Article:
Torku, A. orcid.org/0000-0002-2509-9962, Chan, A.P.C. and Yung, E.H.K. (2021) Age-friendly cities and communities: a review and future directions. Ageing & Society, 41 (10). pp. 2242-2279. ISSN 0144-686X

https://doi.org/10.1017/s0144686x20000239

Age-friendly cities and communities: a review and future directions

Alex Torku [*], Albert Ping Chuen Chan and Esther Hiu Kwan Yung

Department of Building and Real Estate, The Hong Kong Polytechnic University, 11 Yuk Choi Rd, Hung Hom, Kowloon, Hong Kong.

*Corresponding author. Email: alex.torku@connect.polyu.hk

Abstract

The unprecedented increase in the ageing population, coupled with urbanisation, has led to a vast number of research publications on age-friendly cities and communities (AFCC). However, the existing reviews on AFCC studies are not sufficiently up-to-date for AFCC researchers. This paper presents a thorough analysis of the annual publication trend, the contributions of authors and institutions from different countries, and the trending research themes in the AFCC research corpus through a systematic review of 98 publications. A contribution assessment formula and thematic analysis were used for the review. The results indicated a growing AFCC research interest in recent times. Researchers and institutions from the United States of America, Canada, United Kingdom and Hong Kong made the highest contribution to the AFCC research corpus. The thematic analysis classified the AFCC research corpus into four main themes: conceptualisation; implementation and development; assessment; and challenges and opportunities. The themes indicate the current and future research patterns and issues to be considered in the development of AFCC and for interested researchers to make proposals for future research. Future directions are proposed, including suggestions on adopting new assessment methods and instruments, collaboration and cross-nation comparative research, considering older adults as place-makers and conducting a prior participatory analysis to maximise the participation of older adults.

Keywords: age-friendly cities and communities; review; research trend

Introduction

Where and how we live is of utmost importance in our life (Sargisson, 2010). Therefore, it is not surprising that the creation of age-friendly cities and communities (AFCC) has excited the interest of several researchers and investment from governments, international organisations and businesses (World Health Organization, 2002). There is complete unanimity among these stakeholders that promoting ageing in AFCC makes social and economic sense (Lui *et al.*, 2009). For example, the World Health Organization (WHO) is promoting the development of AFCC by raising awareness on the vital role of the environment in shaping healthy ageing (WHO, 2018a). Although the AFCC concept has not fully matured, this concept has been investigated in most developed countries mainly due to the demand of the escalating ageing population. However, this is not the case in most developing countries (Steels, 2015). Research publications are important mediums through which academics and universities impact economic, political and social policies (Cohen, Nelson and Walsh, 2002). Publications in high-quality refereed journals can foster the development and maturity of a research field (Hensen, 2009). It is believed that a country's research output on a topic might have an influence on the level of economic, political and social developments on the topic in that country (Hong et al., 2011). Thus, it is crucial to analyse the research publication trajectories in AFCC to keep a track record of AFCC research outputs in different countries in order to ascertain initiatives for improvement where necessary. In addition, a critical analysis of AFCC publication trajectories will enable researchers to gain insight into the past, present and future topics to generate ideas for their on-going academic carrier.

Some review research studies have been conducted on AFCC (Lui *et al.*, 2009; Dellamora *et al.*, 2015; Neville *et al.*, 2016). These reviews were limited to evaluating policy trends and models (Lui *et al.*, 2009; Neville *et al.*, 2016) and identifying instruments for assessing age-friendliness (Dellamora *et al.*, 2015). Furthermore, Lui *et al.* (2009) did not

consider studies that were published prior 2005 and Neville *et al.* (2016) also did not consider studies that were conducted before 2007 although the AFCC policy initiative was launched between the 1990s and early 2000s (Buffel, Phillipson and Scharf, 2012). Moreover, Neville *et al.*'s (2016) review was limited to rural communities, and the outcome of the studies was based on only nine published studies. However, none of these studies provided a comprehensive review of the trend of AFCC research outputs from various countries and institutions. Merging these diverse studies would facilitate a more profound and holistic understanding of AFCC, bring to limelight existing gaps in the AFCC research corpus and could trigger efforts for improvements in different regions. The contribution of this study aims to bridge this gap. The aim of this paper is to provide a critical review of AFCC studies with the following objectives: (1) examine the annual publication trend of AFCC related studies up to 2018; (2) evaluate the contributions of authors from different countries or regions, and institutions to AFCC research up to 2018; and (3) identify the trending research themes and make future research projections.

Many research disciplines have already benefitted from this type of research. For example, Lin *et al.* (2018); Antwi-Afari *et al.* (2018); Darko and Chan (2016); and Tsai and Wen (2005) have conducted similar studies in their research fields. However, there is no similar review in the AFCC research discipline. Thus, this study is arguably the first to conduct a similar review approach in the AFCC research discipline. The demand of the burgeoning ageing population calls for more contributors to this research discipline, and this type of research will be a good reference for researchers, policymakers, experts and stakeholders in AFCC.

Definition of age-friendly community

WHO defined an age-friendly city as a city with

> *"policies, services, settings and structures support and enable people to age actively by: recognizing the wide range of capacities and resources among older people; anticipating and responding flexibly to ageing-related needs and preferences; respecting their decisions and lifestyle choices; protecting those who are most vulnerable; and promoting their inclusion in and contribution to all areas of community life" (WHO, 2007: 5).*

The term elder-friendly community was also used by Feldman and Oberlink (2003), Hanson and Emlet (2006) and Alley *et al.* (2007). An elder-friendly community is "a place where older people are actively involved, valued, and supported with infrastructure and services that effectively accommodate their needs" (Alley *et al.*, 2007: 4). In scientific studies, the term age-friendly originated from an ecological perspective of ageing that proposes an interrelation between an individual and the conditions of the environment (Menec *et al.* 2011; Greenfield, 2012). It is important to draw the attention of researchers and practitioners to the fact that different terminologies have been adopted by different studies to describe the concept WHO (2007) referred to as age-friendly cities. Other terminologies identified in the literature include elder-friendly community, age-friendly communities, liveable community and lifetime neighbourhood (Lui *et al.*, 2009; Feldman and Oberlink, 2003; Kihl *et al.*, 2005; Hanson and Emlet, 2006; Alley *et al.*, 2007). Lui *et al.* (2009) identified in their review that the term age-friendly community was mainly used in Canada, liveable community was mainly used in the United States of America (USA) and lifetime neighbourhood was mainly used in the United

Kingdom (UK). Despite the differences in the terminologies, they all share a common theme with the WHO (2007) definition of age-friendly cities.

