

CHAPTER 17

URBAN AGEING

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Introduction

The crossroads of living in cities on the one hand and ageing of the population on the other is studied in an interdisciplinary field of research called urban ageing (van Hoof and Kazak 2018, van Hoof et al. 2018). People live longer and in better health than ever before in Europe. Despite all the positive aspects of population ageing, it poses many challenges. The interaction of population ageing and urbanisation raises issues in various domains of urban living (Phillipson and Buffel 2016). According to the Organisation for Economic Co-operation and Development (OECD 2015), the population share of those of 65 years old is expected to climb to 25.1% in 2050 in its member states. Cities in particular have large numbers of older inhabitants and are home to 43.2% of this older population.

The need to develop supportive urban communities are major issues for public policy to understand the relationship between population ageing and urban change (Buffel and Phillipson 2016). Plouffe and Kalache (2010) see older citizens as a precious resource, but in order to tap the full potential these people represent for continued human development (Zaidi et al. 2013), the world's cities must ensure their inclusion and full access to urban spaces, structures, and services. Therefore, cities are called upon to complement the efforts of national governments to address the consequences of the unprecedented demographic shift (OECD 2015). Additionally, at the city level there is a belief to understand the requirements and preferences of local communities (OECD 2015). An important question in relation to urban ageing is what exactly makes a city age-friendly (Alley et al. 2007, Lui et al. 2009, Plouffe and Kalache 2010,

Steels 2015, Moulaert and Garon 2016, Age Platform Europe 2018)? Another relevant question is which factors allow some older people in cities to thrive, while others find it hard to cope with the struggles of daily life? This chapter explores and describes which elements and factors make cities age-friendly, for instance, on the neighbourhood level and in relation to technology for older people.

The city as an ideal place for older people?

Ageing in place (i.e., living in the community, with some level of independence, rather than in residential care), is often seen as an ideal (Kazak et al. 2017). However, there are numerous challenges concerning the adequate provision of services, safety concerns of older people, and affordability issues, which have led some researchers to argue that the focus should be on ageing in the right place (Rosenberg and Wilson 2018, Golant 2015). Given the many challenges, one could ask the question whether urban environments are the best for an ageing population and, therefore, the right place to age well? Cities may be the best possible environment for older people to live and age in place, if they are under a cycle of continuous reinvention and adaptation to guarantee they are in line the needs of an older population (van Hoof and Kazak 2018, van Hoof et al. 2018).

The OECD (2015) report concluded that in the large urban areas, the older population is proportionately growing faster than the total population. This means that the challenges are greater to overcome, but then again, cities have more and better resources and offer greater opportunities. There are differences between urban and rural ageing. Rural areas offer fewer commercial services, such as supermarkets and banks. Scattered urban structures in rural areas decrease the exposure to some environmental threats, like the urban heat island effect or low level of air quality (Kazak 2018). In urban areas closer proximity to public services, which influence the quality of life of older people. Due to the economic contexts, such conditions often cannot be provided in rural areas (Skinner and Winterton 2018). Over time living conditions may improve in non-urban areas, in particular in suburban zones (Kazak and Pilawka 2013, Kajdanek 2014), but it is likely the density of services will never reach that of city centres. However, an analysis of the Active Ageing Index for rural and urban locations suggested that the situation is much better for older people living in cities than for those living in the countryside (Perek-Białas et al. 2017).

One of the concept which could be used in planning for later life also in the urban context could be active ageing concept (WHO, 2002, Walker 2016). Older adults are even seen as consumers and in various forms of employment. In relation to urban ageing, there should be a focus on promoting mobility within cities (such as walkability, use of public transport), promoting safety and security, and empowering older people in local communities (Buffel and Phillipson 2018b). Additionally, urban planning should avoid the segregation of older people, such as is the case in so-called retirement villages in the United States of America (Simpson 2015). Such retirement villages are a type of age-segregated housing (Fitzgerald and Caro 2018). Ideally, an age-friendly city is inclusive for all generations. A large number of cities all over the world have joined the age-friendly cities movement (Buffel et al. 2014, Scharlach 2012, Scharlach and Lehning 2013, Buffel and Phillipson 2018).

