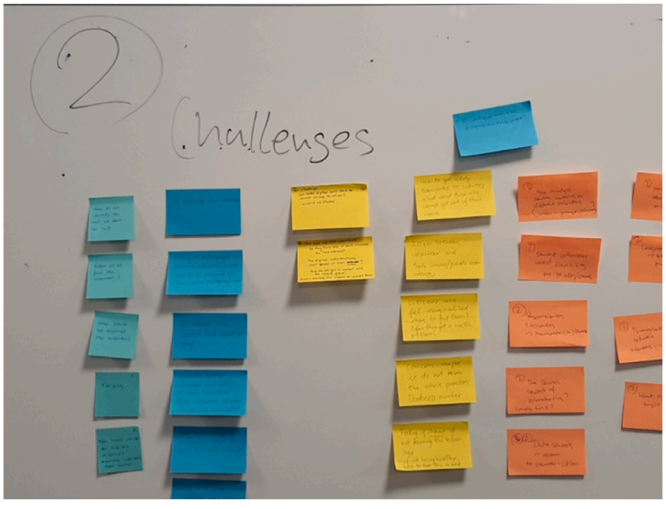

Fig. 1. Issues raised and discussed concerning challenges at the stakeholder workshop.

2.3. Digitalized services: two cases

The case studied in municipality A can be described as partly digital home care. This means that digital elements are introduced to home care services (i.e., long-term care usually taking place in the homes of frail older people). Here, digital elements in large parts refer to the introduction of on-screen visits that, in part and when possible, take place digitally instead of as home visits. The frontline professionals providing and involved with this service are home care workers. This form of digitalization is expected to make the home care workers' working days more efficient, in particular because home care workers must drive quite long distances to reach the homes of their clients due to the rural character of the municipality.

In municipality B, we are focusing on online (screen based) out-of-hospital rehabilitation training as a case. The online rehabilitation training is offered to the "weakest" rehabilitation patients, i.e., those who have difficulties leaving their house and coming to the physical training center due to their disease(s) or impairments. The training takes place in the following set-up: The therapist guides and shows the exercise on her screen, and the participants also do the exercises with their

cameras on, so that they can be seen and corrected by the therapist. The frontline professionals involved in this service include physiotherapists and occupational therapists. According to the interviewed therapists, many of the participants in their training courses are older citizens living in rural areas. Abilities to use a smart phone constitute the minimum digital skills required to be included in the training course. Before the individuals' participation in the training, the team evaluates whether the participants are able to begin participating on their own, or whether a therapist needs to drive to the patient and help them log in or set up the camera and screen. Participants are provided with preinstalled tablets by the municipality in an effort to minimize potential problems with handling the involved technology.

3. Findings

In the following, we first analyze the mechanisms of digital exclusion by presenting the preconditions, practices, and their outcome of digital exclusion as well as by discussing their interrelation with a digital capital perspective. Second, this is followed by an analysis of other types of capital (mainly social capital) used to mitigate the risk of digital exclusion. The presented interview citations have been chosen due to their potential to illustrate analytical links and connections, such as concerning the relevance of certain aspects of digital capital or how social capital works to mitigate digital exclusion in this context.

3.1. Mechanisms of digital exclusion: preconditions, practices, and digital capital

Problems involving hardware or internet infrastructure, i.e., tangible parts of digital capital are mentioned very little in the interviews, and they did not come up in the stakeholder workshop. Due to the set-up of the online rehabilitation training where hardware is provided, this problem is avoided in the case of municipality B. The home care workers in municipality A, however, mention the lack of suitable devices as a challenge to digitalization for several of their care recipients. "*It is this generation … there are many who still have a pushbutton phone*" as one of the care workers remarked. The question of connectivity in rural areas was mentioned only once by one of the therapists in municipality B:

> Yes, the connection can be bad. This can be a challenge. Although it is quite strange, we have tablets with 4G, but there were still some where it just didn't work. I think this is mainly a question of handling. Simply sitting there and swiping on things and making it work. That is the main obstacle.

In that way, the therapist questioned whether the reason was bad connectivity,[3] implying that the real reason may be the problem mentioned the most across all participants: the lack of digital skills, i.e., the intangible aspects of digital capital. On this basis, we argue that insufficient digital infrastructure or access to hardware, i.e., tangible digital capital is not generally experienced as a precondition for digital exclusion among the frontline workers.

When asked if they see higher age as a defining precondition for the risk of digital exclusion, the frontline professionals tentatively agree. However, as one of the therapists in municipality B pointed out, this is not necessarily always the case:

> But I also want to say that we did have a cancer class, during the COVID-19 lockdown. There was also, well, every now and then some trouble, even if they were younger people.

