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Digitization of Aging-in-Place: An International Comparison of the Value-Framing of New Technologies

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Abstract: Planning for aging populations has been a growing concern for policy makers across the globe. Integral to strategies for promoting healthy aging are initiatives for 'aging in place', linked to services and care that allow older people to remain in their homes and communities. Technological innovations—and especially the development of digital technologies—are increasingly presented as potentially important in helping to support these initiatives. In this study, we employed qualitative document analysis to examine and compare the discursive framing of technology in aging-in-place policy documents collected in three countries: The Netherlands, Spain, and Canada. We focus on the framing of technological interventions in relation to values such as quality of life, autonomy/independence, risk management, social inclusion, 'active aging', sustainability/efficiency of health care delivery, support for caregivers, and older peoples' rights. The findings suggest that although all three countries reflected common understandings of the challenges of aging populations, the desirability of supporting aging in place, and the appropriateness of digital technologies in supporting the latter, different value-framings were apparent. We argue that attention to making these values explicit is important to understanding the role of social policies in imagining aging futures and the presumed role of technological innovation in their enactment.

Keywords: aging in place; technology; social policy; Canada; Netherlands; Spain

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1. Introduction

Planning for and supporting aging populations is an important focus for policy makers across the globe as older people increase in both number and as a proportion of the population in most areas of the world. While celebrating the success of health initiatives that have contributed to increased longevity, policy makers at all levels are concerned with addressing both economic and social challenges posed by population aging. The United Nations (UN) has identified the living arrangements of older adults as particularly important to both their well-being and to policy makers as they address the challenges of aging populations [1]. The UN-declared 'Decade of Heathy Ageing' [2], to be led by the World Health Organization (WHO), maps out a multi-faceted agenda which, they stress 'requires a whole-of-government and whole-of-society response' [3].

In many developed Western nations, the goal of promoting healthy and 'active' aging is linked to initiatives to bolster older people's independence, and these may take the form of services and supports that allow them to remain in their homes and communities—frequently referred to as strategies for 'aging in place'. Although there are many definitions,

aging in place (AIP) is generally taken to mean continuing to live in the same place or community for as long as possible even if health changes occur, and is positively positioned as reflecting the wishes of most older adults. As a policy response to population aging, AIP is posed as an alternative to institutionalized care, and is thus important to cost-saving initiatives at all levels of government.

Technological innovations, and especially the development of digital technologies, are often viewed as key tools in supporting AIP. The WHO, for example, notes that such innovations "offer new approaches to delivering care, while trying to bend the cost curve, and supporting ageing in place" [4] (p. 15). The potential role of digital technologies in supporting AIP was also given a signal-boost during the COVID-19 pandemic, as older people shielding at home were identified as particularly vulnerable, and a range of technologies were deployed to help deliver care and mitigate isolation [5,6].

In this paper, we employ qualitative document analysis [7] to explore the ways that digital technologies are discussed in the context of policies to support AIP in three countries (The Netherlands, Spain, and Canada). AIP policy documents have previously been analyzed for their content [8]; however, we adopt a more interpretive approach, drawing inspiration from work in institutional ethnography [9] and narrative analysis [10–12] in policy studies. To contextualize our work, we approach AIP as a complex policy intervention, drawing on Craig et al.'s [13] characterization, as one with multiple interacting components, heterogeneous stakeholder groups, a broad range of possible outcomes, and potentially wide variations in processes, structures, and enactment. As we will argue, understanding the processes, structures, and enactments of policies promoting technologically supported AIP may be enriched by attending to the underlying values that frame the policy discussions and shape the problems to be addressed.

2. Conceptualizing Technologies for Aging in Place

Technologies linked to AIP include a wide range of devices and home modifications, many of which have long been in use (such as ramps and stairlifts). We focus here specifically on digital technologies, which have a novel ability to track, collect, and transmit data about older people as they facilitate social and care-linked connections[1]. Three categories of technology are frequently discussed in this respect, although the boundaries between these are not sharply defined: smart home technologies, telehealth technologies, and telecare technologies [14].