Shaping age-friendly cities

An age-friendly city offers a supportive environment that enables residents to grow older actively within their families, neighbourhoods, and civil society and offers extensive opportunities for their participation in the community, or, in other words, a place where older people are actively involved, valued, and supported with infrastructure and services that effectively accommodate their needs (Fitzgerald and Caro, 2018, p.2). Plouffe and Kalache (2010) describe the efforts of the World Health Organization (WHO) to engage and assist cities to become more “age-friendly”, through the Global Age-Friendly Cities Guide and a companion “Checklist of Essential Features of Age-Friendly Cities”. An age-friendly city is friendly for all ages and not just friendly for older adults. It should ideally be inclusive and offer opportunities, not just be friendly, to all the people living in the city. The concept itself has old roots, as is described by Plouffe and Kalache (2010), namely in Lawton and Nahemow’s ecological perspective (Lawton and Nahemow, 1973), which articulated the dynamic interplay between individual adaptation and environmental alteration to maintain optimal functioning in older age. The WHO project proposed that an “age-friendly” city is one that promotes active aging (WHO, 2002). Such a city optimises opportunities for health, participation, and security in order to enhance quality of life as people age (Plouffe and Kalache 2010).

For the WHO project, numerous partners from 35 cities from around the world collaborated, for instance, through conducting large-scale focus group sessions with various groups of stakeholders (WHO, 2002). Based

on this research, the features of age-friendly cities were determined in eight domains of urban life. These domains are: outdoor spaces and buildings; transportation; housing; social participation; respect and social inclusion; civic participation and employment; communication and information; and community support and health services. One of the noteworthy aspects of this global study was that there were no systematic differences in focus group themes between cities in developed and developing countries, although the positive, age-friendly features were more numerous in cities in developed countries.

One of the major world cities who have adopted the principles of age-friendly cities is Hong Kong. The Hong Kong Special Administrative Region Government (2017) stimulates active and healthy ageing by focusing on a multi-dimensional approach. The dimensions include financial adequacy, general and hospital care, community and residential care, transport and mobility, housing and the built environment, active ageing, more flexible employment, and family-friendly measures. The local government takes actions in all these domains to make cities more inclusive for the older population and for others as well. It is just one of the examples of local governments taking actions in the field of urban ageing, while later we aim to show more detailed how the idea of active ageing is present in concrete actions taken by these cities.

Building friendly places and inclusive neighbourhoods for an ageing population

What does it mean for the built environment and urban planning when a city's population is ageing? How can related services meet the needs of the ever-diversifying urban population and who are the stakeholders responsible for providing these services? First, large and economically growing cities are known for high real estate prices and a high demand for residential space. This implies that one needs to design and develop small dwellings, which also meet the needs for older people who are less affluent and have difficulty paying the rent or find it hard to obtain a mortgage as they no longer actively participate in a work life after retirement. But the lack of space and financial means is not the main driver for small dwellings: it is the fact that the growing number of older people are, in fact, single-person households, made up of people who have been single all their lives (without having any offspring), or who divorced or became widowed. In various studies (for example, Onolemhemen 2009), it was found that among older people, there is a larger percentage of poor women than men (Marin and Zaidi 2017). Nevertheless, both groups are at

risk of dropping out of society (social exclusion), despite numerous personal and environmental strengths, particularly when costs of housing take up a disproportionate share of the living allowances.

Instead of building smaller homes and apartments, larger dwellings could accommodate multiple tenants at the same time. This kind of group living encompasses living with like-minded people, with friends or old acquaintances who share similar interests. Having bonds with co-residents and other people is known to contribute to a sense of home among nursing home residents, and it is probable that the same is true for people living in the community. Moreover, the beauty of it all is that social housing associations can help provide such spaces to live, as well as private investors and people with financial resources themselves. Imagine the opportunities for people who want to live together in terms of shared resources, cooking and eating together, keeping an eye and helping a fellow occupant too if he or she falls ill. Again, people who have found themselves divorced or widowed may find it attractive to start living together and the same goes for people who have always been single but miss the interaction with others that they used to have when still employed or active in organisations. For many people, it seems ideal: to live together with like-minded people. This notion goes even further in multicultural urban environments, where we have witnessed the emergence of nursing homes and housing for older people with a comparable cultural, ethnic, social or religious background. Despite the discussions on whether such buildings and communities are or are not an example of segregation in society, they do serve a role in getting people to live with like-minded others. Many of the world's large cities have a multicultural and multi-ethnic build-up of their societies (Buffel 2017), and each of the groups have their own needs and preferences in terms of housing and interaction with each other. Community building is about stimulating the sense of belonging and sense of community among older people, and between the generations. The importance of it was also noted by Rémillard-Boilard et al. (2017), who called for the promotion of social connectedness within urban environments. Cities are important sites for building social networks but can also trigger marginalisation and social exclusion.