In the group discussion among the therapists, however, it was concluded at one point that the problem is not only or necessarily a simple lack of digital skills in the broadest sense among their target group of rehabilitation patients. As the physiotherapist argued:

> But I still think that it's not only about digital competencies. It is also the case that the weakest citizens often also do have some cognitive challenges. So, there will still be a huge group of people we cannot reach this way. There are some who are relatively well-functioning cognitively but physically weak, who we can reach. The others are still left high and dry.

However, as another therapist claimed, the question of how cognitively well-functioning the citizens should be to participate in the online classes can be seen as a continuum with the experience described above at one end, and at the other end the cognitively challenged participants who can profit greatly from the digital offer and for whom the challenge is what to do when the online classes end:

> Although they are exercising in our courses, they are not being trained to get out of the house. So, they stay a little bit locked inside. And then what happens when our course ends? And those will also always be there, I think, because of cognitive challenges "I cannot find around in the city by myself" and so on …

These discussions aptly illustrate the complex interrelations of various preconditions for digital exclusion: it is neither higher age nor missing digital capital as such, but often an intersection of several preconditions. One major aspect mentioned in this connection is multimorbidity, mainly in the sense that chronic diseases are often accompanied by cognitive impairments. However, the frontline actors also experience this precondition as a continuum which may in some cases lead to exclusion from "normal" face-to-face health services, and which a digital offer may help mitigate. A rural or peripheral location may, based on the discussions among therapists in municipality B, also be seen as a precondition, at least for exclusion from non-digital health services in connection with problems with mobility, which are exacerbated by a rural or peripheral location.

These dynamics have also been discussed with regard to access to the public sector platform used in Denmark (MitID), which was mentioned as a source for exclusion by several of our informants, in line with findings from other studies (Schou & Pors, 2019). As pointed out above, due to the very coercive "digital-by-default" approach to public sector digitalization in Denmark, inability to use this platform (or in some cases similar platforms) to access digital services may lead to severe problems, as one home care worker from municipality A pointed out:

> I have, for example, a citizen now, who has applied for a place in a nursing home, and he got a message about this on his mobile phone. And he could not really find out how to read that. It was something about having to answer via *e-boks* [official electronic mailbox for communication with the public sector], and it totally did his head in!

The described citizen thus reacted with confusion and panic when confronted with the digital environment of MitID that he could not master in a meaningful way (despite being among the 96% of the Danish population who are officially MitID users). Clearly, his challenge can be described as a lack of digital capital, in the sense of knowledge and practices on how to open and read a digital letter send to one's electronic mailbox.

The MitID obstacle was also mentioned by the online rehabilitation training team in municipality B: They aimed to overcome this obstacle by handing out preinstalled tablets, as they had previously experienced how difficult MitID can be:

> Interviewer: So, they get tablets, but do they have to go through MitID […]? Therapist: In the beginning they had to. We just changed the system actually. In the previous system, there was more they needed to be able to do, because they had to use a pin-code and go into an app and click on participate. Now it is […] we call them, so they only have to swipe once. So, we are hoping that we maybe can

[3] This assumption is based on very sound grounds, as technical problems with rural connectivity are scarce in Denmark (DESI - Digital Public Services, 2021).

include more, those who actually had problems with the previous way.

To create a more inclusive digital service, this team thus tried to solve the problem with the MitID platform through a new system and preinstalled tablets. Since MitID is described as an obstacle and a digital environment that—in the frontline workers' experience—many of the citizens are unable to master, it can also in this context be characterized as a precondition for exclusion.

One of the therapists in municipality B told the following story concerning how they developed the concept of the online training based on their experiences during the COVID-19 pandemic:

> Starting out, we tried in COVID times. It was totally new, and it happened on diverse mobile phones [*the participants' own devices*]. It was very difficult to manage technically, and it was difficult to make it work. So now they get the tablets. And we thought, you get your tablet, and then there won't be any problems. But everything can happen (laughs) … I had to drive 20 km because she got into the camera and now the screen was just black. "It is broken, it can't do anything!" If there is a button they can push, they get confused. There is very little that is needed for that with our target group.

This quote illustrates many of the challenges that the municipal frontline professionals experience concerning the citizens' practices of using the technologies embedded in their services and the issues mentioned during the stakeholder workshop. It is evident that the problem is not limited to the technical skills of turning on the device, but rather involves aspects of a general understanding of the workings of the technology which is lacking in the citizens' practices; a certain "feeling" for the technology, as one therapist explained:

> People who just film their ceilings … They just have so little understanding of and feeling for it. Where you really think, that if you give them the tablet nothing can go wrong. And it just can. It's crazy!