- Smart home technologies are primarily focused on risk reduction and include a range of sensor-based devices, which enable the constant ambient monitoring of older people in their homes (for example, those designed for fall detection, or for tracking the time spent in different areas of the home or activity levels) as well as the algorithms that use the data produced to make decisions about intervention;
- Telehealth technologies include remote medical monitoring devices (such as those to measure and transmit data on indicators such as blood pressure or heart rate), sharable electronic health records, virtual consultations with health care providers, and digital medication reminders;
- Finally, telecare technologies include user-activated personal alarms, domestic or companion robots and audio/video monitoring, or other interactive technologies that enable family members or carers to directly interact with older people.

In addition to these technologies specifically designed to support AIP, or 'gerontechnologies' [15], many older people also use existing and non-age specific technologies such as mobile phones, tablets, and voice-activated assistants (such as Amazon's Alexa or Google Home) to support many everyday activities, social connections, and domestic tasks. As one report notes, "when technology is used to support independent living, it becomes AAL [active assisted living] technology regardless of the original intent for use" [16] (p. 25).

Both 'aging in place' and technological innovations to support it tend to be treated as inherently beneficial in discussions across popular media, the academic literature, and industry reports, and 'age tech' has become hailed as 'the next frontier for technology

disruption' [17]. Gerontechnology, as an academic field, has rapidly expanded over the past few decades, with a dedicated organization (*International Society for Gerontechnology*) and journal (*Gerontechnology*). Public-private partnerships promoting the development of gerontechnologies as central to the 'silver economy' [18] or 'golden ageing' [19] have emerged globally. Governments at different levels and in different countries have eagerly funded these initiatives, because technologically supported AIP aligns well with the promotion of 'active aging' and independent living as serving the desires of aging individuals and easing the potential financial burden of aging populations.

Scholars have noted that the promotion of gerontechnologies is rife with a "rhetoric of urgency" [20] (p. 9) linked to a "crisis account of aging" [21] (p. 3) based on both apocalyptic demographic predictions and assumptions about aging-as-decline. Deploying what Neven and Peine [21] describe as "interventionist logic", technological innovation is positioned as a 'triple win'—good for seniors, promising safer and more independent later lives; good for society, because keeping older people in their homes (rather than care facilities) will save a lot of public money; and good for business, because as new devices are produced, new markets are developed and new jobs are created.

It should be no surprise, given this enthusiasm for the social benefits of technology, that technology is increasingly visible in policy discussions in aging societies. Jacobsen, for example, in reviewing aging-in-place policies in Norway, found "the concept of technology" mentioned "eighty times in sixty pages" in a recent (2016) document, compared with no mention of technology in a similar document from 20 years previously [22] (p. 95). However, there has been, to date, little close analysis of the narratives about aging or digital technologies that policy documents deploy, create, or perpetuate.

In our work, we have benefitted from existing policy analyses—especially those that are comparative—which have, for example, identified the key stakeholders, as well as different policy regimes and cultural frames that shape the ways technologies are included in policies for aging in place [10,14,22–26]. The extant literature suggests that there are considerable gaps in evidence to support the widespread claims of benefits to older people [27], and argues that insufficient attention has been paid to ethical considerations, especially as these regard surveillance and privacy [28–32], noting the potential exacerbation of existing inequalities and the marginalization of vulnerable populations [33,34]. Importantly, studies have also reported low take-up rates for many technologies outside of pilot projects [14,35].

Our intention in this paper is not to reiterate these observations/criticisms, but to highlight the rhetorical power of policy documents in constructing problems of aging populations and in promoting technologies as contributing to solutions. As Peine and Neven suggest: "[T]echnology projects or innovation policy not only respond to an understanding of aging, but they shape and prioritize definitions of aging, while sidelining others . . . [A]ging is not a stable target for interventions, but specific versions of aging are *made* into targets for interventions" [36] (p. 18, emphasis in the original). In applying this perspective to policies promoting AIP, we are particularly interested in drawing out the underlying values that frame discussions of technology.