Research Methodology

A critical systematic assessment of previous publications in academic journals is a prerequisite to an in-depth analysis of a topic or research area (Tsai and Wen, 2005). This study draws on the methodology adopted in previous review articles (Darko and Chan, 2016; Lu *et al.*, 2017; Zhang, Oo and Lim, 2019) to identify and systematically analyse the AFCC research publications up to 2018 (as of the end of November). The review considered publications in peer-reviewed academic journals. The reason behind this is that peer-reviewed academic journals go through a relatively more rigorous review process before their acceptance for publication (Darko and Chan, 2016). Therefore, conference publications, articles in press, textbooks and internet data were not included in the review process. However, grey literature such as the WHO policy documents dedicated to the age-friendly cities and communities' topic were included in the review. WHO is internationally recognised and has conducted several studies which were deemed reliable. Therefore, it was essential to include their publications. The study adopted a two-stage analysis process to select and review AFCC research studies. The two-stage analysis process is illustrated in Figure 1.

Stage 1: The selection process

The selection process comprises of two phases: (1) journal processing; and (2) paper processing.

Phase (1) Journal processing: A powerful search engine – Scopus was electronically searched in November 2018 to identify academic journals with AFCC research publications. The Scopus search engine has a wider and up-to-date database of publications covering different subject

areas including but not limited to social sciences, medicine, engineering and environmental science (Darko and Chan, 2016; Chadegani *et al.*, 2013). The publications in this database are highly influential in directing future research fields (Zhang, Oo and Lim, 2019; Chadegani *et al.*, 2013). The above reasons influenced the decision to adopt Scopus as a search engine for the study. Akin to previous review publications (Darko and Chan, 2016; Lu *et al.*, 2017; Zhang, Oo and Lim, 2019), keywords were carefully selected to search the Scopus database to retrieve relevant journals and articles. These keywords were coined from the different terminologies that have been used to describe AFCC. The following keywords with the appropriate Boolean operators: “age-friendly city” OR “elder-friendly community” OR “liveable community” OR “lifetime neighbourhood” were used to search the Scopus database. The search was conducted at the end of November 2018 and was not limited to any specific year in order to retrieve all the relevant literature present in the Scopus database up to date. However, the search was limited to article and review document type; and documents in English. The full search code with the appropriate Boolean operators is as follows:

TITLE-ABS-KEY ("age-friendly city" OR "elder-friendly community" OR "liveable community" OR "lifetime neighbourhood") AND DOCTYPE (ar OR re) AND (LIMIT-TO (LANGUAGE , "English"))

Based on the above search code, 81 journals with a total of 117 documents were retrieved from the Scopus database.

< Insert Figure 1 about here >

Phase (2) Paper processing: A detailed examination of the title, abstract and keywords was conducted on each of the 117 publications. The detailed examination was to confirm that the

searched keywords appeared either in the title, abstract or keywords of the papers (Darko and Chan, 2016; Lu *et al.*, 2017; Zhang, Oo and Lim, 2019). This process aimed to identify all AFCC related articles and review papers by using the search keywords of "age-friendly city" OR "elder-friendly community" OR "liveable community" OR "lifetime neighbourhood". After a detailed examination of the papers, 79 papers were selected for further analysis. The 79 papers were further filtered by a brief examination of the full text of the documents. For the paper to pass the filtration process, the document must entirely or partly articulate matters relating to AFCC. This filtration criterion was adapted from Owusu, Chan and Shan (2019). The aim is to filter out publications that mention the keywords in their title, abstract or keyword but did not articulate any AFCC issues either entirely or partly in the full text. All the 79 papers met the filtration criterion thus were considered as target papers for further analysis. However, prior to submission in (January 2020), additional keywords (age-friendly places, ageing in place) were introduced. An additional of nine relevant papers were identified from the updated search and included in the review resulting in a total of 88 papers. A total of five grey literature published by the WHO, four grey literature published by The American Association of Retired Persons (AARP) Public Policy Institute; Department for Communities and Local Government, London; University of Calgary, Canada; and New Zealand Ministry of Social Development were included in the review. One additional anthology dedicated to the AFCC topic, published by Springer was also included in the review. A complete list of the publications is presented in the supplementary material. Furthermore, the AFCC evaluation, strategy and action plan for Portland and Multnomah County, USA; City of Reykjavik, Iceland; City of Cornwall, Canada; Elgin of St. Thomas, Canada; Tai Po District, Hong Kong; The City of Greater Sudbury, Canada; New York City, USA; Mornington Peninsula Shire, Australia; and Quebec, Canada were included in the reviewed.

Stage 2: The review process

The review process comprises of two phases: (1) descriptive analysis; and (2) thematic analysis.

Phase (1) Descriptive analysis: The targeted publications were descriptively analysed to present the annual publication trend and active contributors in the AFCC research corpus. Frequency count, percentage, and contribution assessment formula proposed by Howard, Cole and Maxwell (1987) were used to achieve the first phase of the review process. The proposed formula has been widely adopted in previous review publications (see Lin *et al.*, 2018; Darko and Chan, 2016; Yuan and Shen, 2011). The widely accepted and validated formula by Howard, Cole and Maxwell (1987) is shown below:

$$Score = \frac{1.5^{n-i}}{\sum_{i=1}^{n} 1.5^{n-i}}$$

Where n denotes the number of authors, and i denotes a specific author's order. In a multi-authored publication, the weight of each author's contribution differs, that is the first author is assumed to contribute more to the publication than the subsequent authors, the second author also contributes more to the publication than the subsequent authors and so forth (Howard, Cole and Maxwell, 1987). Based on Howard, Cole and Maxwell (1987) formula a score of one is allocated to each publication regardless of the number of authors. The score (one) is further distributed to each author based on the order of authorship of the publication. The score matrix based on the order of authorship is presented in Table 1. Explicitly, the study adopts this formula to rank the authors, institutions, and countries/regions that contribute to AFCC research corpus up to November 2018.