The participants in the stakeholder workshop mentioned another aspect of lacking competencies for practices related to digital technologies. During the workshop, this was discussed as a question of language: a certain language used for and with technologies that citizens in digitally vulnerable positions might be lacking. Thus, "softer" aspects, such as understanding, feeling, and language of and for technology that go beyond the basic ability to push a certain button, have very much been discussed as central reasons for exclusionary dynamics concerning practices related to digital solutions. In more abstract terms, we can conclude that various stakeholders pointed to the relevance of practices that are characterized by aspects of digital capital that transcend the mere technical aspects and point to the relevance of embodied, somewhat emotional "feeling" aspects as well as by linguistic, language-related digital capital (which—as pointed out earlier—is a form of cultural capital, which is obvious in the case of language). In the same way that high digital capital can be observed for instance in people who seem to have an intuition for the technology (Park, 2017), the absence of such intuition ("feeling"), as described by the frontline workers, may be a sign of low or missing digital capital. Such lacks in digital capital have been observed by various informants in this study.

At the same time, however, various strategies for making up for the lacking competencies, mainly by exchanging other types of capital (mainly various forms and variations of social capital) in order to mitigate digital exclusion, have been described.

3.2. Mitigating the risk of digital exclusion: the role and relevance of social capital

One major factor discussed by informants was the role and relevance of relatives and family for the ability to be included in digital services. As one of the home care workers in municipality A remarked: "*not everybody has their family within 20 km, or, in general, not everybody has family*." They added that it is often the family or the adult children who help the older people with their digital access and digital technologies. They confirmed that this makes people without children or relatives vulnerable to digital exclusion. Other studies have also pointed to the fact that digitalization in the field of health and welfare services may as a consequence bring the family back in, as it is a matter of care and welfare provisions for their older relatives or parents (Fersch & Schneider-Kamp, 2025). This is an interesting point concerning the digital capital needed to mitigate digital exclusion or the question of what kind of other capital older people may use in order to build up or balance a potential lack of digital capital. In this regard, social capital in the form of close family—mainly the next generations, i.e., children or grandchildren—appears to be crucial. In terms of whether there is a specific rural aspect to this social capital, the frontline professionals' view appears to be quite differentiated: Whereas they argued that for some specific tasks family members nearby might be best (as in the quote above), there appears to be agreement that many tasks in digital family-help can be and are being done remotely. Thus, the fact that the children of older people in rural areas may have moved farther away to the cities, does not appear to be problematic, as most of the digital family-help can be done remotely. The important dividing line in terms of the risk of digital exclusion seems to be between people with and those without family in the next generation(s). One of the home care workers told an anecdote that implies that having family members far away may even be helpful for building up digital capital:

> Well at one point we had one, she skyped with her grandchildren and great grandchildren in the US and so on. It's great when there finally is someone who really wants to learn it!

This points to another important aspect of digital inclusion, namely the motivation to learn digital skills. It appears that family and younger generations not only provide practical guidance but may also be great motivators for older citizens to learn digital skills to stay in touch with their family. Motivation, or rather, lack thereof, was also one of the challenges mentioned at the stakeholder workshop.

The interviewed volunteer in municipality B mentioned that family help may also be a hindrance to acquiring one's own digital capital:

> Volunteer: I think, those who are not keen on the digital – at the moment when they do not have a helper on their side, they will try it.
>
> Interviewer: Okay.
>
> Volunteer: And then all it needs is just some patience and to stick with it, to persevere, right?

This quote points to an interesting differentiation regarding how family help as social capital may work to mitigate digital exclusion: The help may end up taking over the necessary digital tasks for the person in a digitally vulnerable position ("a helper") without any learning effect, thus providing inclusion only for the time being, or it may show or teach them how to use it ("a trainer"), thus enabling the digitally vulnerable person to gain their own digital capital. The interviewee pointed out that, in the case of a lack of motivation, a helper who overtakes the task might be a hindrance to the second option. Nevertheless, both are ways in which digital exclusion is (at least temporarily) mitigated with the help of family members as social capital; however, the second option appears to lead to more inclusion in the long term.

The interviewed volunteer in municipality B mentioned another version of social capital, namely acquaintances and friends found through participation in physical training activities she provided as a volunteer instructor: Very often, they would go for a coffee after the training activities, and these coffee talks also involved helping each other out with practical matters, e.g., on digital devices:

> Volunteer: I have one [in my class], she is 91 and then I have one, she had turned 93. They are digital! Because every time we have "Balance and exercise" from nine to half past ten, we go to have a coffee

afterwards and sort out all kinds of issues. […] And then we often sit there often talking and help each other out with these mobile phones.

Interviewer: Yes.

Volunteer: […] I have a former priest who also comes. She was totally lost once because her mobile phone didn't work anymore. Well, we got that one fixed as well, right?

Thus, social capital enabling the mitigation of digital exclusion may also take the form of peers, who may be acquaintances, friends, or neighbors encountered through common activities and location. In Denmark, several organizations mediate such enabling activities through for example the national organization DanAge (Ældre Sagen) (a Danish interest organization for older people) which has local branches all over the country, or as initiatives that arise through the statutory councils for the elderly that operate in collaboration with the municipalities. Just as the family may be said to be brought back through digitalization, non-profit organizations in local communities below the municipal level may similarly be said to be brought back in.