It is noteworthy to stress that so far, we have not dealt with the many home modifications that are available to adapt dwellings (van Hoof et al. 2010, Kazak et al. 2017). Easy-access and single-level dwellings will be needed to house the growing group of older people, who may be at a higher risk of reduced mobility and who are prone to falls. Again, age-friendly architecture can help: as accessible dwellings are also advantageous for young parents with prams. In addition, when talking

about accessibility of buildings and homes, one should also consider the concept of egressability: are people able to leave a building in case of calamities. Such events include fires or being taken away on a stretcher by an ambulance worker, or in extreme and terminal cases, in a coffin upon death. Less extreme examples of mobility are found in public transport with accessible busses that take people from A to B, multi outdoor seats for people to take a rest, sufficient public toilets, and even adjusted sidewalks that are accessible for people using wheelchairs and wheeled walkers (and again, younger people with prams). All those facilities and elements of urban design have an impact on walkability of neighbourhoods. Access to public services, better commutes and proximity to other people and places make neighbourhoods happier, healthier and more sustainable. Neighbourhood walkability is not a new approach in academic research as a measurement of promoting active urban ageing (Hall and Ram 2018, Weiss et al. 2010, Bogen et al. 2018). In order to make cities more age-friendly, there is a need to undertake actions in improving urban walkability conditions, as they are strongly related with quality of life of citizens (Zhao and Chung 2017). In addition, legible and familiar environments (both indoors and outdoors) are beneficial to the community as a whole. The outdoor environment can be a place where people meet, with fitting adaptations for the local climate. Most importantly, when the weather does not permit outdoor activities, the indoor environment should also be comfortable for older people. Urban planning challenges include an even and accessible distribution of services, including shops and health centres, which do not require large distances to travel. Inner cities should be easy to reach by public transportation, have sufficient seats to take a rest, have public toilets and a place to enjoy a cup of coffee, may be inviting to older clients to spend cash while shopping.

When redeveloping urban environment in order to face the needs of older people, one should not solely focus on one selected vulnerable or frail group (Szewrański et al. 2018). A more comprehensive approach should encompass social inclusion of all (or as many as possible) groups, that have specific needs in regard to the design of the urban structure. Such approach can be supported through the concept of universal design (de Souza and de Oliveira Post 2016). Instead of implementing the idea of an age-friendly city, and then, for instance a cyclist-friendly city, it seems rational to integrate all vulnerable groups at once, define their needs and requirements, and then decide about the final solutions that would combine solutions that contribute to the requirements of the wider community. An integrated approach that focuses on eliminating

architectural and technical barriers seems to be necessary, especially due to limited availability of financial resources (Hełdak et al. 2018).

Technology as a solution for urban ageing?

The use of smart technology is increasingly considered as a possible solution for dealing with the challenges related to urban ageing mostly because of exponential technological advances in the last decades. Although technology is often seen as a solution for sustainable urban ageing, there are numerous issues and challenges (Righi et al. 2015). Righi et al. (2015) provided a vision of smart city, which conceives older people as embedded in intergenerational urban communities and capable of creating new engagement situations by reconfiguring IT-driven scenarios to their interests and social practices. Looking at the concept of smart cities, many definitions of a smart city exist, none of which has been universally acknowledged (Cocchia 2014). The concept of smart cities may be understood as urban areas that widely utilise information and communication technologies (ICTs) to organise and provide all urban functions, for instance, to reduce costs of infrastructure maintenance (such as roads, bridges, subways, airports, seaports, public transport, and sewerage), consumption of resources (such as gas, electricity, and water supply), better use the free spaces as well as to engage citizens in local governance (Batty et al. 2012, Klimczuk and Tomczyk 2016). Some examples of smart city technologies are smart power grids to enable a reduction of energy consumption, digitalized supervision of pedestrian traffic to increase safety and security, and electronic monitoring of the activity of urban municipal services (Klimczuk and Tomczyk 2016). As can be seen in these examples, smart city technologies rely heavily on both Big Data analytics and the Internet of Things, which includes the diffusion of sensors and wireless sensor networks in the city with the capability of real-time data gathering (Pierce and Andersson 2017). Such real-time data gathering can also be accomplished inside older adults' dwellings, effectively turning these into so called smart homes. Smart homes have been postulated as a potential solution to support ageing in place. For example, smart homes technologies are aimed at supporting independent living by facilitating tasks such as preparing food and cleaning. Furthermore, smart home technology can assist in monitoring and maintaining health status (Mitzner et al. 2010). Despite the emphasis on smart homes by government agencies, policy makers, and the industry, their existence is not widespread (Sixsmith and Sixsmith 2008, Wilson et al. 2015). Consequently, their suggested potential for older adults for

alleviating pressure on (family) carers, and decreasing health care expenditure, has not yet reached its full potential. One of the reasons for this is low level of smart home technology adoption by older adults (Balta-Ozkan et al. 2013, Peek et al. 2016).