3. National Contexts

We examined documents from three countries—The Netherlands, Spain, and Canada—to explore the ways in which digital technologies for AIP are presented. Participating researchers from each country were collaborators on research funded by the More Years Better Lives Joint Programming Initiative. The three countries discussed here have some similarities, being developed Western countries and participants in international bodies such as the UN, WHO, and Organization for Economic Cooperation and Development; however, they also represent different geopolitical environments and policy regimes (northern Europe, southern Europe, and North America). Although space does not permit a full discussion of the complex and particular geographic, political, and social contexts for each country, we highlight some key features here.

3.1. The Netherlands

With about 17.4 million inhabitants and an area of 41.865 km^2, The Netherlands is a small but very densely populated country. Political power is primarily held by the federal government, the 12 provinces, and 352 municipalities (excluding the Dutch Caribbean). The responsibility for health and care is distributed across the federal government and the municipalities, with responsibility for health care and long-term care resting with the federal government. Since 2015, preventive and community care (and for youth health services) has been the responsibility of the municipalities. The latter change was established with the aim of being able to provide better integrative and bespoke support for people, but has, in practice, induced a significant strain on municipal budgets and competences. According to Neven et al. [37], the Dutch care regime may be characterized as neoliberal [38], with significant emphasis being placed on market mechanisms as an alleged attempt to provide high-quality care at a reasonable cost. In preventive and community care, this implies that services are founded on "people's opportunities rather than their shortcomings" [39] (p. 4), which, in practice, means that people need to or are encouraged to draw on their own networks and resources for support. This often makes it difficult to receive adequate care, in particular for those citizens who lack sufficient social and financial resources. Dutch aging-in-place policies need to be seen in this context, as a means to support an aging population through preventive and community care and, where possible, through their own social and financial resources, rather than through long-term, publicly funded institutional care.

3.2. Spain

The aging society in Spain is not geographically homogenous, but is characterized by densely populated and growing metropolitan areas and rural areas that have been losing population since the 1960s. The majority of older people are concentrated in urban centers, although the aging of rural areas is more pronounced as younger people migrate to the cities.

The Spanish long-term care model "is a specific case of the Mediterranean welfare regime as a concrete combination of universalism, familism and the market" [40] (p. 381, citing Rodríguez Cabrero). The Autonomous Communities and the municipalities manage resources and share part of the expenses with the National Administration, which has the regulation responsibilities. A public long-term care policy was only developed in the 1980s, with the first pension, health, and social care systems aiming to provide a comfortable later life to a generation who endured scarcity and a previous lack of rights during Franco's regime. Spain's development of aging-in-place policies and care in the community systems came much later than in northern Europe, but moved in this direction by the 1990s as these became strategic priorities. These were hampered, however, by a lack of public spending on social services as well as continuing expectations that elderly care was more a domestic matter than a social responsibility. With the burden of care falling on women in the family, policies in the 1990s aimed to improve their work–life balance to enable them to work both outside the home while continuing care responsibilities in the home. In a move particularly important given the crisis of care precipitated by shifting family structures and growing resistance by younger women to these expectations, the 2006 Dependency and Promotion of Autonomy Act recast care as an individual right, independent of family situations. However, financial exigencies and conservative political policies have resulted in an increased provision of economic benefits rather than services, and care has increasingly become a commodity provided by a growing private market. For those without considerable financial resources, aging-in-place policies are still largely designed to support the work of family carers.

