Faculty of Design

2022

Social Design of Community Service Models with AIoT to Support Aging and Elders Well-Being -68

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Relating Systems Thinking and Design
2022 Symposium
University of Brighton, Brighton, UK,
October 13-16, 2022

Social Design of Community Service Models with AIoT to Support Aging and Elders' Well-being

Scoping review study

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Along with the increase in average life expectancy, the world's elderly population is expected to grow to 2.1 billion by 2050. Ageing marks a sensitive and vulnerable period of life, bringing loss of roles and functions and increased dependence on others, often reflected in a decline in quality of life. As everyone experiences ageing, the need to achieve a satisfactory old age for all in the future means that more research and a better systematic understanding of ageing and elder well-being are needed as changing demographics put growing pressure on public health and finance, and the provision of long-term care becomes increasingly inadequate.

In this study, we have systematically scoped three streams of literature, design, social studies and digital technology based on Arksey and O'Malley's (2005) methodological framework. With this RSD presentation, we will report on our ongoing work, scoping our research on three core elements: Aging and elder well-being, Community services and AIoT (Artificial intelligence and Internet of Things).

Our preliminary review revealed a cluster of ethnographic studies on 'ageing in place' in which community services appeared to be of interest. Several survey

studies confirm that most elders prefer to receive care from their families rather than in institutions. In a cluster with a systemic lens, community services have been studied to become an increasingly important model of long-term care a few have demonstrated that community services are more effective in supporting elders' interests and care preferences.

Within the digital technology stream, an emerging cluster of studies proposes Artificial intelligence and the Internet of Things (AIoT) as potential solutions to the challenges associated with an ageing society. AIoT integrated into elderly care expands the range of services and supports social well-being. Experimental studies with prototyped technologies are studied in relation to outcomes of improving the self-care experience of elders at home and how AIoT facilitates the development and sharing of their unique coping strategies, thereby maintaining their vitality and independence. However, the volume of the literature shows that only a few studies have included AIoT as part of community service.

Overall, our systemic review work in progress unpacks the relevant literature into different clusters and categories, including theoretical lenses, research methods, findings and outcomes. The initial charting of the studies indicates that despite the accumulation of previous research, the current body of knowledge on the interplay of ageing and elder well-being, community services, and AIoT is underdeveloped, with unresolved issues at multiple levels of the community care model, including policy, organisation, services and individuals.

KEYWORDS: aging, ageing, elder, elderly well-being, community, community service, care model, digital technology, ai, IoT, aIoT, systematic review, scoping review

RSD TOPIC(S): Health & Well-Being, Sociotechnical Systems

Presentation summary

Longer life expectancy and systemic understanding of elder well-being

With better living conditions and health care interventions, the average life expectancy continues to increase; most people can expect to live to age 60 or beyond (Partridge et al., 2018). This has led to an unprecedented increase in the size of the elderly population, which is expected to grow to 2.1 billion by 2050, representing 22% of the total population, twice the total population share in 2015 (WHO, 2021).

Ageing marks a sensitive and fragile period of life, bringing with it a loss of roles and functions and an increased dependency on others, a dependency that can be reflected in a decline in quality of life and life satisfaction (Şahin et al., 2019). Our parents, family, and friends, including us personally, everyone experience ageing. The need to achieve a satisfying old age for our parents, family, friends, and ourselves in the future means that more attention and research on the elderly well-being is now required, especially as the population of elders is rapidly growing, the old-age dependency ratios keep rising, the pressure on the public health care and financial systems continues to expand and the supply of long-term care remains short (Rouzet et al., 2019). Enhancing elderly well-being in response to this ageing society challenge requires more social support. This calls for further design at the systemic and strategic level to provide more responsive and personalised services for elders in a more affordable and sustainable care model with more efficient and refined service networks.

Method

Systematic scoping review method

In this research, we carry out a systematic scoping review of three literature streams – design, social studies, and digital technologies – based on the methodological framework of Arksey and O'Malley (2005), which consists of five stages: (1) identifying the research question; (2) identifying relevant studies; (3) study selection; (4) charting the data; (5) collating, summarising, and reporting the results.

A scoping review was chosen not only for the purpose of systematically scanning and assessing the evidence within existing research areas but also for the purpose of breaking down the relevant literature into new clusters and categories to identify new research scopes from which to effectively identify research gaps as well as possible new results.