Many studies confirm that the older adult population is highly heterogeneous (Gunter 1998, Yoon et al. 2013) and as well in seeking to understand technology acceptance by older person who are ageing in place, it is important to acknowledge this. Older adults do not only vary with regards to their values, attitudes, needs and wants, but also with regards to how these are affected by ageing, life events, and changes in their social and physical environment (Moschis 2012). These differences are also reflected in their use of technologies that could help them to age in place (Peek et al. 2017). Whether or not a new technology is considered a welcome addition by a senior is dependent on perceived benefits and costs of technology, perceived need for technology, social influences, and the degree to which a technology is in line with the older adult's self-concept (Ahn et al. 2008, Chen and Chan 2013, Lee and Coughlin 2015, Mitzner et al. 2010, Peek et al. 2014). Furthermore, the use of technology is dependent on the availability and use of technological and non-technological alternatives (Peek et al. 2016, Greenhalgh et al. 2016). For example, older adults who have family members that visit them daily are less interested in smart home monitoring technologies that are designed to watch over them; they see no need for it.

As long as there is technological development, there will likely exist a gap between those that grew up with certain technologies, and those that did not (Fozard and Wahl 2012, Lim 2010). Consequently, older adults can benefit from people around them who can help them encounter technologies, and who can also help them in using technologies. For seniors, assessing what is the most appropriate technology for their ageing in place needs can be difficult. Professionals (i.e., technology consultants) specifically tasked with matching seniors' needs with technology solutions can greatly help here. In the municipality of The Hague, a participatory action research project was conducted to determine the challenges these professionals face and to co-design tool for optimising their matchmaking service. Results showed that important challenges for technology consultants in their current matchmaking practice were: making the matchmaking service more demand oriented and creating an accurate and complete overview of relevant factors within the seniors' individual situation so that an optimal match could be made. A matchmaking tool was created to help overcome these challenges. The tool entails a

structured approach to better match technologies to a senior's individual ageing in place needs and circumstances (Haufe et al. 2019).

Conclusion

There is an urgent need to remind and to repeat that the global ageing of the urban populations calls for more age-friendly approaches to be implemented in the cities (van Hoof et al. 2018). It is a must even it is a challenge for policy makers to prepare the places in such a way to both current and future generations of older people can benefit from age-friendly solutions. This requires public and many private partners to collaborate, for instance, in the redesign of the public space, healthcare and welfare services, and the design of new housing concepts and technologies. In order to achieve an age-friendly city, initiatives which fit to the needs and expectations of the citizens should be under a continuous cycle of monitoring, evaluation and validation of the age-friendly city concept of WHO through the active involvement of older people who voice their opinions and experiences. Cities with a proper approach and actions can adjust to the future population profiles taking into account their preferences and needs which will without a doubt be *more senior* than ever.

References

- Age Platform Europe. 2018. <http://www.age-platform.eu/>
- Alley, D., Liebig, P., Pynoos, J., Banerjee, T. and Choi, I.H. 2007. "Creating elder-friendly communities: Preparations for an aging society". *Journal of Gerontological Social Work* 49 (1-2): 1-18.
- Ahn, M., Beamish, J.O., and Goss, R.C. 2008. "Understanding older adults' attitudes and adoption of residential technologies". *Family and Consumer Sciences Research Journal* 36 (3): 243-260.
- Balta-Ozkan, N., Davidson, R., Bicket, M., and Whitmarsh, L. 2013. "The development of smart homes market in the UK". *Energy* 60, 361-372.
- Batty, M., Axhausen, K. W., Giannotti, F., Pozdnoukhov, A., Bazzani, A., Wachowicz, M., Ouzounis, G. and Portugali, Y. 2012. "Smart cities of the future". *European Physical Journal: Special Topics* 214 (1): 481-518.
- Boerenfijn, P., Kazak, J.K., Schellen, L. and van Hoof, J. 2018. "A multi-case study of innovations in energy performance of social housing for older adults in the Netherlands". *Energy and Buildings* 158: 1762-1769.

Bogen, B., Moe-Nilssen, R., Ranhoff, A.H. and Aaslund M.K. 2018. "The Walk Ratio: Investigation of invariance across walking conditions and gender in community-dwelling older people". *Gait & Posture* 61: 479-482.