3.3. Canada

Canada is large and regionally diverse, with a substantial rural population and significant variations in socioeconomic, demographic, and linguistic profiles across different parts of the country. Considerable political power, especially around health and welfare

policies most relevant to issues of care, is held by the provinces and territories, who have control over most forms of health and care delivery. The federal government has the responsibility for various aspects of public health surveillance and regulation (for example, disease surveillance, the approval and regulation of pharmaceuticals, supporting health research) and, via the Canada Health Act, sets national principles for health care (such as accessibility, restrictions of user fees, the portability of care between regions, and other standards of care) which must be met by the provinces/territories in order to receive cash and tax transfers to fund their services. The federal government continues to be a key player in initiatives relevant to technologies for AIP, such as research funding and other incentives for innovation, as well as control over ICT access, device standards, and regulation. The federal/provincial division of powers around relevant issues can often be difficult to parse and may be complicated by parties at different ends of the political spectrum holding power at different levels [41]. At the national level, there is no coordinated strategy for developing policy around aging and care, although some provinces have developed these and cooperated with other provinces/territories in identifying strategic priorities as set out in the 2019 document on Core Community Supports to Age in Community [42]. The province of Quebec declined to participate in this, choosing instead to develop its own comprehensive plan of action. Lobbying continues for the development of a national senior's strategy by non-governmental groups such as the National Institute on Aging, a think-tank based at an Ontario university [43].

4. Materials and Method

4.1. Materials

The documents examined and included for analysis in this study (see Table 1) were selected through purposive sampling by members of the collaborating research teams. Purposive sampling is particularly suited to small case studies [44], focusing on "selecting information-rich cases whose study will illuminate the questions under study" [45] (p. 230). Co-authors from each country, drawing on their existing knowledge and networks, searched relevant government and agency websites for documents which met both the criteria of promoting AIP and including discussions of digital technologies. The policy landscape relevant to AIP is broad and complexly constituted both within and across the three countries; therefore, we adopted a broad definition of 'policy document' to include a range of position papers, policy strategies, and advocacy documents. We sought to include a minimum of 3 documents for each country, including additional documents where appropriate to reflect regional variation or to reach saturation. The final sample included 3 documents from The Netherlands, and 5 each from Spain and Canada. The final selection of 13 documents varied in type, tone, and intended audience, and represented a range of national, regional, and local agency authors. Given these limitations and challenges, we emphasize that our study is not a systematic, comparative analysis, but is an exploratory one.

Table 1. Documents analyzed.

Country	Document Title	Source
The Netherlands	Aging in Place into Very Old Age: Survey of Bottlenecks and Action Perspectives in Policy and Practice	Environmental Assessment Agency [46]
The Netherlands	Living Longer Independently Program	Ministry of Health, Welfare and Sport [47]
The Netherlands	Healthy at Home: Collaborating on Aging in Place	ActiZ (Association of health providers) [48]
Spain	Strategy to Prevent Older People's Dependency and Promote Active Aging in the Region of Castilla and Leon	Department of Social Services of the Regional Government ofCastilla y León [49]
Spain	Framework for Promoting Older People's Rights	IMERSO (National Institute for Social Services and Older People [50]

Table 1. *Cont.*

Country	Document Title	Source
Spain	National Older People's Strategy for Active Aging and Their Good Treatment (National Council of Older People)	National Council of Older People [51]
Spain	White book of Active Aging	IMERSO (National Institute for Social Services and Older People) [52]
Spain	Elderly Care Strategy for Madrid (2017–2021)	Department of Social and Family Policies of the Regional Government of Madrid [53]
Canada	Seniors In Need, Caregivers In Distress: What Are The Home Care Priorities For Seniors In Canada?	Health Council of Canada [54]
Canada	Thinking About Your Future? Plan Now to Age in Place.	Federal/Provincial/Territorial Ministers Responsible for Seniors Forum [55]
Canada	Core Community Supports to Age in Community (Fed/prov)	Federal/Provincial/Territorial Ministers Responsible for Seniors Forum [42]
Canada	A Canadian Roadmap for an Aging Society (CSA)	Canadian Standards Association [56]
Canada	A Québec for All Ages: A Plan for Action 2018–2023	Ministry of Health and Social Services (Québec) [57]