< Insert Table 1 about here >

Phase (2) Thematic analysis: Thematic analysis was conducted to identify and categorise the AFCC research interests and themes that were covered in the publications identified in the selection stage. Howitt and Cramer (2011) highly recommended the use of thematic analysis in analysing qualitative data. Thematic analysis entails the analysis of data (words of text) with the purpose of identifying the significant themes therein (Howitt and Cramer, 2011). The publications are the 'data' for this study. A similar analysis can be found in previous review studies (Zhang, Oo and Lim, 2019; Sodhi and Tang, 2018; Tsai and Wen, 2005). A systematic approach proposed by Braun and Clarke (2006) was adopted for this analysis. The approach is comprehensively described in six main steps (Braun and Clarke, 2006), namely: (1) familiarisation with the data; (2) initial coding generation; (3) search for themes based on the initial coding; (4) review of themes; (5) theme definition and labelling; and (6) report writing. Familiarisation with the data (step 1) was achieved in stage 1 (selection process) of the study. Steps 2, 3, 4, and 5 led to the identification and categorisation of four AFCC research themes as follows: (1) Conceptualisation; (2) Implementation and Development; (3) Assessment; and (4) Challenges and Opportunities. The theme definition and labelling were done by two researchers (with a research background in the field of AFCC) with an agreement of 0.87. The differences in opinions were discussed among the authors, and this led to the identified themes. Publications that covered multiple themes were grouped into the various themes that were covered. Step 6 which is the report writing is presented in the results and discussion section.

Result and discussion

This section ascertains the annual publication trend, the contributions of authors, institutions, and countries, and the themes covered in the AFCC research corpus.

Annual publication trend of AFCC research

The WHO has spearheaded the AFCC movement since the 1990s. The publications within the 1990s were geared towards promoting physical activity among older adults. The WHO with contributions from a scientific committee proposed the guideline for facilitating the development of strategies and policies aimed at maintaining and increasing the level of physical activity among older adults (WHO, 1996). During the late 1990s and early 2000s, the WHO expanded its focus from promoting 'physical activity' to 'active ageing' (WHO, 1997 cited in Kalache, 2016). The 'active ageing' concept was in line with the theme headlining the United Nations' International Year of Older People in 1999. The WHO (2002) further expounded on the 'active ageing' concept. WHO (2002) defined active ageing as "the process of optimizing opportunities for health, participation and security in order to enhance quality of life as people age" (WHO, 2002: 12). Despite this definition, WHO (2002) further emphasized that "the word active refers to continuing participation in social, economic, cultural, spiritual and civic affairs, not just the ability to be physically active or to participate in the labour force" (WHO, 2002: 12).

The active ageing concept started attracting wide recognition among the academic community after 2002 largely due to the efforts of the WHO. Between 2003 to 2010, an average of 2.00 AFCC publications was published annually. Between 2011 to 2018, an average of 9.75 AFCC publications was published annually. The increase in the average annual publication echoes an increasing interest in AFCC research; more researchers have joined international organisations, policymakers and advocates to promote the AFCC movement. The increase in interest maybe because most countries started experiencing the demands and challenges posed by the ageing population. In October 2007, the WHO's *'Age-Friendly Cities: A Guide'* was published to spur the interest of policymakers at both international and local levels to implement changes that aim at making cities friendlier for the ageing population (WHO, 2007).

The WHO's *'Age-Friendly Cities: A Guide'* motivated local age-friendly interventions across different cities and communities in most developed countries. It explains the sudden increase in AFCC publications. The annual publication trend is illustrated in Figure 2.

< Insert Figure 2 about here >

Contributions of countries, institutions, and researchers to the AFCC research

Determining the contribution of countries, institutions, and researchers will be valued by interested AFCC researchers and policymakers to identify potential collaborations and opportunities for future research. The score matrix shown in Table 1 was applied in quantifying the contribution of countries, institutions and researchers to the AFCC research corpus. The score for each country and institution was computed based on each author's score. For example, Menec, V.H (first author), Means, R. (second author), Keating, N. (third author), Parkhurst, G. (fourth author), Eales, J. (fifth author) authored the article '*Conceptualizing age-friendly communities*' (Menec *et al.*, 2011). The first author is affiliated to the University of Manitoba, Canada; The second and fourth authors are affiliated to the University of the West of England, UK, and the third and fifth authors are affiliated to the University of Alberta, Canada. In this case, score distribution will be done using the score matrix with $n = 5$ as shown in Table 1. According to the order of authorship, the score for each author is 0.384 (first author), 0.256 (second author), 0.171 (third author), 0.114 (fourth author), and 0.076 (fifth author). A score of 0.631 (0.384 + 0.171 + 0.076) is awarded to Canada for its contribution; and a score of 0.37 (0.256 + 0.114) is awarded to UK for its contribution. Similarly, the University of Manitoba is scored 0.384; the University of the West of England is scored 0.37 (0.256 + 0.114); the University of Alberta is scored 0.247 (0.171 + 0.076). The summation of the scores for selected publications is presented in Tables 2 to 4.

Table 2 presents the country of origin, the number of institutions and the score for each country. From Table 2, USA, Canada, UK and Hong Kong have the highest contribution to the AFCC research corpus. Developing countries including India, Kenya, Thailand and South Africa also contributed to the AFCC research corpus, although not as significant compared to the developed countries. Researchers are of the view that a country with a high research publication on a topic might also have a high level of industrial practices and policy developments on the topic (Hong *et al.*, 2011). This view may hold because almost all the countries with high scores are developed and the scores reflect the efforts, they have put into making their cities and communities age-friendly. For example, quite a number of cities and communities in these developed countries are members of the WHO's Global Network for Age-friendly Cities and Communities which means they are committed to becoming more age-friendly (WHO, 2018a). Unlike the developing countries, these developed countries are aware of the benefits of AFCC and have made it a priority which is also supported by their matured publication culture.

Table 3 present the institutions contributing to the AFCC research corpus. The World Health Organisation (Switzerland) emerged as the highest contributor. This is followed by Portland State University (US), The Chinese University of Hong Kong (Hong Kong), University of Sherbrooke (Canada), and University of Manitoba (Canada). Other institutions conducting similar research were identified but Table 3 present only the institutions that scored one or more.

Table 4 present authors that are contributing to the AFCC research corpus. Several authors were identified, however Table 4 report only on the authors with a score of one or more. Moulaert, T., Buffel, T., Scharlach, A. E., Garon, S., Kalache, A. among others have the highest contribution to the AFCC research corpus, respectively. As mentioned previously, the Howard, Cole and Maxwell (1987) formula determined the author's contribution based on the

order of authorship and the number of authors, which means that an author may have a lot of collaborated publications and end up with a lower contribution score.