Bouzarovski, S., Petrova, S. and Sarlamanov, R. 2012. "Energy poverty policies in the EU: A critical perspective". *Energy Policy* 49: 76-82.

Buffel, T. 2017. "Ageing Migrants and the Creation of Home: Mobility and the Maintenance of Transnational Ties". *Population, Space and Place* 23 (5): art. no. e1994.

Buffel, T., McGarry, P., Phillipson, C., De Donder, L., Dury, S., De Witte, N., Smetcoren, A.-S. and Verté, D. 2014. "Developing Age-Friendly Cities: Case Studies from Brussels and Manchester and Implications for Policy and Practice". *Journal of Aging and Social Policy* 26 (1-2): 52-72.

Buffel, T. and Phillipson, C. 2016. "Can global cities be 'age-friendly cities'? Urban development and ageing populations". *Cities* 55: 94-100.

Buffel, T. and Phillipson, C. 2017. "Chapter 10. Urban ageing: New agendas for geographical gerontology". In *Geographical Gerontology: Perspectives, Concepts, Approaches*, edited by M.W. Skinner, G.J. Andrews and M.P. Cutchin, 123-35. Taylor and Francis.

Buffel, T. and Phillipson, C. 2018a. "A manifesto for the age-friendly movement: developing a new urban agenda". *Journal of Aging & Social Policy* 30 (2): 173-192.

Buffel, T. and Phillipson, C. 2018b. "Urban ageing. New agenda for geographical gerontology". In: Skinner M.W., Andrews G.J. and Cutchin M.P. (eds.) *Geographical gerontology. Perspectives, concepts, approaches*. London: Routledge. pp. 123-135.

Calvert, J.F., Kaye, J., Leahy, M., Hexem, K. and Carlson, N. 2009. "Technology use by rural and urban oldest old". *Technology and Health Care* 17 (1): 1-11.

Chen, K., and Chan, A. H.-S. 2013. "Use or non-use of gerontechnology--a qualitative study". *International Journal of Environmental Research and Public Health* 10 (10): 4645-4666.

Chief Secretary for Administration's Office. 2017. *Active and healthy ageing in Hong Kong*. Hong Kong SAR: Hong Kong Special Administrative Region Government.

Cloutier, G., Papin, M., and Bizier, C. 2018. "Do-it-yourself (DIY) adaptation: Civic initiatives as drivers to address climate change at the urban scale". *Cities* 74: 284-291.

Cocchia, A. 2014. *Smart and Digital City: A Systematic Literature*

Review. In R. Dameri and C. Rosenthal-Sabroux (Eds.), *Smart City. Progress in IS* (pp. 13–43). Cham: Springer International Publishing.

de Souza, S.C. and de Oliveira Post, A.P.D. 2016. “Universal Design: An Urgent Need”. *Procedia - Social and Behavioral Sciences* 216: 338-344.

Filippín, C., Flores Larsen, S. and Ricard, F. 2018. “Improvement of energy performance metrics for the retrofit of the built environment. Adaptation to climate change and mitigation of energy poverty”. *Energy and Buildings* 165: 399-415.

Fitzgerald, K.G. and Caro, F.G. 2018. “Introduction. International perspectives on age-friendly cities”. In: Caro, F.G. and Fitzgerald, K.G. (eds) *International perspectives on age-friendly cities*. London: Routledge. pp. 1-21.

Fozard, J.L., and Wahl, H.-W. 2012. “Role of cohort effects and technology generations in gerontechnology”. *Gerontechnology* 11 (2): 105-109.

Golant, S.M. 2015. *Aging in the right place*. Baltimore: Health Professions Press.

Gordon-Wilson, S and Modi, P. 2015. “Personality and older consumers’ green behaviour in the UK”. *Futures* 71: 1-10.

Greenhalgh, T., Shaw, S., Wherton, J., Hughes, G., Lynch, J, A’Court, C, Hinder, S., Fahy, N., Byrne, E., Finlayson, A., Sorell, T., Procter, R. and Stones, R. 2016. “SCALS: A fourth-generation study of assisted living technologies in their organisational, social, political and policy context”. *BMJ Open* 6 (2): e010208.

Gunter, B. 1998. *Understanding the Older Consumer*. London, UK: Routledge.

Gusmano, M.K. and Rodwin, V.G. 2010. “Urban Aging, Social Isolation, and Emergency Preparedness”. *IFA Global Ageing* 6 (2): 39-50.