4.2. Method

Document analysis, as described by Bowen [7] (p. 34), "is a process of evaluating documents in such a way that empirical knowledge is produced and understanding is developed". Documents may be approached as objective sources of information or as social products in their own right worthy of textual analysis [58]. We adopt the latter approach, common to qualitative document analysis "which combines elements of content analysis and thematic analysis" [7] (p. 32). This approach entails a "first-pass document review, in which meaningful and relevant passages of text" are identified, followed by thematic analysis to identify emerging themes and patterns which become the basis for analysis (Ibid.). Co-authors in each country were responsible for the initial document review and identification of key passages of text, which were then translated into English where necessary. The Canadian co-authors then took the lead on the thematic analysis, applying narrative framing to guide the analysis [11,12]. This approach aims to open a "critical space between description and intention" that might shed light on the manner in which policies do not just "respond to social ills", but also "contribute to the constellation of ideas and evidence that create the problem itself" [12] (p. 304). Narrative frames carefully consider and balance the facts and values that comprise public policies. For example, as outlined below, all documents tended to cite similar 'facts', such as the demographics of aging populations and survey data showing that most older people would prefer to 'age in place'. However, as one document notes, " . . . any thoughtful discussion about home care for seniors needs to include conversations about aging and our values, responsibilities, and expectations, both as a society and as individuals" [54] (p. 1).

Thematic analysis began with some general questions, looking for patterns within and between documents and countries:

1. How is aging in place conceptualized?;
2. How is technology or technological innovation introduced into discussions of AIP?;
3. What kinds of technologies are mentioned?;
4. What stakeholders are identified?;
5. What visions for the future are articulated?

It was particularly with respect to this last question that the importance of a focus on the underlying values woven into policy narratives became apparent. Making these values explicit is important for understanding the role of social policies in imagining aging futures, and the role that digital technologies might play in producing them. As Biggs

notes, imaginations can be influenced through social policy, "subject to a good story being told" [12] (p. 305).

5. Results

5.1. Narrative Frames of Aging in Place and the Role of Technology

Despite the differences in local contexts and policy regimes, there were some common stories told by documents from the three countries that are consistent with the supranational UN and WHO framing outlined in the Introduction. With varying degrees of detail, all framed their discussions by establishing that, first, their populations were aging, and second, that the preference of most older people is to remain in their homes[2]. Additionally claimed was that facilitating aging in place could meet both the preferences of older people and mitigate the financial challenges of caring for aging populations. Given that all three countries have publicly funded health care, including long-term care, the latter is an important concern.

The overall focus of the documents examined was on the broader issue of aging in place rather than on technology per se, although all identified technological innovation as having a role in facilitating AIP, both in the present and in the future. This is summarized concisely by a document from The Netherlands: "Thanks to technological developments in the field of eHealth, remote care and home automation, people are increasingly spending longer aging in their own home environment" [48] (p. 19). In addition to new innovations, emphasized here was the deployment of existing technologies, such as tablets, smartphones, and apps, to "make homes smarter, so that people can continue to live independently at home for longer" (p. 16).

In Spain, technology was discussed in terms of its potential to make older peoples' living environments more accessible and adaptable to their needs. The idea of the "digital home for all" was presented in promissory language and, similarly to The Netherlands, included emphasis on appropriate implementation of already existing technologies. The types of technology under consideration were identified as those aimed at:

1. Providing more security to those aging in place (for example, the use of GPS for those with memory or vision issues and online services to assist with errands and social contact);
2. Enhancing telecare and telemedicine (including sensors, monitoring, and caregiver notifications);
3. Providing leisure opportunities (such as games, online communities, and socializing).

Canadian documents provided the most promissory perspective of the three countries, perhaps reflecting what has been noted as a lag between the Canadian development and deployment of assisted living technologies and that of European countries. A report prepared for the Canadian Standards Association suggested that, although research and development is under way, the integration of assisted living technologies with the Canadian health care system is only in early stages and is complicated by the fragmentation of the technology market "across ten provinces and three territories, with more than 100 different health authorities" and "contributing to low adoption rates compared with other countries" [16] (p. 13). Thus, the emphasis in the Canadian policy documents was rather speculative about the potential and promise of digital technologies to support AIP. In the case of one of the more comprehensive documents on promoting AIP, technological development was presented as mostly "outside of scope" [42] (p. 6), but in a 'postscript' in the executive summary, it was hailed as likely to become more important in the future[3]. The province of Quebec, producing its own plan, also pledged future investment in "gerontechnology", to "make living environments and homes adaptable, accessible and safe for seniors" [57] (p. 71). However, all three countries shared similar conceptualizations of what sorts of technologies—both existing digital devices and apps and gerontechnologies yet to be developed—might support AIP goals.