In general, the scores show that the concept is still growing in developed countries and it is also emerging in developing countries. Also, it is worth mentioning that a higher proportion of publications in the AFCC research corpus were collaborated by authors located in the same country or region. Such condition may also imply that a higher number of publications in the AFCC research corpus were contextualised in some specific cultural, social, political or economic settings. This means that in order to conduct AFCC research, authors must be aware of the local circumstances such as the cultural, social, political and economic settings–authors from different settings may have a different interpretation of the AFCC concept. For example, some authors critique the WHO's (2007) AFCC initiatives as western-oriented although it included cities and communities worldwide (van Hoof *et al.*, 2018; Wang, Gonzales and Morrow-Howell, 2017). The implication drawn from this research trend is that albeit countries, institutions and authors conducting AFCC research may benefit from each other's findings, each city or community is unique and complex, its contradiction requires a careful understanding of the local circumstances instead of implementing the findings from others. However, to encourage international collaboration, the researchers from different culture, social or economic setting should engage in cross-nation comparative research in the future.

< Insert Table 2 about here >

< Insert Table 3 about here >

< Insert Table 4 about here >

AFCC research theme trend

Theme 1: Conceptualisation

The trend observed in the research themes, Figure 3, conform to the historical development of AFCC research. The sense of urgency to create AFCC was heightened by the statistical data of most of the developed countries. Responding to the demands of the ageing population led to studies that concentrated on conceptualising AFCC. The conceptual framing of the AFCC was influenced by both policies and scientific research. The major policy influencer is the WHO (2007) at the global level. The livable community framework (Kihl *et al.*, 2005), positive ageing framework (New Zealand Ministry of Social Development, 2007) and the Lifetime neighbourhood framework (Harding, 2007) are notable policy influencers at the national level. The Elder-friendly community (Austin *et al.*, 2001) is a pioneering policy inspired framework at the local level. In the context of the scientific inspired framework, Menec *et al.* (2011), Alley *et al.* (2007), Greenfield (2012) Greenfield *et al.* (2015), Bookman (2008), Lehning, Scharlach and Wolf (2012) and Scharlach (2012) are among the notable scientific contributors. Drawing on these frameworks, several research-policy relations appear to underpin the overreaching conceptualisations of the age-friendly movement.

The policy inspired framing at the local level focus on delivery benefits to targeted individuals. The global and national levels have an emphasis on the community. The focus on the community level can be seen as an on-going paradigm shift from intervention at the individual level to a more community centred level. In the past decade, the age-friendly concept has witnessed enormous growth in the emphasis on community, with the expansion of physical and social opportunities for older adults to age actively and independently. The policy frameworks aimed to lay the foundation for supporting physical and social features through sustainable initiatives, programmes, services and activities at the community context. In general, the policy frameworks included the provision of outdoor spaces, housing,

transportation, social and civic participation, social inclusion, communication and information, community supports and health services.

The scientifically inspired framing advances broad theories including the bioecological systems theory, the general ecological model and person-environment interaction to conceptualise the policy inspired frameworks as AFCC initiatives and for conceptualising the similarities and differences in the context of the features that promote ageing in place and AFCC (Menec *et al.* 2011; Greenfield, 2012). The scientifically inspired framing provides a heuristic device to appreciate the inherent differences and similarities across AFCC frameworks for policymakers and other AFCC stakeholders to strategically select features from the frameworks and initiatives that fit a specific context. Much of these studies demonstrate examples of scientific research feeding into AFCC policy and vice versa. In this manner, AFCC research knowledge and policy governance are co-produce through an ongoing process of mutual constitution. The various frameworks are presented in Table 5.

Although this theme remains critical and fundamental to the AFCC research corpus, it has not received any significant addition recently. It can be because the existing conceptual models have been widely accepted and implemented by several cities and communities. For example, over 1000 cities and communities in 41 countries, covering over 240 million people worldwide are members of the WHO's Global Network for Age-friendly Cities and Communities and are committed to implementing these AFCC models to developing AFCC (WHO, 2020). One of the reasons why the WHO (2007) framework has been widely adopted could be because it was based on international research and collaboration with researchers, practitioners and older adults. Also, the WHO (2007) model is the first to allow researchers worldwide to adopt the age-friendly concept into a local setting (Moulaert and Garon, 2016). This model has been translated into several languages. Therefore, flexibility and adaptability are essential characteristics that influence the acceptance of any AFCC model.

The review demonstrated that a strong and growing consensus is emerging on the fundamental features of AFCC. Moreover, all the models share a central theme which is to develop cities and communities that support active ageing, reduce isolation, sustain independence, improve accessibility and affordability for the older adults and general population. The proposed features broadly span from the physical to social environment. Furthermore, the interrelationship between the individual features of AFCC also exists between the physical and social feature—these features are complementary and mutually reinforcing. The interrelated nature of the physical and social environment can be exploited to create AFCC. For example, developing new residential buildings (physical component) alone cannot make a city or community age-friendly. However, developing residential buildings and implementing appropriate home funding schemes (social component) can make these homes affordable for older adults; thereby creating AFCC. Several studies have shown this in their implementation and development process of AFCC as detailed in Theme 2. More critical attention is needed on the levels of influence as it is improbable to have a universal concept that works in all context—AFCC concepts will be different for dependent (frail) older adults and independent older adults (Cramm *et al.*, 2018; Van Dijk *et al.*, 2015). For example, concepts addressing needs applicable to an independent older adult such as driving, walkable street and accessible shopping will be completely different from concepts that are addressing needs for the independent, frail older adult such as home care or assisted living. Therefore, the conceptualisation of AFCC should be characterised by the levels of influence, taking into account applicable physical and social environment features. The central theme of all the models, interrelation of the physical and social environment and the level of focus is presented in Figure 4. The authors speculate that future contribution to this theme will depend on the outcomes of the other themes — an outcome that demand improvement to the existing concepts will attract the interest of researchers to contribute to this theme.

< Insert Figure 3 about here >

< Insert Table 5 about here >

< Insert Figure 4 about here >

Theme 2: Implementation and development

This theme is currently the most popular in the AFCC research corpus. The theme includes studies that highlighted the strategies, policy approaches and action plans for implementing and developing AFCC as presented in Table 6. This theme is an embodiment of the research corpus that translates the conceptual models into policy and practice. Research studies that focused on this theme started emerging a few years after the instigation of the conceptualisation theme (see Figure 3). This theme is predicted to remain popular because of the increasing awareness that has been created by international organisations such as WHO to the development of AFCC.

