CONCEPTUALIZING SUSTAINABLE RETIREMENT VILLAGES IN AUSTRALIA

Xin Hu[1], Bo Xia[2], Martin Skitmore[3] and Laurie Buys[4]

[1, 2 and 3]*School of Civil Engineering and Built Environment, Queensland University of Technology, Gardens Point, Brisbane QLD, 4001, Australia*

[4]*School of Design, Queensland University of Technology, Gardens Point, Brisbane QLD, 4001, Australia*

The Australian ageing society with baby boomers reaching retirement age has placed a lot of pressures on housing services. The retirement village is increasingly accepted as a suitable living arrangement for older people. Ecological theory of ageing emphasizes a match between environment and older peoples' competences. As one response to this, creating village environment in a sustainable way is on the agenda. However, it is not very clear what kinds of sustainable features should be incorporated within the village environment to fit residents' competences, in particular given that baby boomers who have unique requirements have become the main potential customers. In present paper, a sustainable retirement village framework is proposed by building on ecological theory of ageing and triple bottom line. A two-step inductive reasoning research method is adopted in this conceptualization process. The proposed sustainable retirement village framework contains four domains, including senior-oriented basic settings, financial affordability, age-friendly social environment and environmental sustainability. These four domains are interrelated, and a sustainable retirement village stresses a dynamic balance between different domains. This proposed framework not only gives implications for village developers on creating a suitable village environment to better accommodate residents, but also paves the way for future studies on housing older people in an age-friendly manner.

Keywords: sustainable retirement villages, ecological theory of ageing, triple bottom line, Australian baby boomers.

INTRODUCTION

The ageing population has become an established tread in Australia, and this tread will accelerate over next a few decades with the predicted proportion of the aged 65+ being 18.3-19.4% in 2031 (Australian Bureau of Statistics 2013). This demographic ageing has posed a lot of pressures on housing services. These pressures are becoming heavier, given that baby boomers with unique requirements and more expectations than other generations are entering into retirement (Ozanne 2009).

The retirement village is one of the living arrangements of older Australians. It is an institutional environment where accommodations, services, and facilities are tailored to satisfy residents' requirements (Gardner *et al.* 2005). It has been accepted as a viable living option for older adults, accommodating around 5 percent of older Australians (Xia *et al.* 2015). Given the fast-growing ageing population as well as the

[1] huxincqu@gmail.com

Hu, X, Xia, B, Skitmore, M and Buys, L (2015) Conceptualizing sustainable retirement villages in Australia *In:* Raidén, A B and Aboagye-Nimo, E (Eds) *Procs 31st Annual ARCOM Conference*, 7-9 September 2015, Lincoln, UK, Association of Researchers in Construction Management, 357-366.

increasingly accepted village lifestyle, it is becoming more popular with the estimated penetration rate reaching 7.5-8 percent in next few decades (Jones Lang Lasalle 2008).

To better accommodate residents, the village environment should be fit with residents' competences. Nevertheless, some villages have failed to meet residents' needs in terms of affordability, life-style and ergonomic needs (Gardner *et al.* 2005). This situation may exacerbate given that baby boomers' unique features are redefining Australian retirement village development models (Wright *et al.* 2014). To address this issue, delivering *"sustainable retirement villages"* is a promising approach (Xia *et al.* 2015). A sustainable retirement village offers residents a suitable living environment where residents' social, economic and environmental needs are well satisfied (Xia *et al.* 2015). Older people expect to live in a sustainable environment such as sustainable social and physical living environment and housing affordability (Pillemer *et al.* 2011), and they can make contributions to making their living community sustainable (Ritchie 2000). For village residents, they also expect village developers to provide a sustainable village environment, and they have played positive roles in sustainable village development such as renewable energy utilization (Xia *et al.* 2014).

However, *"sustainable retirement villages"* is novel concept which has not been widely explored. Previous explorations, such as Xia *et al.* (2015) and Zuo *et al.* (2014), are case studies and merely suggest a concept. They do not clearly point out what kinds of sustainable features should be contained within a retirement village environment to fit residents' competences, especially competences of baby boomers. Thus, this study aims to propose a sustainable retirement village framework to well response to Australian baby boomers' competences on the basis of ecological theory of ageing and triple bottom line.