5.2. From Facts to Values

Taken together, the acknowledgement of aging populations, expressed preferences for aging in place, and beliefs that a range of digital technologies may be beneficial in supporting those preferences while helping to control the public costs of care, are presented as 'facts' across all three countries. We now turn to further exploring the values that flesh out the narratives constructed about technologies and AIP. We do so aware that, although there is little disagreement that values are important to policy development, 'values' are not easily definable, and may be presented as goals, aims, directions, or guiding principles [59]. In some cases, they are explicitly stated as such, but in others, are presented as more general normative assertions about what is or is not desirable. As Giacomini et al. [59] suggest, "values talk" is "both very important and ambiguous in meaning" (p. 22), and comparisons across contexts are complicated. With these caveats in mind, we nonetheless identified a range of values with which technologically assisted AIP measures were associated in policy documents[4]. These aforementioned values included:

1. Quality of life;
2. Independence/autonomy;
3. Risk management;
4. Social inclusion;
5. 'Active aging';
6. Sustainability/efficiency of health care delivery;
7. Support for caregivers;
8. Older peoples' rights.

All of these were evident in at least one document from each country; however, certain clusters or thematic groupings were noted as especially emphasized in each. For each country, we identified the values that seemed to dominate, along with the overall value-framing to which these were articulated (see Table 2). For The Netherlands, an overarching connection between technology and care came to the fore, with quality of life, support for caregivers, and the sustainability or efficiency of health care delivery being especially emphasized. For Spain, we noted a general theme of technology and autonomy that supported the values of independence, active aging, and older peoples' rights. Finally, a theme of technology and connections was apparent in the Canadian documents and the values of social inclusion, quality of life, and active aging were accentuated.

Table 2. Summary of value themes.

The Netherlands: Technology Supporting Care	Spain: Technology in Aid of Autonomy	Canada: Technology Forging Connections
• Quality of life; • Support for caregivers; • Sustainability/efficiency of health care delivery.	• Independence/autonomy; • "Active aging"; • Older peoples' rights.	• Social inclusion; • Quality of life; • "Active aging". • *Quebec:* • *Independence/autonomy;* • *Risk management.*

5.2.1. The Netherlands: Technology Supporting Care

Policy texts from The Netherlands demonstrated a focus on care, with concern for technologies that could mitigate the need for additional care, prevent institutionalization, augment and support existing care infrastructure, and contribute to the sustainability of health care systems while improving the quality of life for older people. The goal of "living longer independently"—where 'independence' was equated with self-reliance—was premised on "good support and care at home, support for informal caregivers and volunteers, and a fitting living situation". Technologies were presented as a way to "reduce the amount of home care required and increase the quality of life" [47] (p. 46). The twin

aims of both reducing cost and improving quality of life were also found together in other documents—for example, "technology becomes a 'natural part' of [care processes], contributing not only to the quality of life and the quality of care, but to the affordability and efficiency of this care . . . the nursing home of the future is at home" [48] (p. 26).

Technologically supported care was, in some instances, explicitly presented as a reduction in human labor: "Robotics and other technological innovations may therefore render human labor less essential in some professions. For seniors who are aging in place, eHealth and domotic applications could be considered" [46] (p. 162). There was also acknowledgement, however, that "neither digital services nor the use of new technologies will automatically successfully take off" (p. 191), and that the promise of the successful deployment of technologies for care depended on effective communication among stakeholders and skills development for both older people and caregivers.