Hall, C.M. and Ram, Y. 2018. “Walk score® and its potential contribution to the study of active transport and walkability: A critical and systematic review”. *Transportation Research Part D: Transport and Environment* 61 (Part B): 310-324.

Haufe, M., Peek, S.T.M., and Luijkx, K.G. 2019. “Matching assistive technology to independent-living seniors’ individual needs: development of the GTM tool”. *BMC Health Services Research* 19 (26): 1-13.

Heldak, M., Stacherzak, A. and Przybyła, K. 2018. “Demand and financial constraints in eliminating architectural and technical barriers for people with disabilities in Poland”. *Journal of Healthcare Engineering* 1297396: 1-9.

Kajdanek, K. 2014. "Newcomers vs. old-timers? Community, cooperation and conflict in the post-socialist suburbs of Wrocław, Poland". In: Watt P. and Smets P. (eds) *Mobilities and Neighbourhood Belonging in Cities and Suburbs*. London: Palgrave Macmillan.

Kazak, J.K. 2018. "The use of a decision support system for sustainable urbanization and thermal comfort in adaptation to climate change actions - The case of the Wrocław larger urban zone (Poland)". *Sustainability* 10 (4): 1083.

Kazak, J. and Pilawka, T. 2013. "Living conditions and migration in suburban area of Wrocław". *Journal of Agribusiness and Rural Development* 4 (30): 71-81.

Kazak, J., van Hoof, J., Świąder, M. and Szewrański, S. 2017. "Real estate for the ageing society – the perspective of a new market". *Real Estate Management and Valuation* 25 (4): 13-24.

Kielkowska, J., Tokarczyk-Dorociak, K., Kazak, J., Szewrański, S. and van Hoof, J. 2018. "Urban adaptation to climate change plans and policies – The conceptual framework of a methodological approach". *Journal of Ecological Engineering* 19 (2): 50-62.

Klimczuk, A., and Tomczyk, L. 2016. Smart, Age-friendly Cities and Communities: the Emergence of Socio-technological Solutions in the Central and Eastern Europe. In F. Flórez-Revuelta and A.A. Chaaraoui (Eds.), *Active and Assisted Living: Technologies and Applications* (pp. 335-359). London: The Institution of Engineering and Technology.

Kotharkar R. and Bagade, A. 2018. "Evaluating urban heat island in the critical local climate zones of an Indian city". *Landscape and Urban Planning* 169: 92-104.

Lawton, M.P. and Nahemow, L. 1973. "Ecology and the aging process". In: Eisdorfer, L. and Lawton, M.P. (eds) *The psychology of adult development and aging*. Washington: American Psychological Association. pp 619-674.

Lee, C., and Coughlin, J.F. 2015. "PERSPECTIVE: Older Adults' Adoption of Technology: An Integrated Approach to Identifying Determinants and Barriers". *Journal of Product Innovation Management* 32 (5): 747-759.

Lim, C.S.C. 2010. "Designing inclusive ICT products for older users: taking into account the technology generation effect". *Journal of Engineering Design* 21 (2): 189-206.

Lui, C.-W., Everingham, J.-A., Warburton, J., Cuthill, M. and Bartlett, H. 2009. "What makes a community age-friendly: A review of international literature". *Australasian Journal on Ageing* 28 (3): 116-121.

Marin, B., and Zaidi, A. 2017. Trends and Priorities of Ageing Policies in the UN European Region. *Mainstreaming Ageing: Indicators to Monitor Sustainable Progress and Policies*. Hampshire: Ashgate.

Mills, B. and Schleich J. 2012. "Residential energy-efficient technology adoption, energy conservation, knowledge, and attitudes: An analysis of European countries". *Energy Policy* 49: 616-628.

Mitzner, T.L., Boron, J.B., and Fausset, C.B. 2010. "Older adults talk technology: Technology usage and attitudes". *Computers in Human Behavior* 26 (6): 1710-1721.

Moschis, G.P. 2012. "Consumer behavior in later life: Current knowledge, issues, and new directions for research". *Psychology & Marketing* 29 (2): 57-75.

Moulaert, T. and Garon, S., eds. 2016. *Age-Friendly Cities and Communities in International Comparison. Political Lessons, Scientific Avenues, and Democratic Issues. International Perspectives on Aging Volume 14*. Cham: Springer International Publishing.

OECD. 2015. *Ageing in Cities*. Paris: OECD Publishing.

Onolemhemen, D.N. 2009. "Meeting the Challenges of Urban Aging: Narratives of Poor Elderly Women of Detroit, Michigan". *Journal of Gerontological Social Work* 52 (7): 729-743.