Although AFCC implementation efforts have been attempted in cities and communities worldwide, evidence suggests that AFCC initiatives are not globally effective (Joy, 2018; Buffel *et al.*, 2012; Kendig *et al.*, 2014; Garon *et al.*, 2014). One of the reasonable explanations for this is the variations in the implementation approach. The mechanisms by which age-friendly interventions are implemented are characterised by two basic approaches: top-down approach and bottom-up approach. The top-down approach is initiated by international organisations and people on a higher level in the hierarchy such as planners, policymakers and local authorities. It relies on pre-conceived initiatives and expectations to implement age-friendliness. The bottom-up approach relies on collective action from the local level with the older adults being the main drivers for implementing age-friendly initiatives at the local level. While some of the cities and communities focus more on one of these approaches than the other, it should be emphasised that none of the approaches reviewed is solely top-down or bottom-up. Previous implementation strategies proof that the top-down approach fails to

develop the required commitment to support the AFCC initiative. Also, the bottom-up approach often ends up with insufficient resources to support the AFCC initiative. As a result, an increasing number of cities and communities adopt elements of both the top-down and bottom-up approaches (mixed approach) to implementing AFCC initiatives.

For example, the City of Reykjavik (2013), City of Cornwall (2017), the Elgin of St. Thomas (2017), Tai Po District (CUHK Jockey Club Institute of Ageing, 2016) adapted a pre-conceived AFCC initiatives and the implementation efforts were driven mainly by the older adults at the local level. The concentration of older adults' participants in the implementation of AFCC has increased in almost all cities. In general, the modification of AFCC domains across different cities and communities reinforces the need to approach the implementation of AFCC from a local perspective. Also, the flexibility of pre-conceived models can facilitate the modification of knowledge generated at the international level (such as the WHO model) to the local level. Therefore, cities and communities are encouraged to take advantage of the flexibility of the models by reviewing and if necessary, modifying the domains and checklist to reflect the city or community's diversity.

The importance of collaborative partnership as a key element in implementing AFCC is articulated in literature (Garon *et al.*, 2014; Steels, 2015; Buffel and Phillipson, 2016; Rémillard-Boilard, Buffel and Phillipson, 2017). Collaborative partnership is achieved through a flexible and decentralised form of governance at all levels—grass-root, local, regional and national levels. Such participation motivates the partners to use their resources and networks to implement the AFCC initiatives more efficiently and effectively. Closer collaboration between partners at the micro-level—grass root and local levels are of much importance for implementing AFCC initiatives in resource-scarce cities and communities. This is because AFCC interventions are community-led and focused. For instance, The City of Greater Sudbury (2018) partnered with local businesses, Community Action Networks and individual

older adults to develop age-friendly initiatives. A similar partnership is shown in Tai Po District were The Hong Kong Jockey Club Charities Trust is implementing the Jockey Club Age-friendly City Project in partnership with four gerontology research institution in Hong Kong (CUHK Jockey Club Institute of Ageing, 2016). Age-friendly New York City also had a public-private partnership between the New York City Council, the Office of the Mayor, the New York Academy of Medicine, and Age-Friendly Commission in making New York a more age-friendly city (New York City, 2011). The impact of the collaborative partnership also reflected in the success of implementing the AFCC concept in Quebec (Garon *et al.*, 2014).

Steering committees have been instrumental in the implementation and development of AFCC initiatives. The success of age-friendliness in Quebec was primarily determined by the collaborative partnership that was created through the forming of a steering committee (Garon *et al.*, 2014). In Mornington Peninsula Shire (2013), the Peninsula Advisory Committee for Elders (PACE) was formed to steward the Elderly Citizen's Strategy. The Elgin of St. Thomas' (2017) also recruited a steering committee to oversee the development and implementation of the Age-Friendly Plan. A few common attributes shared by Mornington Peninsula Shire (2013), City of Greater Sudbury (2018) and The Elgin of St. Thomas' (2017) steering committees include: the committee consisted of members who are interested in representing the views of older adults, the members were familiarised and understood the city or community and the committees were included throughout the development and implementation of the AFCC initiatives. For instance, the steering committee in Mornington Peninsula Shire (2013) meet monthly to further the Elderly Citizen's Strategy which shows the level of commitment required from the committee members. The inclusion of older adults and older adults' organisation in the steering committee is mandatory for the success of the AFCC initiatives.

Flexible development approaches are needed to develop and sustain AFCC. Some of the development concepts put forward include re-inhabitation, re-greening, redevelopment and

the natural perceptual wayfinding concept which focus on improving urban accessibility through modification of existing spaces and places to make navigation easier for all age-groups (Frau, 2015; Farrelly, 2014). Furthermore, developing sustainable AFCC should be approached by designing multigenerational cities and communities to encourage interaction among all age groups and social inclusion of the older adults in the immediate and wider social community (Maltz *et al.*, 2014; Kerbler, 2015).

<Insert Table 6 about here>

Theme 3: Assessment

All through this period the interest and focus on assessing and evaluating the implemented conceptual frameworks (Themes 1 and 2) on AFCC have been growing steadily. It showed a significant increase between 2014 and 2016, and it is currently the second most popular theme in the AFCC research corpus (see Figure 3). This theme grouped studies that aimed at assessing the age-friendliness of cities and communities. It is one of the most critical themes in the AFCC research corpus. The outcomes of this theme will define the turning point of the AFCC research corpus. With increasing implementation and development of the AFCC movement, this theme will remain popular with a consistent increase in publications. The characteristic features of the domains of AFCC have been used to assess age-friendliness. The WHO checklist is mostly used by cities and communities that adopt the WHO model. Also, the AARP's Liveable Communities Evaluation Guide includes a toolkit for assessing the age-friendliness of a city or community based on eight diverse domains (Kihl *et al.*, 2005). The assessment methods adopted throughout this study is presented in Table 7.

The age-friendly journey proposed by the WHO includes a baseline assessment and an evaluation after the strategy and action plan has been implemented. The baseline assessment provides information about how older adults perceive the existing features of the environment. This will trigger the needed age-friendly interventions and serve as a reference or benchmark

for assessing the impact of the intervention. The evaluation is conducted after the implementation of the strategy and action plan to assess the impact of the intervention. Cities and communities have relied on the WHO checklist for baseline assessment and evaluation of age-friendliness. However, the WHO checklist has attracted considerable criticisms. According to Plouffe, Kalache and Voelcker (2016), the WHO checklist is unable to capture the diversity of older adults and the communities, and the progress of the implemented AFCC initiatives in the communities. Also, the identified needs of the older adults on the checklist are too broad and unrealistic (Plouffe, Kalache and Voelcker, 2016). Furthermore, adopting the WHO checklist can result in a 'top-down' approach to governance by local authorities (Lui *et al.*, 2009).