THE ECOLOGICAL THEORY OF AGEING AND ITS IMPLICATIONS ON THE RETIREMENT VILLAGE DEVELOPMENT

Effects of environment on individuals' wellbeing are well recognized. In the specific field of Gerontology, ecological theory of ageing is adopted to explore the issue of person-environment interaction in old age. It indicates older adults' behaviours are the function of their competences and the environment (Lawton 1977). Importantly, older adults' competences and the environment should be in balance with each other, and too much or low environment press (environmental stimuli that are behaviour-activating to individuals) imposed on older people can result in maladaptive behaviours (Iwarsson, 2005; Lawton 1977).

The competence represents the nature of a person such as the physical and mental health conditions and cognitive states. It is the abilities of an individual to function (Iwarsson, 2005). Competence varies from low to high. Lower competence results from declining physical and psychological conditions of older people. The environment means the social-spatial surroundings where older adults live (Lawton 1977). It is classified based on its strength, ranging from weak to strong. Different combinations of competence and environment mean different behavioural outcomes (Iwarsson, 2005; Schwarz, 2012). An older adult with low competences exposing to a strong environment can result in negative impacts on his/her well-being. In this sense, his/her living environment should be adjusted to be in balance with his competences.

The implications of this theory on the development of retirement villages are various. In particular, the two variables, residents' competences and the village environment,

should be in equilibrium with each other to ensure person-environment congruence. To achieve this, understanding residents' competences is the foundation. Given that baby boomers are entering retirement and have become the main potential customers, it is meaningful for village developers to create a village environment that can be in balance with their competences.

RESEARCH METHOD

The research method of inductive reasoning is adopted to conceptualize *"sustainable retirement villages"*. Inductive reasoning is utilizing observed data to infer theoretical concepts and patterns (Bhattacherjee 2012). The conceptualization process is on the basis of ecological theory of ageing and triple bottom line. Two steps are contained in the inductive reasoning, including identifying Australian baby boomers' competences and sustainable features inferring.

First, literature review is adopted to identify Australian baby boomers' competences. Exploring baby boomers' competences is a hot research topic in Australia, such as Quine and Carter (2006) and Taylor *et al.* (2014), given that this cohort is entering retirement and has had profound effects on the Australian society. Literatures are searched and collected from previous academic studies and government reports. Second, sustainable features inferring depends on the identified Australian baby boomers' competences. Corresponding responses to the identified competences are well suggested from the perspective of triple bottom line. These responses constitute the main characteristics of sustainable retirement villages. Through this process, a conceptualized sustainable retirement village framework is proposed.

THE COMPETENCES OF AUSTRALIAN BABY BOOMERS

Baby boomers have the general features of older people. In addition, baby boomers differ from prior generations significantly. For instance, they are healthier, more active, better educated and living with higher expectations than their parents (Quine and Carter 2006). Based on literature review, the main competences of Australian baby boomers are measured from four aspects, including basic features as older people, financial, social and environmental competences.

In general, baby boomers experience natural changes as older people in terms of physical and psychological aspects such as declining mobility abilities. The village environment should well response to these changes, such as easy access design and basic services provision. In addition, baby boomers' adaptability to a new environment is declining. The retirement village is an institutional environment which means baby boomers live with village rules and regulations and staff behaviours (Stein and Morse 1994). Their declining adaptability to the village institutional environment should be well considered in village daily management and operation.

In financial aspect, financial security and the accessibility of affordable services are core concerns of baby boomers in later life (KPMG 2009). Usually, boomers are wealthier than their parents with more disposable capitals entering into retirement (Andrews 2001). Nevertheless, some boomers do not have sufficient money for their retirement, and therefore have lower levels of financial security (Humpel *et al.* 2009; Snoke *et al.* 2011). Reasons can be diverse, such as financial irresponsibility, less inheriting from parents, and in needs of financially supporting family members (Quine and Carter 2006). Their main retirement income sources are government pensions and allowances, which may be insufficient (Jefferson and Preston 2005).