Peek, S.T.M., Aarts, S., and Wouters, E.J.M. 2016. Can Smart Home Technology Deliver on the Promise of Independent Living? A Critical Reflection Based on the Perspectives of Older Adults. In J. van Hoof, G. Demiris, and E. J. M. Wouters (Eds.), *Handbook of Smart Homes, Health Care and Well-Being* (pp. 203–214). Cham: Springer International Publishing Switzerland.

Peek, S.T.M., Luijkx, K.G., Rijnaard, M.D., Nieboer, M.E., van der Voort, C.S., Aarts, S., van Hoof, J., Vrijhoef, H.J. and Wouters, E.J.M. 2016. "Older adults' reasons for using technology while aging in place". *Gerontology* 62 (2):226-237.

Peek, S.T.M., Luijkx, K.G., Vrijhoef, H.J.M., Nieboer, M.E., Aarts, S., van der Voort, C.S., Rijnaard, M.D. and Wouters, E.J.M. (2017). Origins and consequences of technology acquirement by independent-living seniors: Towards an integrative model. *BMC Geriatrics* 17 (1): 189.

Peek, S.T.M., Wouters, E.J.M., van Hoof, J., Luijkx, K.G., Boeije, H. R., and Vrijhoef, H.J.M. 2014. "Factors influencing acceptance of technology for aging in place: A systematic review". *International Journal of Medical Informatics* 83 (4): 235-248.

Perek-Białas, J., Zwierzchowski, J., Antczak, R. and Panek, T. (2017). *Criteria Specific Analysis of the Active Ageing Index at the National Level in Poland: 2007-2015*. Brussels: UNECE / European Commission.

Pierce, P., and Andersson, B. (2017). Challenges with smart cities initiatives – A municipal decision makers' perspective. *Proceedings of the 50th Hawaii International Conference on System Science (HICSS-50)*, 2804-2813.

Plouffe, L. and Kalache, A. 2010. "Towards Global Age-Friendly Cities: Determining Urban Features that Promote Active Aging". *Journal of Urban Health* 87 (5): 733-739.

Rémillard-Boilard, S., Buffel, T. and Phillipson, C. 2017. "Involving Older Residents in Age-Friendly Developments: From Information to Coproduction Mechanisms". *Journal of Housing for the Elderly* 31 (2): 146-159.

Righi, V. Sayago, S. and Blat, J. 2015. Urban ageing: technology, agency and community in smarter cities for older people". In *Proceedings of the 7th International Conference on Communities and Technologies*. 119-28. New York: ACM New York.

Rosenberg, M.W. and Wilson, K. 2018. "Population geographies of older people". In: Skinner M.W., Andrews G.J. and Cutchin M.P. (eds) *Geographical gerontology. Perspectives, concepts, approaches*. London: Routledge. pp. 56-67.

Scharlach, A. 2012. "Creating Aging-Friendly Communities in the United States". *Ageing International* 37 (1): 25-38.

Scharlack, A.E. 2016. "Age-friendly cities: For whom? By whom? For what purpose?". In: Moulaert, T. and Garon, S., (eds.) *Age-Friendly Cities and Communities in International Comparison. Political Lessons, Scientific Avenues, and Democratic Issues. International Perspectives on Aging Volume 14*. Cham: Springer International Publishing. pp 305-329.

Scharlach, A.E. and Lehning, A.J. 2013. Ageing-friendly communities and social inclusion in the United States of America". *Ageing and Society* 33 (1): 110-136.

Schellen, L. and van Hoof, J. 2017. "Thermal comfort in smart homes for an aging population". In *Handbook of Smart Homes, Health Care and Well-Being*, edited by J. van Hoof, G. Demiris and E.J.M. Wouters, 475-84. Cham: Springer International Publishing

Simpson, D. 2015. *Young-Old. Urban Utopias of an Aging Society*. Zürich: Lars Müller Publishers.

Sixsmith, A., and Sixsmith, J. 2008. "Ageing in place in the United Kingdom". *Ageing International* 32 (3): 219-235.

Skinner, M.W. and Winterton, R. 2018. "Rural ageing". In: Skinner M.W., Andrews G.J. and Cutchin M.P. (eds) *Geographical gerontology. Perspectives, concepts, approaches*. London: Routledge. pp. 136-148.

Steels, S. 2015. "Key characteristics of age-friendly cities and communities: A review". *Cities* 47: 45-52.