5.2.2. Spain: Technology in Aid of Autonomy

Documents from Spain represented both national and regional initiatives, and we identified 'independence' or 'autonomy' (linked to the promotion of active aging, the mitigation of risk and older peoples' rights) as the umbrella theme. Unique from the Spanish perspective was the explicit argument that if older people were forced to move out of their homes—or forced to stay in unsuitable homes for lack of alternatives—this was a violation of their rights. For example, as one document noted: " . . . staying at home could hamper independence and lead to social isolation if the house is not physically adapted and accessible to this new phase of life . . . homes can become dangerous" [49] (p. 54). This was a particular concern with respect to rural elders who, lacking effective supports, may need to leave not only their homes, but their communities. Technologies here are positioned as supporting the independence of older people who wish to age in place, with technologies in the area of telecare and telemedicine depicted as allies in reinforcing older people's autonomy, ensuring that they can stay at home, thus preventing institutionalization [50]. In some of the documents, 'active aging' was used almost synonymously with the notion of aging in place. For example, the White Book of Active Aging identified a cultural shift in which autonomy as a moral value has increased in prominence—expressed by the assertion that the ability to remain in one's home indicates "social and personal competence" [52] (p. 35).

As with The Netherlands, there was also a clear message that effective technological innovation needed to be inclusive and focused on the needs of older people: "It is important to highlight that the integration of ICTs at home, smart or not, will be an important support for the promotion of personal autonomy and well-being as long as the person is the first beneficiary and technology is adapted to knowledge and previous experience" [52] (p. 447).

5.2.3. Canada: Technology Forging Connections

Documents from Canada were framed predominantly by the theme of 'connection', related to concerns about social isolation as a problem for older people who are aging in place. Digital technologies were posed as important to mitigating isolation, with the assertion that "older adults who are digitally excluded are also excluded from full participation in society" [56] (p. 29). For example, a guide to planning for aging in place encouraged older people to explore "different ways of connecting with friends and family, such as Skype, FaceTime or social media" [55] (p. 7). These social connections, along with connections to health-related supports, were centered as underpinning general well-being and quality of life, as well as linked to strategies for 'active aging'. The province of Quebec's 'plan for action' drew more specifically on the value of 'active aging' as premised on independence and risk management, suggesting that technologies could be "at the service of seniors, and especially those with loss of autonomy, so that they can continue an active life, independent at home and in complete safety" [57] (p. 74).

Reflecting the lag noted earlier in Canada's deployment of gerontechnologies compared with Europe, as well as the challenges of geography and low population densities in much of the country, there was a larger focus on potential barriers to the expansion

of technology, including the need to attend to infrastructures and training. As one document noted: "A wide variety of technological innovation is helping connect older adults and support aging in place, though a lack of digital literacy and access to reliable and affordable Internet also pose barriers" [56] (p. 6). Another document noted that although technology "offers distinct possibilities—especially for older adults in rural and remote communities", it also cautioned that "technology is not a substitute for human contact" and that "protecting privacy and preventing abuse are also important priorities" [42] (p. 25).

6. Discussion and Conclusions

Overall, policy documents from all three countries shared the belief that technological innovation is part of an appropriate response to the challenge of aging populations and that technologically assisted aging-in-place holds considerable future potential. Although there was considerable overlap in expressed values across countries, such as the desirability of promoting the "independence" that aging in place versus institutional care is seen to represent, each tended to emphasize different clusters or themes in framing policy discussions. The Netherlands focused on technology as enhancing care, Spain prioritized independence and autonomy, and Canada accentuated technologically assisted connections. There are certainly complex factors which may underlie these differences which are beyond the scope of the present paper (such as significant rural populations and different welfare regimes), but these also represent different rhetorical devices for constructing convincing narratives of technological innovation. Policy documents such as those reviewed here embody "socio-technical imaginaries" which, as "collectively held and performed visions of desirable futures" [60] (p. 19), are simultaneously descriptive (referring to what is or what may be possible) and normative (suggesting what is desirable). In other words, they illustrate the point made earlier that "specific versions of aging are *made* into targets for interventions" [36] (p. 18). As Jacobsen notes with reference to aging and home care, policy papers "invite people at large to experience a yet-to-be-seen crisis and to engage in shaping their future based on evidence not yet present" [22] (p. 96).