In terms of social aspect, keeping current lifestyle is a common expectation of baby boomers. First, baby boomers expect the social environment of independency, security and privacy (KPMG 2009). Second, baby boomers expect the accessibility of support and services, especially health related. This is because that some of them suffer from various health issues due to unhealthy lifestyles (Humpel *et al.* 2010). This results in the broadened range and intensity of support and services (KPMG, 2009). In addition, baby boomers expect to retain their social networks, such as keeping close connections with family members and friends (Quine and Carter 2006). Moreover, boomers value social participation. The majority of them prefer participating in activities and continuing to be active members of their community (Quine and Carter 2006; Taylor *et al.* 2014). Furthermore, baby boomers have high expectations on their development after retirement, and they also expect to access valuable information in later life (KPMG 2009).

In environmental aspects, older people usually consume more energy owing to their lifestyles (Yamasaki and Tominaga 1997). Baby boomers are concerned about energy consumption and expect their community to be environmentally friendly (Barker *et al.* 2013; Quine and Carter 2006). Thus, the development of retirement villages for baby boomers should take environmental sustainability principles into account to satisfy their accommodation preferences (Wright *et al.* 2014).

A RESPONSE TO THE COMPETENCES OF AUSTRALIAN BABY BOOMERS: THE PERSPECTIVE FROM PROVIDING SUSTAINABLE RETIREMENT VILLAGES

Why offering the retirement village with sustainable features is a promising solution?

According to ecological theory of ageing, retirement villages designed for baby boomers should well response to their competences. Besides the basic features of baby boomers as older people, other three competences in social, economic and environmental aspects can be responded well by this kind of retirement village environment which is designed based on principles of triple bottom line (Xia *et al.* 2015). This is because that triple bottom line, in the living environment field, means offering a comfortable standard of living, reducing environmental impacts and achieving affordability (Maliene and Malys 2009; Plaut *et al.* 2011). Figure 1 depicts how triple bottom line can well response to baby boomers' competences.

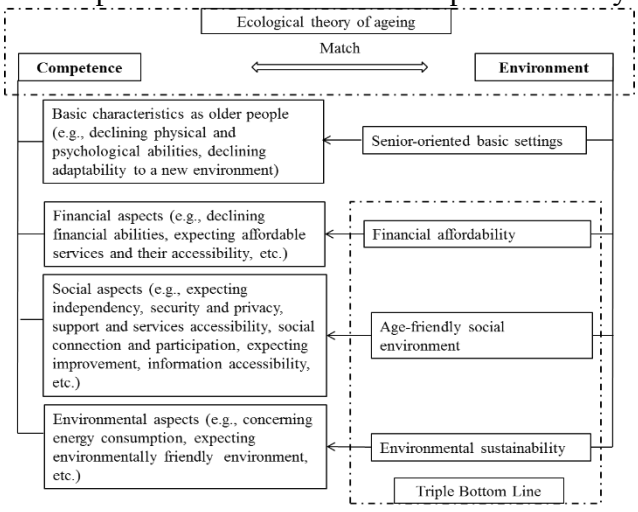

Figure 1: Triple bottom line as a response to the competences of Australian baby boomers

The proposed conceptual framework of sustainable retirement villages

In general, a sustainable retirement village enables to meet its residents' social, financial and environmental requirements besides their basic needs as older people. Figure 2 shows the four domains of the proposed sustainable retirement village framework, including senior-oriented basic settings, financial affordability, age-friendly social environment and environmental sustainability.