Szewrański, S., Kazak, J., Szkaradkiewicz, M. and Sasik, J. 2015. "Flood Risk Factors in Suburban Area in The Context of Climate Change Adaptation Policies – Case Study of Wrocław, Poland". *Journal of Ecological Engineering* 16 (2): 13-18.

Szewrański, S., Świader, M., Kazak, J.K., Tokarczyk-Dorociak, K. and van Hoof, J. 2015. "Socio-Environmental Vulnerability Mapping for Environmental and Flood Resilience Assessment: The Case of Ageing and Poverty in the City of Wrocław, Poland". *Integrated Environmental Assessment and Management* 14 (5): 592-597.

Timonen, V. 2008. "Ageing Societies: A comparative introduction". New York: McGraw-Hill.

Triana, M.A., Lamberts, R. and Sassi, P. 2018. "Should we consider climate change for Brazilian social housing? Assessment of energy efficiency adaptation measures". *Energy and Buildings* 158: 1379-1392.

van den Bergen, C., Noyon, L., Booij, J., Meerstadt, B., Bilkes, R., de Vries, E., Beeldman, E., van Doesburg, N., van Vliet, J. and Duimel, M. 2017. *Den Haag seniorvriendelijke stad. Toen en nu*. The Hague: Stichting GetOud.

van Hoof, J., and Kazak, J.K. 2018. Urban Ageing. *Indoor and Built Environment* 27 (5): 583-586.

van Hoof, J., Kazak, J.K., Perek-Białas, J.M., and Peek, S.T.M. 2018. The challenges of urban ageing: Making cities age-friendly in Europe. *International Journal of Environmental Research and Public Health* 15 (11): 2473.

van Hoof, J., Kort, H.S.M., van Waarde, H. and Blom, M.M. 2010. "Environmental interventions and the design of homes for older adults with dementia: an overview". *American Journal of Alzheimer's Disease and Other Dementias* 25 (3): 202-232.

van Hoof, J., Schellen, L., Soebarto, V., Wong, J.K.W., and Kazak, J.K. 2017. "Ten Questions concerning thermal comfort and ageing". *Building and Environment* 120: 123-133.

van Middelkoop, M., Vringer, K. and Visser, H. 2017. "Are Dutch residents ready for a more stringent policy to enhance the energy performance of their homes?" *Energy Policy* 105: 269-282.

Walker, A. 2016. "Population ageing from a global and theoretical perspective: European lessons on active ageing". In: Moulaert, T. and Garon, S., (eds.) *Age-Friendly Cities and Communities in International Comparison. Political Lessons, Scientific Avenues, and Democratic Issues*.

International Perspectives on Aging Volume 14. Cham: Springer International Publishing. pp 47-64.

Walker, G., Taylor, A., Whittet, C., Lynn, C., Docherty, C., Stephen, B., Owens, E. and Galloway, S. 2017. "A practical review of energy saving technology for ageing populations". *Applied Ergonomics* 62: 247-258.

Weiss, R.L., Maantay J.A. and Fahs M. 2010. "Promoting active urban aging: A measurement approach to neighborhood walkability for older adults. *Cities and the Environment* 3 (1): 12.

Wilson, C., Hargreaves, T., and Hauxwell-Baldwin, R. 2015. "Smart homes and their users: a systematic analysis and key challenges". *Personal and Ubiquitous Computing* 19 (2): 463-476.

World Health Organization. 2007. *Global Age-friendly Cities: A Guide*. Geneva: World Health Organization.

Yoon, C., Skurnik, I., and Carpenter, M. 201). Aging and consumption. In R. Belk and A. Ruvio (Eds.), *Routledge Companion to Identity and Consumption* (pp. 187–194). New York, NY: Taylor & Francis.

Zaidi, A., Gasior, K., Hofmarcher, M.M., Lelkes, O., Marin, B., Rodrigues, R., Schmidt, A., Vanhuyse, P. and Zolyomi, E. 2013. Active ageing index 2012 concept, methodology and final results. <http://wikiprogress.org/articles/initiatives/active-ageing-index-2012-concept-methodology-and-final-results/>

Zhao, Y. and Chung, P-K. 2017. "Neighborhood environment walkability and health-related quality of life among older adults in Hong Kong". *Archives of Gerontology and Geriatrics* 73: 82-186.

Żyromski, A., Biniak-Pieróg, M., Burszta-Adamiak, E. and Zamiar, Z. 2014. "Evaluation of relationship between air pollutant concentration and meteorological elements in winter months". *Journal of Water and Land Development* 22 (1): 25-32.