Practically, most reviewed studies shown in Table 7 adopted the WHO checklist and were geared towards a 'bottom-up' approach to governance. Most of the assessment were utterly built on the older adults and some studies included caregivers (see Table 7). Lee and Kim (2017) relied on gerontological professionals and older adults to revise the WHO checklist. Other examples that adopted the WHO checklist and relied solely on older adults as participants include the baseline assessment conducted in Tai Po District, Hong Kong (CUHK Jockey Club Institute of Ageing, 2016) and Elgin of St. Thomas (2017). Therefore, it is crucial that the features that are included in the baseline assessment are relevant areas of concern to the older adults and the community or city.

Some of the cities and communities have included a diverse group of older adults in their assessment which somewhat address the criticism raised by Plouffe, Kalache and Voelcker (2016). Cities and communities assured diversity with respects to age, education level, living arrangement, geography (urban and rural), marital status, financial level, and health status (Lee and Kim, 2017; Park and Lee, 2017). For example, Novek and Menec (2014) recruited older adults living in urban and rural communities in the province of Manitoba,

Canada. Also, a range of methods has been used to engage a diverse group of older adults including word of mouth and poster advertisement in the province of Manitoba (Novek and Menec, 2014). Elgin of St. Thomas (2017) used both online and physical contact to solicit information from its members. Focus groups and questionnaire survey are the dominant approaches used up to date (Sun, Phillips and Wong, 2018; Liu, Kuo and Lin, 2018; Orpana *et al.*, 2016).

The existing methods to assess age-friendliness were mainly quantitative or qualitative. A few studies adopted both quantitative and qualitative methods as shown in Table 7. Each domain of the AFCC was assessed based on the domain features. However, Moulaert and Garon (2016) argued that using only one assessment method with discrete domain features may not capture the interactive and dynamic nature of the domains. These interrelationships among the domains are essential in identifying joint AFCC policy initiatives for effective implementation. A mixed-method (combining quantitative and qualitative methods) can be more effective in establishing interrelationships and assessing age-friendliness (Moulaert and Garon, 2016). Dellamora *et al.* (2015) further added that the mixed method provides the most comprehensive, inclusive, rigorous, and systematic community assessment. Despite the effectiveness of these methods, the WHO (2017) identified that the current metrics and methods used in the field of ageing are limited, preventing a complete understanding of the experience of the older adults and appropriate interventions. This may be because almost all the current assessment methods in the AFCC research corpus are subjective and based on the perception of the older adults or caregivers (see Table 7). The common limitations of these methods include reflecting subjective factors, reporter bias, Hawthorne effects, memory lapses and recall biases (Wild *et al.*, 2016; Lee and Yoo, 2018). For example, Bigonnesse, Beaulieu and Garon (2014) assessed the housing needs of older adults by conducting focus groups (subjective assessment method) with caregivers to express the perceptions of frail older adults

that were unable to participate in the data collection. However, perceptions are subjective, based on personal experiences and opinions which can vary among individuals. Therefore, relying on a caregiver in Bigonnesse, Beaulieu and Garon (2014)'s case to voice an older adult's perception may yield unreliable results. In general, adopting such subjective assessment (focus group, interviews, questionnaire surveys, photovoice, among others) may result in recall bias, and this may affect the reliability and validity of the assessment result in the AFCC research corpus. In order to provide a more rigorous, innovative and evidence-based intervention for AFCC, it is crucial for researchers to adopt a more objective assessment method where possible.

It is worth mentioning that emerging studies have used accelerometer data (Hawkesworth *et al.*, 2018), pedometer data (Menec *et al.*, 2016) and Global Positioning System (GPS) data (Tsai *et al.*, 2016) to assess the physical environmental features. These cutting-edge methods have significantly advanced the frontiers of the relationship between the physical environment and physical activity among older adults. Although these methods adopted objectively generated user data, answers to the fundamental question of how the older adult body responds to stress-inducing or adverse physical features have not been adequately answered. For example, *Menec et al.* (2016) used pedometer data (mainly the number of steps taken) to objectively study whether amenities within walking distance relates to overall physical activity level. Hawkesworth *et al.* (2018) employed accelerometer data to investigate the association between physical built environment features and physical activity. However, the complexity and the demanding nature of the environment surrounding the amenities may influence the older adult's decision to walk to an amenity. The demanding nature of the environment can be reliably captured using the older adult's bodily responses such as the cognitive effort required to navigate the environment or several heart-related measures.

Identifying these stress-inducing or adverse physical features will be a major breakthrough in assessing the age-friendliness of cities and communities.

< Insert Table 7 about here >

Theme 4: Challenges and opportunities

'Challenges and opportunities' is another significant theme, reinforcing the need to harness the opportunities presented by developing AFCC and the challenges that may need to be addressed when developing AFCC. It includes political, financial, social and physical characteristics of the environment that promotes or hinders: older adults to age in friendly environments; or the implementation of age-friendly initiatives as shown in Table 8. For the past decade, few publications focused on this theme, and the highest number of contributions to this theme was recorded in 2014 and 2016 (see Figure 3). This theme presents a few general challenges and opportunities that all cities and communities should consider to some extent.

The administrative procedures and bureaucratic rules limit the realisation and implementation of AFCC. Cities and communities tend to divide AFCC responsibilities among ministries and departments. In addition, these ministries and departments are characterised by division of labour which impedes and complicate the AFCC policy acceptance and implication process (Walker, 2016). This was a major hiccup that hindered the implementation AFCC in Victoria, Australia. The fragmented nature of the government departments and multi-sectoral partnership limited the strategic directions for AFCC at the federal, state and local level in Victoria, Australia (Brasher and Winterton, 2016). Major AFCC initiatives demand strong and committed top-down support. However, constantly changing leaders and changing policies often result in a new political style and government commitment (Kendig *et al.*, 2014; Garon *et al.*, 2014; Fitzgerald and Caro, 2014).

Buffel and Phillipson (2016) identified economic austerity, pressures from urban development, and privatisation of public space as challenges to implementing age-friendly initiatives. Tight fiscal environment, cut in public and private funding, and austerity policies in many cities and communities have obstructed the implementation, monitoring and evaluation of age-friendly initiatives (Buffel and Phillipson, 2016; Fitzgerald and Caro, 2014; Buffel *et al*., 2014). Many of the leading cities in the WHO's Global Network for Age-friendly Cities and Communities including New York, Manchester, London, Barcelona and Madrid have experienced challenges in implementing age-friendly policies from the introduction of austerity policies (Buffel and Phillipson, 2016). Another roadblock is the sustainability of AFCC. Sustaining, monitoring and evaluating AFCC initiatives is becoming increasingly difficult especially when economic, politics and society is continuously changing (Fitzgerald and Caro, 2014; Buffel *et al.*, 2014; McGarry and Morris 2011). However, the impact of austerity policies can be mitigated if cities and communities utilise its existing assets, develop targeted local solutions to complement local problems, promote financial security among older adults and harness the networks of the private sector (Goldman *et al.*, 2016).

