The potential for AI to the monitoring and support for caregivers: an urgent tech-social challenge

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Abstract

Italy stands at the forefront of a group of high and middle-income countries currently experiencing a relatively swift progression of population ageing. Meeting the social challenges and seizing the opportunities connected with population ageing represents a complex task. The increasing gap between long-term care needs of an older population, and available formal and informal care resources is perhaps one of the most critical challenges posed by the process of population ageing to our social fabric. The actual institutional arrangements characterising long-term care provision in Italy are ill-equipped to face such a challenge. It is in this context that solutions based on both assistive technologies and artificial intelligence appear as a necessary avenue to increase the future social and economic sustainability of population ageing. "Care Sustainability in an Ageing Society" (CaSAS) is part of the larger Age-It national project, which is dedicated to better equipping and preparing Italian society through institutional, economic, social, medical, and technological solutions to face the challenges and meet the opportunities presented by rapid population ageing. Prior research has predominantly focused on utilizing artificial intelligence (AI) and assistive technology (AT) to enhance the capacity and intensity of monitoring the health conditions and activities of care receivers. Some AI applications were also implemented to assist caregivers with advice to provide care tasks or to remember caregiving routines. CaSAS seeks to complement this approach by shifting the focus toward caregivers' skills, information, and, most importantly, their physical and mental well-being. Both informal and formal caregivers require tailored, specific advice, education, and information to better cope with caregiving tasks and the associated burden. The potential of AI and AT tools is substantial in expanding existing protocols, interventions, and best practices from occasional small-scale experiences to interventions that impact the general population, potentially yielding ground-breaking social impact. The preliminary phases of implementation of the CaSAS research program led to the formulation of five recommendations when planning and utilizing AI and AT solutions in the context of the caregiver-care receiver relation.

Keywords

Artificial intelligence, caregiving, caregiver support, long-term care

1. The challenge ahead

Italy stands at the forefront of a group of high and middle-income countries currently experiencing a relatively swift progression of population ageing (in 2020, 23.2% of its population was aged 65 years or more, compared to the EU average of 20.6%.) [1]. This phenomenon is clearly linked to the dual dynamics of increasing longevity and decreasing fertility, trends that are only partially offset by inflows of minor/young adult immigrants.

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Longer life expectancy represents a major change in the "standard" individual's life course vis-à-vis the lives of our ancestors. Several emerging trends can be viewed as individuals adapting to this new demographic reality, including the postponement of key life transitions such as entering the labour market, forming partnerships, and becoming parents; further, individuals are increasingly planning and embracing a healthy and leisure-intensive period of life after retiring from paid work, as well as securing care support in the extended later stages of life through insurance [2].

However, meeting the social challenges and seize the opportunities connected with population ageing seems to be a more intricate and demanding task for our social fabric [2]. One of the most prominent of these challenges is the growing mismatch between the rising demand for long-term care – linked to a reduction in later-life morbidity, which lags significantly behind the observed increase in longevity– and the available formal and informal care resources. In fact, the growing demand for long-term support to older individuals may prove challenging due to a number of factors, such as: (i) the existing and growing constraints to the expansion of public spending in the area of long-term care policies and services; (ii) the increasing demographic imbalance between the working-age population and the older population – which also limits the workforce available for employment in the care sector; (iii) and the diminishing availability of informal care, stemming from diverse processes such as: declining fertility; increasing female participation to the paid labour market; the postponement of retirement age; and the heightened mobility and living distance between parents and their adult children, that has affected the traditional ways of providing care, giving rise to other alternative forms of care such as at-distance care provision [4-7].

At present, the institutional arrangements behind the system of long term care provision in Italy are mainly based on (i) a familism-by-default approach, which places a heavy burden on the shoulders of families – mainly female partners and daughters or daughters-in-law – in terms of directly providing care or finding ad hoc market-based solutions; (ii) the provision of cash-for-care transfers to not self-sufficient individuals (i.e. "indennità di accompagnamento" and "assegno di cura"); (iii) a limited role of the direct public services and of institutional care (e.g. nursing homes); (iv) an important role of the third sector and (mainly immigrant) paid caregivers in the provision of personal care to older people ageing in place [1, 2]. These arrangements prove largely inadequate in addressing the challenges connected with population ageing and the rising demand for care. What is more, the above mentioned social, economic, and demographic transformations makes it clear that the solution of reinforcing existing policies and measures does not represent a viable or realistic solution to the impeding challenge. In other words, an approach based on "more of the same" falls short of what is needed.