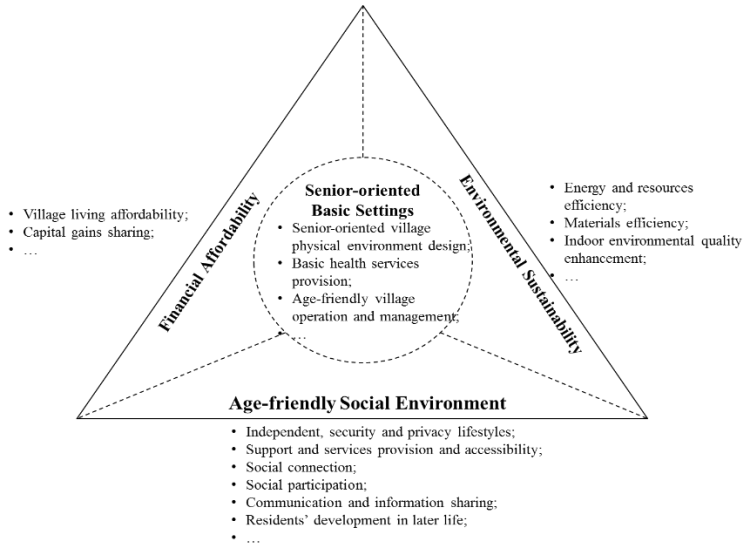

Figure 2: The proposed sustainable retirement village framework

Senior-oriented basic settings

To satisfy residents' basic needs as older people, senior-oriented basic environmental settings are essential, including village physical environment design following the code of design for older people, basic health services provision, and resident-centred village operation and management.

First, the design of the village physical environment should be senior-oriented through following the code of design for older people. This can refer to various aspects, such as village location selection (e.g., near the public transport service), on-site facilities range and their accessibility, village outdoor spaces design (e.g., barrier free design), village buildings and dwellings design (e.g., accessibility), and village natural environment (e.g., beautiful scenery around and qualified air conditions).

Second, it is necessary to make basic health related services affordable and accessible for residents. This is given that the need for health services increases with age owing to the declining health conditions of people in later life.

Third, the operation and management of villages should be resident-centred. Given the institutional feature of retirement villages, village developers should tailor village rules and regulations carefully to avoid creating pressures for residents (Grant 2007), and village managers should be helpful and their behaviours should be age-friendly.

Financial affordability

Financial affordability is an important expectation of baby boomers. For sustainable retirement villages, it refers to village living affordability and capital gains sharing.

First, village living affordability means residents with different socio-economic backgrounds can afford their village life (including the entry contribution, ongoing costs and departure fees) without compromising their future financial needs. Though sustainable retirement village living usually means high costs for residents,

affordability is possible through various ways, such as using practices which do not significantly increase additional costs but bring benefits to residents (Zuo *et al.* 2014).

In addition, capital gains sharing is another important aspect of financial affordability. Capital gains are the added value of resale their village units when residents leave their village. Capital gains sharing ensures more financial resources available for residents for the next accommodation transition.

Age-friendly social environment

The age-friendly social environment is an important part of sustainable retirement villages. It refers to independent, security and privacy lifestyles, support and services provision and accessibility, social connection, social participation, communication and information sharing, and residents' development in later life.

First, a sustainable retirement village should meet residents' needs on independence, security and privacy. Independence means residents can deal with their village affairs by themselves. In this sense, it is the residents who play dominate roles in their village life, and the choice is theirs. To keep independence, measures, such as suitable services delivery patterns and environment settings, are suggested (Haak *et al.* 2007). It also should be noted that to prompt a long-term independence, a short-term compromise on independence is essential at some times. Security refers to both individual security and the environmental security. The individual security focuses on residents' health conditions and financial safety, and the environmental security means providing a safe social and physical environment (Nathan *et al.* 2014). Moreover, it is an unwritten law to respect resident's privacy. Privacy respecting can be achieved by ways such as appropriate village design.

Second, a sustainable retirement village offers residents an appropriate range of support and services to maximize their benefits without exceeding their financial capabilities. The range of support and services should be tailored based on residents' preferences and needs to avoid paying additional costs for support and services that they do not use and do not want to afford (Nathan *et al.* 2013). In addition, the support and services should be provided within residents' walking instances and easy to reach, as residents are sensitive to distance and use support and services that are convenient to them most frequently (Krout *et al.* 2000; Nathan *et al.* 2013).

In addition, a sustainable retirement village promotes residents' social connection by offering them opportunities of contacting with friends, neighbours and family members. To achieve this, diverse measures can be adopted, such as organizing village activities, presence of facilities and communal spaces within villages and making them easy access, encouraging visiting of family members and friends, encouraging services and products exchanges among residents, and techniques assistances (Buys 2001; Nathan *et al.* 2013).