Also, the lack of on-going political and financial commitment has caused many implemented age-friendly initiatives to remain unrealised and not live up to expectation (Kalache, 2016). Although AFCC is community-led, major initiatives demand strong political leadership. The problem is political players constantly change which can result in changes in policy interest (Kendig *et al.*, 2014; Garon *et al.*, 2014; Fitzgerald and Caro, 2014). The role of government in showing commitment to the AFCC movement is indispensable for supporting the 'bottom-up' initiatives for implementing AFCC. A massive shift of land ownership from public-owned spaces to private/corporate-owned spaces has been a common observation in most cities in the twenty-first century (Minton, 2009). The control and ownership of public

spaces have hindered the extent to which these spaces can be adapted to meet the changing needs of people in later life (Buffel and Phillipson, 2016).

Equally important are the barriers created by unequal ageing (Walker, 2016). The implemented AFCC initiatives need to capture the diversity of older adults and the communities (Plouffe, Kalache and Voelcker, 2016; Lui *et al.*, 2009). However, the extensive disparity in ageing between countries, cities and communities obstructs an inclusive approach to creating an AFCC (Walker, 2016). For example, life expectancy varies substantially in different countries. Individual older adults experience different changes in functional capacity. The social, cultural, political and economic settings create major difference among countries, cities and communities. Also, the quality of life in later life varies significantly among developed and less developed countries. These inequalities make it more cumbersome to creating an all-inclusive and flexible AFCC initiative. Older adults may be denied the opportunity to participate in the AFCC processes due to the prevalence of ageist attitudes, prejudice and stereotypes that portray older adults as burdens or care-dependent (Buffel *et al.*, 2014; Isaacson *et al.*, 2015; Rémillard-Boilard, Buffel and Phillipson, 2017).

The demographic ageing can be turned into opportunities depending on how cities and communities address the challenges it presents. The development of AFCC provides significant opportunities for cities, communities, businesses, and older adults themselves. The existing and potential opportunities include development in technology and innovation, new market and service approach to meeting housing and support needs of older adults (van Hoof *et al.*, 2018; Fitzgerald and Caro, 2014). AFCC initiatives may stimulate cities and communities to harness exiting resources to achieve age-friendliness (Isaacson *et al.*, 2015; Buffel, Phillipson and Scharf, 2012). These opportunities have the potential to develop what van Hoof *et al.* (2018) described as the "silver economy". The development of AFCC can boost the economy by increasing the demand for innovative solutions which in turn create jobs for both young and

older workers. Furthermore, AFCC initiatives have the potential to create an all-inclusive community, maintain and extend social networks because AFCC has elements that benefit needs and abilities of all ages (Fitzgerald and Caro, 2014; Boilard, Buffel and Phillipson, 2017).

It is important to mention that challenges and opportunities will arise when cities and communities pursue the AFCC movement. However, every city or community will have unique opportunities and challenges to address. The socio-economic and cultural settings in every city and community will play a major role in addressing these unique challenges and utilising the opportunities.

< Insert Table 8 about here >

Future directions

In line with the current research themes and the increasing interest among researchers, institutions and countries, the following future directions have been identified:

1. The current studies from developing countries suggest that older adults living in low- and middle-income countries have a different experience and perception of age-friendliness (Isaacson *et al.*, 2015; van Hoof *et al.*, 2018; Aboderin, Kano and Owii, 2017). The low- and middle-income countries that are embracing the age-friendly concept required a substantial modification of the extant AFCC framework of dimensions and indicators to fit locally defined, priority challenges and contexts of older adults in these settings. A typical example is the age-friendly slums initiatives in Nairobi (Aboderin, Kano and Owii, 2017). Furthermore, a study conducted by the WHO in Bamenda (Cameroon), Conakry (Guinea), and Kampala (Uganda) identified missing dimensions of the WHO AFCC model. One of these included meeting the basic needs of the older adults; with respect to access to food and financial security in old age (WHO, 2018b). This situation raises a key question about the extent to which the

AFCC concept may offer an appropriate basis and useful frame for the initiatives to advance the well-being of older adults living in low- and middle-income settings. As a result, the existing concepts such as the WHO's (2007) AFCC initiatives have been criticised for promoting an ideal city and being western-oriented (Buffel, Phillipson and Scharf, 2012; van Hoof *et al.*, 2018; Wang, Gonzales and Morrow-Howell, 2017). Collaboration among AFCC researchers from developed and developing countries provides a potential solution to resolve this criticism. Also, this calls for researchers in developing countries to conduct more AFCC research to facilitate cross-nation comparative research and bring to limelight ways in which cultural, social, political and economic settings can influence age-friendly outcomes. Researchers in the developed countries, specifically, US, Canada, UK and Hong Kong have researched the following themes: conceptualisation, implementation and development, assessment and challenges and opportunities. To facilitate the cross-nation comparison, researchers in developing countries should focus on studying these themes. These cross-nation comparisons are essential to providing answers to existing and future critics. Also, various cities and communities in developed countries have shared their experiences, progress, evaluation and initiatives on the WHO's Global Network for Age-friendly Cities and Communities' portal. These shared initiatives can be a useful knowledge base when conducting the cross-nation comparison. More importantly, a comprehensive comparison should include the heterogeneity, diverse needs and capabilities of the older adults in a city or community.

2. The Portland and Multnomah County and Quebec approach to age-friendliness may serve as a model for cities, communities, researchers and practitioners who are currently in the process of implementing the age-friendly concepts and developing action plans for creating AFCC. Albeit the age-friendly movement can potentially transform the

experience of all age groups, the core of each initiative should be driven by the older adults. Also, cities and communities should be aware that the implementation and development of AFCC require more than the existing generalised AFCC models. The AFCC models should be a preliminary step to a successful implementation of AFCC. More importantly, the sustainability of the AFCC initiatives will demand both political and financial commitment from ministries, departments, organisations, academics, older adults and other AFCC stakeholders throughout the process and accepting a bottom-up approach where older adults are perceived as place-makers and valuable resources. A successful bottom-up approach to implementing AFCC can only be achieved when there is an effective and supportive top-down backup. Furthermore, the reviewed studies proved that older adults are willing to contribute to the development AFCC, therefore this presents a good opportunity for researchers to implement measure to maximise the participation of the older adults. However, different cities and communities will demand different participatory measures. Conducting a prior participatory analysis can be beneficial for the assessment of AFCC.