It is in this context that the significance of approaches, tools and solutions based in both assistive technologies and artificial intelligence appears as a promising, and likely necessary, avenue to increase the future social and economic sustainability of population ageing, and the correlated increase in the demand for long term care [8]. What is more, it is probably necessary to (re)direct the utilization of these approaches and tools. Instead of solely focusing on assisting and monitoring care-receivers – thereby augmenting the supervisory capabilities of caregivers – it is imperative to broaden the perspective to encompass the skills and well-being of the caregivers themselves.

2. The project Care Sustainability in an Ageing Society (CaSAS)

In the context of the recently financed AgeIt project a team built on the collaboration of several Italian universities (Bologna, Milano-Bicocca, Molise, Padova), research institutes (INRCA, ISTAT) and the Beta80 group, a major effort has been launched to study and identify some of the most promising and viable solutions to improve the sustainability of the Italian long-term care system. The project moves in several directions, all to varying degrees, reliant on the utilization of AI and AT approaches. These include:

(i) Developing and producing analytical models which, by leveraging a heterogeneous set of structured data sets and the enhanced analytical capabilities offered by AI approaches, allow to produce a detailed map of care resources and needs across different geographical and territorial contexts within Italy. Such a model, fed with information on population demographic composition, the transport system, and the availability and location of health and long-term care services, will also allow to predict future gaps in the care system;

(ii) Creating an online training and information platform catering to the needs of both formal and informal caregivers, as well as the care receivers' families;

(iii) Mapping long-term care policies, measures and activities implemented at the local and community level. This will facilitate the identification of context-specific best practices and the preparation of an updated atlas of policy tools to improve the sustainability of population ageing across different institutional levels;

(iv) Implementing a series of prototypical institutional-technological solutions to address the support and educational needs of caregivers who provide support to older people with dementia; those who support older individuals after hospital discharge following a heart failure; and those caregivers who need to physically move, together with their care receivers, into different environments – from urban to rural areas – and thus face different challenges in terms of the walkability of different physical and institutional contexts. Overall, in this fourth direction, wearable sensors - monitoring parameters like arm and leg movements, heart rate, and sleep quality - will be utilized, feeding into a device-agnostic online platform. In turn, AI models will be utilized to analyse the collected data, and create an early warning system redirecting caregivers to actions, learning modules, or information resources aiming at improving their wellbeing, skills and therefore the quality of support they provide to their care receivers.

3. The tech-social challenge and the role of AI

Within the context of the ongoing process of population ageing and, more specifically, of the growing mismatch between the demand for and availability of long-term care resources, the significance of AI and AT-based resources should not be underestimated or overlooked. It is only by increasing the quality of care provided, the productivity and sustainability of our caregiving system – defined as the complex set and interaction of social, institutional, medical and technological solutions – that we may transform what seems to be an insurmountable challenge into a significant opportunity for social and technological development. AI and AT solutions stand as among the most effective tools at our disposal to support caregivers, fostering their well-being, skills, and productivity, and reducing care burden [8]. This, in turn, can have profound impact on both the wellbeing of care receivers, and the socio-economic sustainability of population ageing [8-10]. AI based instruments and tools could be utilized along a wide range of activities, e.g. promoting directly or indirectly the autonomy of older people and supporting ageing-in-place solutions; allowing to monitor both caregivers and care receivers' wellbeing; setting in motion early warning systems; and enhancing the skills and information available and accessible to both formal and informal caregivers, as well as to the care receivers' families [10-13].

Yet, while the potential benefits of using AI approaches and tools are substantial, so too are the risk associated with potential mistakes [8]. The experience gained in the early phases of the AgeIt project suggest that some important areas of attention, to avoid likely missteps, include the following:

(i) AI and AT-based innovative solutions and tools need to be co-designed with both care receivers and caregivers, ensuring they are easily comprehensible, user-friendly, and effective;

(ii) Leveraging the large diffusion of technological solutions and "nudging" activities and interventions, may be more relevant and impactful than investing in small-scale, high-intensity technological solutions or interventions;

(iii) Clearly articulating the short/medium-term gains and advantages of the proposed tools and solutions to caregivers is crucial. Any modification in the delicate balance of a caregiving-receiving relation is perceived as a challenge and the immediate gains of such changes should be visibly apparent;

(iv) Linking several sources and types of – already available – information may often and quickly generate sufficiently rich information to effectively readdress policy interventions;

(v) When planning AI and AT interventions, as well as innovative institutional solutions, it is essential to be mindful of the unequal impact these tools and measures can have. There is a risk of exacerbating existing social, economic, and health inequalities among the older population [14].

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