4. Discussion and conclusion

Summing up, our analysis demonstrates a differentiated pattern concerning the risk of digital exclusion from health and social services: Several aspects, preconditions and contextual factors are working together, leaving certain people at a higher risk of digital exclusion. For instance, if little prior experience with digital technology, i.e., a lack of digital capital, chronic illness, and cognitive impairment are combined, this may lead to digital exclusion. However, this is highly individual, and for some, cognitive impairment may not be a deciding factor. The analysis also shows that the lack of digital capital comes into play not only in relation to technical skills, but also in relation to a more intangible "feeling" or intuition for technology and how it works.

Social capital has proven to be used as a mitigator. Firstly, this refers to family, or rather family members in the next generation(s) (as most of the citizens in digitally vulnerable positions are older people), who are involved in digital help. Interestingly, physical distance did not seem to be a hindrance for this, as much of the help can be provided remotely, e.g., over the phone. This is of relevance for older people in digitally vulnerable positions in rural areas whose children may have moved away to the cities. The dividing line appears whether the citizens in digitally vulnerable positions have a family: Those without are at greater risk of digital exclusion, and not having a family to help with technological issues may place people in vulnerable situations.

This is also interesting in the context of the Nordic welfare state, which has previously been labelled "women-friendly" in the literature (Borchorst & Siim, 2002). Due to the provision of comprehensive care services, women were to a certain extent "freed" from gendered expectations of providing unpaid care work in the family, and they could participate on more equal terms in the labor market, a development which has been labelled defamilialization (Orloff, 1993). If the digitalization of the welfare state is bringing the family back in for providing much needed digital help, will this lead to a roll-back of defamilialization, or rather a form of refamilialization, with all its gendered consequences (see also e.g. Fersch & Schneider-Kamp, 2025)?

Secondly, social capital was used to mitigate the risk of digital exclusion through acquaintances met during physical training classes for older people, organized by a volunteer. The group often had coffee together after the session, and during these informal social gatherings the participants discussed and solved all kinds of problems, including those concerning digital technology, thus providing peer help. This confirms the assumption about the beneficial effects of a vigorous civic society that can provide individuals with necessary social capital, which has been touted for a long time (e.g. Arai & Pedlar, 1997). However, although some research shows that there are indeed higher rates of volunteering in rural areas (Sørensen, 2012; Paarlberg et al., 2022), this has been shown to be very dependent on the specific local context and to be higher in some rural areas than in others. Thus, individuals residing in areas with lower voluntary activity, such as leisure or training activities, may be more vulnerable to digital exclusion. As the public sector has been withdrawing from providing services in recent decades, particularly in rural areas, volunteering has been touted as a prime solution specifically in rural areas, which is not without problems (Joseph & Skinner, 2012): This can also be traced in our interview with the volunteer, who stated that there is such a high demand on more or less the same people who tend to volunteer in her area, and a competition by several voluntary organizations, that they risk becoming overburdened. Research has shown that policymakers overestimate both the ability, willingness, and benefits of volunteering in rural areas (Gieling & Haartsen, 2017). While our findings show that civic society activities can effectively provide the necessary social capital to mitigate the risk of digital exclusion, relying on this mechanism may be "risky business" as this may not be a viable option in every location.

Finally, our study shows that there are two ways in which social capital works to mitigate digital exclusion: either in the form of a helper who overtakes the task or in the form of a trainer who teaches the persons in a digitally vulnerable position how to do the tasks themselves. Taking the perspective of digital capital into account, the trainer form provides a more sustainable, long-term form of digital inclusion. Initiatives taken to strengthen digital inclusion through supporting the supporters should therefore focus on this form of help.

The latter also shows the analytical potential of the concept of digital capital in the context of other forms of capital for studying dynamics of digital inclusion and exclusion: A capital perspective opens up the possibility to analyze what kind of support is most helpful when it comes to the question of how to build-up own digital capital for those who lack it, while at the same time does not lose sight for the way in which social inequalities are inextricably entwined with the individual's opportunities for both acquiring a high enough level of digital capital and/or being able to utilize one's social capital for compensating for this lack. Ultimately, any future solution must be sensitive towards these complex dynamics.

CRediT authorship contribution statement

Barbara Fersch: Writing – review & editing, Writing – original draft, Project administration, Methodology, Investigation, Funding acquisition, Formal analysis, Data curation, Conceptualization. **Egon Bjørnshave Noe:** Writing – review & editing, Project administration, Funding acquisition, Conceptualization. **Annette Aagaard Thuesen:** Writing – review & editing, Funding acquisition. **Beate Langer:** Formal analysis, Data curation.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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