As noted at the outset, our study had several limitations, including the small sample size, variability of documents, and the challenges of comparing language across translation. However, although we cannot generalize from studies with such limitations, " . . . one can learn from them . . . opening up new territory for further research" [45] (p. 46). To this end, we contend that extrapolating the values that frame policy discussions to promote aging in place is an important task for future research if claims about the universal and inherent value of such interventions are to be avoided, and we hope that researchers from a wider range of countries and geopolitical regions will take up this challenge.

Exploring the discursive aspects of social policies and social reform, although complicated, is vital to understanding how particular policies may be prioritized and/or enacted (or not) and how different stakeholders may emphasize different value framings [11,12,22,24,33,59,61,62]. This type of analysis seems particularly germane to understanding the role of social policies in imagining aging futures, and to the anticipated role of digital technologies in realizing these futures. As technology continues to play a growing role in policies addressing the challenges of aging populations, there is a pressing need for research which more critically examines "what the problem is represented to be", shifting the focus of policy analysis from "problems as presumed problematic conditions" to problematization, how 'problems' are constituted—given shape and meaning—within policies [63] (pp. 1–2). As our analysis suggests, different 'problems' (such as the sustainability of care regimes, infringement of human rights, social isolation) reflect different values at stake and are linked to specific forms of technological innovation as solutions.

Finally, as Giacomini et al. note, although the concept of 'values' plays a key role in policy analysis, less attention has been paid by scholars to the construction of values, i.e., what they are "made of, where they are found, and how they relate to both ideas and action in the policy world" [59] (p. 22). How, for example, might different conceptions of 'independence' or 'activity' work to either contest or buttress ageist and ableist denigrations

of dependency and vulnerability? What is the potential for articulated values to work against or in tension with one another—such as might be found with "independence" and "connection"? How are trade-offs between independence and surveillance/data protection, for example, to be weighed? What makes technologically assisted care more valued as a route to health care system sustainability than revisions of the tax structure? Who will care for the technology that will replace human care, and how will factors such as gender and race influence inflect the value of new forms of care labor? If it is indeed "within the policy environment that we can come to understand values about age and ageing, about who is seen to be deserving of full citizenship and about how these cultural ways of knowing frame courses of action within a society" [64] (p. 353–354), then there is a strong case for research which focuses on more than just technological *possibilities* in envisioning aging futures.

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Notes

1 For an extended discussion of why this capacity of digital technologies is significant, see [65].

2 'Aging in place' was not always specifically used as a term, especially in Spain, where initiatives were framed by a broader policy aiming to "foster personal autonomy and care for people in a situation of dependency". The guiding principle here is that "if possible, people in a situation of dependency should stay in their daily-life environment" [66].

3 This prediction seems to have been borne out, as the most recent forum of the Federal/Provincial/Territorial Ministers Responsible for Seniors, in June 2021, resulted in a consensus to prioritize "the role of technology to enhance aging in place" (press release, June 9). The report of this meeting was not yet available at the time of writing.

4 All of these are, of course, open to varying and sometimes critical interpretations whose detailed exploration is beyond the scope of this paper. For example, we have not distinguished between independence and autonomy as terms here, because these were not clearly distinguished in the documents analyzed. Plath [24] cautions that 'independence' may be conceptualized in an overly individualistic way as the functional ability to manage everyday tasks without assistance from others, whereas 'autonomy' includes the personal control to make choices and decisions. The former understanding was more characteristic of documents from The Netherlands, which equated "living independently" as linked to greater self-reliance, whereas the latter understanding was evident more in the Spanish documents, where these values were more explicitly discussed as 'rights'. 'Active aging' is also a concept open to critical scrutiny as a framing value for technological innovation [67].

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