Moreover, social participation in sustainable retirement villages refers to the provision of social participation opportunities, residents' active involvement in activities and village community affairs. First, it is necessary for village developers to provide residents with the chances of social participation. This is usually achieved by organizing village activities. Social Ecological Model suggests that old adults' activities participation is impacted by personal factors, social/organizational factors and physical environment factors (Zimring *et al.* 2005). For personal factors, health related assistances should be offered to improve residents' healthy conditions so as to enhance activities participation levels. For social/organizational factors, village operators should tailor their organized village activities based on residents' interests

and keep activities information informed. In terms of the physical environment, factors, such as village aesthetics, fewer physical barriers within the neighbourhood, and facilities provision, positively affect residents' activity participation (Joseph *et al.* 2006; Nathan *et al.* 2013, 2014). In addition, a sustainable retirement village should offer residents opportunities of playing active roles in the village affairs instead of just passive recipients, such as helping organize activities, being an active member of village resident committees and joining in the decision-making that closely relates to their interests.

Furthermore, informing residents with what is happening and what will happen within villages is also important (Xia *et al.* 2015). A sustainable retirement village should have an unimpeded and two-way communication and information sharing channel. The principles of information provision to older people include relevance and access (Everingham *et al.* 2009). Thus, village staffs should identify what kinds of information are valuable for residents (relevance), and then transmit them to residents in effective ways (access). In addition, residents should be encouraged to give feedbacks on their village life and give suggestions to village mangers to help villages' sustainable improvement.

At last, life-span developmental psychology indicates that the need for development is still an important theme in later life and growth can occur throughout life span. A sustainable retirement village should offer its residents ample opportunities to grow and develop. For instance, activities and facilities provision can help residents develop new interests, obtain skills and knowledge that they do not have previously. In addition, offering classes/courses is also a useful way of promoting residents' development in later life.

Environmental sustainability

The retirement village industry should take responsibilities of environmental sustainability given that older people consume more energy (Kronenberg 2009). For sustainable retirement villages, environmental sustainability refers to energy and resource efficiency, materials efficiency, and indoor environment quality enhancement. Its aim is to reduce the negative impacts of the village development and the village built environment on the natural environment and residents.

Energy efficiency means energy consumption reduction. This not only decreases greenhouse gas emissions, but also helps enhance residents' capability of financial affordability (Zuo *et al.* 2014). A sustainable retirement village should develop strategies to reduce energy consumption, such as taking full use of sunlight through suitable unit position and window orientation, energy-efficient construction materials selection, and the application of renewable energy consumption techniques (Zuo *et al.* 2014). In addition, paying for the daily consumption of resources (e.g., water and electricity) is a main part of residents' ongoing costs. To reduce resources consumption so as to make village life more affordable, resources saving approaches, such as water-saving fixtures installing, are encouraged to be adopted.

Materials efficiency means green materials selection in village design and construction stages. The selected construction materials should be recyclable to protect environment (Barker *et al.* 2013). In addition, the selected materials should be not harmful to residents. Moreover, the materials selection should also take the features of residents as older people into account (Zuo *et al.* 2014). For instance, the selected window materials should ensure heat loss minimum in cold days to offer residents warm environment.

It is also of great importance to provide a high quality indoor environment for residents to ensure their health and comfort as they spend most of their time indoor (Lee *et al.* 2011). The high quality of indoor environment mainly contains three aspects, including high indoor air quality, suitable thermal quality and appropriate lighting quality.

DISCUSSION: FEATURES OF THE PROPOSED SUSTAINABLE RETIREMENT VILLAGES FRAMEWORK

This proposed sustainable retirement village framework has three features, including interrelated domains, a balance between different domains and a dynamic system.

Interrelated Domains. The four domains contained in this framework are interrelated. First, senior-oriented basic settings is the foundation of this framework, and other three domains are developed on the basis of it. Second, changes in certain domain will result in corresponding chain reactions in other domains. For instance, inappropriate village physical environment design can negatively impact residents' social participation. This further increases energy and resources consumption as residents will spend more time in their own home instead of outside, which can add additional costs. Third, different aspects in each domain are also interrelated. For instance, in the age-friendly social environment domain, more village activities information accessibility results in higher levels of social participation.

A Balance Between Different Domains. It is impossible to make all the four domains optimal at the same time due to some potential conflicts between them. For instance, adopting environmental sustainability measures can result in relatively high costs of village living for residents in the short-term run. Sustainable retirement villages pursue a balance between different domains to make an overall optimization for residents.