Our work in progress is at stage 4 of charting the categories of elder well-being, community services and systemic unities for analysis. Next, we aim to unravel the underlying models and re-explore the definitions of community services, especially those enabled by digital technologies. The final results of the review will summarise the overall state of existing relevant research activities and define the scope of future research around three core elements: elderly well-being, community services, and AIoT.

Initial Results

Community service models

From an ageing perspective, community services appeared to be in the interest of seniors reconsidering their living arrangements with specific preferences for social support and care services (Mulliner et al., 2020; Jancz & Trojanek, 2020; Fu & Chui, 2020; Werner et al., 2020). Several studies have shown that as elders age, they are less inclined to move and prefer to stay in their own homes and live independently for as long as possible, which is known as "aging in place" (Abramsson & Andersson, 2016; Filipovič Hrast et al. 2019; Jancz & Trojanek, 2020; Mulliner et al. 2020). Furthermore, most elders prefer to receive care from their families or communities rather than in institutions (Fu & Chui, 2020; Plöthner et al., 2019; Wieland et al., 2010), and the COVID pandemic has contributed to this trend even more (Werner et al., 2020). Besides, the convenience and affordability of community services have made them more popular with most elders in areas with less developed care industries than the limited number and higher cost of elderly care facilities (Yue et al., 2021; Fan et al., 2018).

Not only do older people exhibit a personal preference for community services, but community-based models of long-term care are also increasingly applied as one of the key solutions to the challenges of ageing. Several countries have issued policies to advocate for it, driven by the urgency of the forecasts on limited human and financial

resources for healthcare (Feng et al., 2020; Noh et al., 2021; Janse et al., 2018). The potential merits of community models of care include a reduced financial burden and making care resources more accessible by enhancing preventive care for the elder and keeping care-dependent individuals in home healthcare settings for as long as possible (Feng et al., 2020; Chen et al., 2017; Plöthner et al., 2019).

Artificial intelligence of things (AIoT)

In the meantime, with the advent of the information age, the use of popular technologies such as the Internet of Things (IoT) and Artificial Intelligence (AI) are increasingly seen as possible solutions to the challenges associated with an ageing society. These digital technologies can support social well-being and expand its services, for instance, by making formal care available to elders at home and connecting formal and informal care, having the potential to improve the quality of life of elders and allow them to maintain an independent lifestyle (Tun et al., 2021; Calatrava-Nicolás et al., 2021; Liu & Wang, 2021). This could potentially reduce the pressure on the public health care system and decrease expenditures, while allowing patients in remote areas or without access to medical centres to receive an excellent level of care services (Tun et al., 2021). Though, despite the future promises, the potential of AI is currently not met in the long-term care services for enhanced elderly care experience. An important reason for this is that the social aspects of AI and its organisational context of multi-users in care providing are largely ignored (Simonse, Albayrak and Starre, 2019).

Discussion

Despite the foregoing accumulation of research and increased understanding of the emerging area of community models of care, the body of knowledge is currently underdeveloped (Feng et al., 2020; Pratono & Maharani, 2018). These unresolved issues exist at multiple levels of the model; at the policy level, there are unclear and limited sources of funding to support community services and inadequate public policies (Feng et al., 2020; Van Eenoo et al., 2016); at the organisational level, there are silos between organisations, institutions, and disciplines in different fields, which lack mutual recognition and cooperation (Greenfield et al., 2015); at the service level, there is a shortage of caregivers to provide professional services, with varying quality of services

and weak regulation (Feng et al., 2020; Pratono & Maharani, 2018; Van Eenoo et al., 2016) at the individual level, service eligibility criteria are not uniformly assessed, and the fairness of receiving care is debatable (Van Eenoo et al., 2016). In addition, there are challenges such as difficulties in evaluating the impact and outcomes of service interventions at the individual and community levels (Greenfield et al., 2015); lack of trust in the organisation and digital technologies by the target group to integrate and accept the community setting (Pratono & Maharani, 2018).

In order to allow elders to stay safely and independently at home and support their well-being, a better understanding of how to alleviate the systemic challenges is required. From a strategic design perspective, the integration of technologies into community services might be a strategic lever to improve the accessibility, quality, and efficiency of care and services. But there is the complex challenge of designing sustainable multi-organizational care networks based on user values across the boundaries of multiple socio-technical systems (Alami et al., 2020; Tun et al., 2021). Therefore, future research aims to contribute with a fine-grained understanding of how to combine the efficient and precise power of advanced technology (AI and IoT) with personalised and responsive community services to build inclusive and sustainable multi-organizational care networks that enhance the positive well-being of the elderly.

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