A Dynamic System. Both residents' competences and the village environment change over time. A sustainable retirement villages reflects the two dynamic processes, and stresses a dynamic fit between residents' competence and the village environment.

CONCLUSIONS

The sustainable retirement village is becoming increasingly popular in Australia. In this study, a sustainable retirement village framework is proposed to well response to the unique competences of Australian baby boomers. The proposed sustainable retirement village framework relies on ecological theory of ageing and triple bottom line, and it contains four domains, including senior-oriented basic settings, financial affordability, age-friendly social environment and environmental sustainability. These four domains are interrelated, and a sustainable retirement village emphasizes a dynamic balance between different domains. The proposed sustainable retirement village framework will give implications on the future retirement village industry development as well as paving the way for future studies on housing older people in an age-friendly manner.

REFERENCES

Andrews, K. (2001). National strategy for an ageing Australia: An older Australia, challenges and opportunities for all. Canberra: Commonwealth of Australia.

Australian Bureau of Statistics (2013). Projection results - Australia, available at: http://www.abs.gov.au/ausstats/abs@.nsf/Lookup/3222.0main+features52012%20%28base%29%20to%202101 (accessed on March 2015).

Barker, J., Xia, B., Zuo, J. and Zillante, G. (2013). Sustainable retirement living: what matters?, *Australasian Journal of Construction Economics and Building-Conference Series*, **12**(1), 56-61.

Bhattacherjee, A. (2012). Social science research: principles, methods, and practices, available at:http://scholarcommons.usf.edu/cgi/viewcontent.cgi?article=1002&context=oa_textbooks (accessed on March 2015).

Buys, L. R. (2001). Life in a Retirement Village: Implications for Contact with Community and Village Friends, *Gerontology*, **47**(1), 55-59.

Everingham, J-A., Petriwskyj, A., Warburton, J., Cuthill, M. and Bartlett, H. (2009). Information Provision for an Age-Friendly Community, *Ageing International*, **34**(1-2), 79-98.

Gardner, I., Browning, C. and Kendig, H. (2005). Accommodation options in later life: retirement village or community living?, *Australasian J. on Ageing*, **24**(4), 188-195.

Grant, B. C. (2007). Retirement Villages, *Activities, Adaptation and Aging*, **31**(2), 37-55.

Haak, M., Fänge, A., Iwarsson, S. and Dahlin Ivanoff, S. (2007). Home as a signification of independence and autonomy: Experiences among very old Swedish people, *Scandinavian Journal of Occupational Therapy*, **14**(1), 16-24.

Humpel, N., O'Loughlin, K. Wells, Y. and Kendig, H. (2009). Ageing baby boomers in Australia: evidence informing actions for better retirement, *Australian Journal of Social Issues*, **44**(4), 399-415.

Humpel, N., O'Loughlin, K., Wells, Y. and Kendig, H. (2010). The health of Australian baby boomers, *Australasian Journal on Ageing*, **29**(1), 8-13.

Iwarsson, S. (2005). A long-term perspective on person–environment fit and ADL dependence among older Swedish adults, *The Gerontologist*, **45**(3), 327-336.

Jefferson, T. and Preston, A. (2005). Australia's *"Other"* Gender Wage Gap: Baby Boomers and Compulsory Superannuation Accounts, *Feminist Economics*, **11**(2), 79-101.

Jones Lang Lasalle, 2008. Development in the retirement living sector: Is supply meeting demand or missing the mark?, available at: http://www.communityliving.net.au/home/DigitalAssets/research/joneslanglasalle/693921031/DigitalAssetsFile (accessed on March 2015).

Joseph, A., Zimring, C. Harris-Kojetin, L. and Kiefer, K. (2006). Presence and visibility of outdoor and indoor physical activity features and participation in physical activity among older adults in retirement communities, *Journal of Housing For the Elderly*, **19**(3-4), 141-165.

KPMG, 2009. Monash Baby boomer study, available at: http://bernardsalt.com.au/uploads/09Monash-BabyBoomerStudy-BS0312-MAR.pdf (accessed on March 2015).

Kronenberg, T. (2009). The impact of demographic change on energy use and greenhouse gas emissions in Germany, *Ecological Economics*, **68**(10), 2637-2645.

Krout, J. A., Oggins, J. and Holmes, H. H. (2000). Patterns of service use in a continuing care retirement community, *The Gerontologist*, **40**(6), 698-705.

Lawton, M. P. (1977). An ecological theory of aging applied to elderly housing, *Environments and Aging*, **31**(1), 8-10.

Lee, Y., Yoon, H., Lim, S., An, S. and Hwang, J. (2011). Housing alternatives to promote holistic health of the fragile aged, *Indoor and Built Environment*, **21**(1), 191-204.

Maliene, V. and Malys, N. (2009). High-quality housing—A key issue in delivering sustainable communities, *Building and Environment*, **44**(2), 426-430.

Nathan, A., Wood, L. and Giles-Corti, B. (2014). Perceptions of the built environment and associations with walking among retirement village residents, *Environment and Behavior*, **46**(1), 46-69.

Nathan, A., Wood, L. and Giles-Corti, B. (2013). Environmental factors associated with active living in retirement village residents: findings from an exploratory qualitative enquiry, *Research on Aging*, **35**(4), 459-480.

Ozanne, E. (2009). Negotiating identity in late life: diversity among Australian baby boomers, *Australian Social Work*, **62**(2), 132-154.

Pillemer, K., Wells, N. M., Wagenet, L. P., Meador, R. H. and Parise, J. T. (2011). Environmental sustainability in an aging society: a research agenda, *Journal of Aging and Health*, **23**(3), 433-453.

Plaut, J. M., Dunbar, B., Wackerman, A. and Hodgin, S. (2011). Regenerative design: the LENSES Framework for buildings and communities, *Building Research and Information*, **40**(1), 112-122.

Quine, S. and Carter, S. (2006). Australian baby boomers' expectations and plans for their old age, *Australasian Journal on Ageing*, **25**(1), 3-8.

Ritchie, M. A. (2000). Social capacity, sustainable development, and older people: lessons from community-based care in Southeast Asia, *Development in Practice*, **10**(5), 638-649.

Schwarz, B. (2012). Environmental gerontology: What now?, *Journal of Housing For the Elderly*, **26**(1-3), 4-19.

Snoke, M., Kendig, H. and O'Loughlin, K. (2011). Australian evidence of baby boomers financial security: A review, *Journal of Economic and Social Policy*, **14**(1), Article 8.

Stein, I. and Morse, C. (1994). Relocation of the aged-a literature review, *Australian Journal on Ageing*, **13**(1), 41-43.

Taylor, A., Pilkington, R., Feist, H., Dal Grande, E. and Hugo, G. (2014). A survey of retirement intentions of baby boomers: an overview of health, social and economic determinants, *BMC Public Health*, **14**, 355-364.

Wright, D. L., Buys, L., Vine, D., Xia, B., Skitmore, M., Drogemuller, R., Kennedy, R. and Li, M. (2014). EUTOPIA 75+: exploratory futures scenarios for baby boomers' preferred living spaces, *Journal of Futures Studies*, **19**(2), 41-60.

Xia, B., Zuo, J., Skitmore, M., Buys, L. and Hu, X. (2014). Sustainability literacy of older people in retirement villages, *Journal of* A*ging* R*esearch*. doi:10.1155/2014/919054

Xia, B., Zuo, J., Skitmore, M., Chen, Q. and Rarasati, A. D. (2015). Sustainable retirement village for older people: a case study in Brisbane, Australia, *International Journal of Strategic Property Management*, **19** (2), 149-158.

Yamasaki, E. and Tominaga, N. (1997). Evolution of an aging society and effect on residential energy demand, *Energy Policy*, **25**(11), 903-912.

Zimring, C., Joseph, A., Nicoll, G. L. and Tsepas, S. (2005). Influences of building design and site design on physical activity: Research and intervention opportunities, *American Journal of Preventive Medicine*, **28**(2), 186-193.

Zuo, J., Xia, B., Barker, J. and Skitmore, M. (2014). Green buildings for greying people: a case study of a retirement village in Australia, *Facilities*, **32**(7/8), 365-381.