3. Several studies have been conducted to assess the age-friendliness of cities and communities (see Table 7). The current methods involve: the older adults self-reporting their satisfaction with the features of the environment using instruments such as verbal feedback, questionnaires, and visual audit completed by trained auditors. Although these methods have provided valuable insight about AFCC, they also have several limitations such as reflecting subjective factors, reporter bias, Hawthorne effects, memory lapses and recall biases (Kim, Ahn and Nam, 2019; Wild *et al.*, 2016; Lee and Yoo, 2018). Moreover, the WHO (2017) recently mentioned that the existing methods and metrics are limiting a comprehensive understanding of the experience of the older adults in AFCC and appropriate interventions. For example, fundamental questions

such as “which interventions work to create more age-friendly environments?” remain unanswered (WHO, 2017: 20). The WHO recommended that “new methods and instruments are needed that can capture trajectories of Healthy Ageing and their determinants, outcomes and distributions across the life course, and these will need to be incorporated in routine data collection and other periodic population surveys” (WHO, 2017: 21). Recent developments in sensing technology can be exploited by future researchers to collect objective, routine and unbiased data on the older adults’ physiological, psychological, emotional and behavioural responses. These responses can contain vital information about older adults’ experience and interaction with the AFCC domains. The ability of humans to exhibit different physiological, psychological, emotional and behavioural responses while interacting with the environment (Ojha *et al.*, 2019; Taj-Eldin *et al.*, 2018) makes it viable to adopt human-centred measures to assess the friendliness of cities and communities.

For example, instead of asking the older adults how they perceive the interval between outdoor seating using a questionnaire, physical audit or other subjective assessment methods, photoplethysmography sensors can be used to measure the variability in the older adults’ heart rate. The older adults’ heart rate may contain vital information about the age-friendliness of the interval between outdoor seating. Similarly, inertial measurement units motion sensors can be used to assess the gait pattern of the older adults and relate it to the age-friendliness of a footpath. Wearable insole pressure sensor system senses foot dynamics and can be used to collect the foot planter distribution patterns of the older adults when exposed to the built environment features. These responses can correlate with the older adult’s experience and interaction with the physical environment. This concept is termed “elderly-centric sensing”. Recognising the physiological, psychological, emotional and behavioural patterns in

these sensor data can potentially facilitate the continuous assessment of AFCC, complement existing assessment methods, enhance the ability to understand the older adults' needs and provide age-friendly interventions that meet their needs.

4. The interaction between community level and national level AFCC development can be complex: national level AFCC development necessitate appropriate AFCC initiatives applicable to communities with diverse needs. However, challenges remain as to whether communities are financially self-sufficient to embark and sustain the AFCC movement. Local government constrained budget may result in difficult administrative procedures, bureaucratic rules and political processes in setting AFCC initiative priorities. Furthermore, re-allocation of resources from existing government commitments to a new area such as AFCC is a major challenge. However, this can be addressed in long-term by establishing a stronger need and focus on the older adults in the long-term commitments and activities of the governments; and aligning the commitments and actions of all levels of entities. Considering these challenges, more attention is needed on how to secure community-level income. More research is needed on how different entities—local, state-regional, and national policy and political action groups, the non-profit-volunteer and the private sector—can support communities to create AFCC. More fundamental research is required to understand how to successfully run a whole community AFCC approach inclusive of the various entities (especially the nongovernmental entities) with respect to all the domains of AFCC.

Conclusion

This study examined the annual publication trend of AFCC related studies, the contribution of authors and institutions from different countries and the trending research themes in the AFCC corpus based on a systematic literature review of 98 publications. The increase in the average

annual publication from 2.00 papers (between 2003 and 2010) to 9.75 papers (between 2011 to 2018) reflects an increasing interest in AFCC research among researchers with US, Canada, UK and Hong Kong having the highest contribution to the AFCC research corpus. Contributions from developing countries such as India, Kenya, Thailand and South Africa were marginal compared to the developed countries. However, with the rapid urbanisation coupled with the ageing population, developing countries are expected to increase their contribution to the AFCC corpus. Institutions that emerged as highest contributors to the AFCC research corpus were the World Health Organisation (Switzerland), Portland State University (US), The Chinese University of Hong Kong (Hong Kong), and University of Sherbrooke (Canada). From the thematic analysis, four themes: (1) Conceptualisation; (2) Implementation and Development; (3) Assessment; and (4) Challenges and Opportunities, were identified to be trending in the AFCC research corpus. The themes highlighted important issues that need to be addressed in the development of AFCC: the need to adopt new methods and instruments such as sensing technology to collect objective, routine and unbiased data to complement existing assessment methods; the need to conduct collaborative research among developed and developing countries through cross-nation comparisons; the need to perceive older adults as place-makers and value resources in AFCC; the need to conduct a prior participatory analysis to identify appropriate participatory measures the can maximise the participation of older adults in the development of AFCC. It is worth mentioning that, although the review was very comprehensive on AFCC research the selected publications may not be exhaustive, that is there may be a possibility that the review process did not include all publications in the corpus of AFCC research. However, the authors believe that the selected publications are sufficient to achieve the aim of the study. That is publications that may have been omitted would not result in any significant changes to the findings of this study. Researchers and practitioners within

the AFCC research discipline will find this study as an essential reference to gain an understanding of the status and future directions of AFCC research.

Acknowledgement. This research is based on a larger scale PhD research study on age-friendly cities and communities where publications with similar background/methodology/database but with different scope and objectives may be published.

Author contributions. All authors have contributed substantially to the creation of this paper.

Fianacial support. This research was funded by the Research Grant Council (RGC) of Hong Kong and the Department of Building and Real Estate, The Hong Kong Polytechnic University.

Conflict of interest. The authors declare no conflicts of interest.

References

Aboderin I, Kano M, and Owii HA, (2017) Toward "age-friendly slums"? Health challenges of older slum dwellers in Nairobi and the applicability of the age-friendly city approach. *International Journal of Environmental Research and Public Health* **14**, 1259. DOI: https://doi.org/10.3390/ijerph14101259

Alidoust S, and Bosman C, (2016) Boomer planning: The production of age-friendly cities. *Built Environment* **42**, 107-119.

Alley D, Liebig P, Pynoos J, Banerjee T, and Choi IH, (2007) Creating elder-friendly communities: Preparations for an aging society. *Journal of Gerontological Social Work* **49**, 1-18. DOI: https://doi.org/10.1300/J083v49n01_01

Andrews B, (2008) Lifetime homes, lifetime neighbourhoods–developing a housing strategy for our ageing population. *Policy and Politics* **36**, 605. DOI: 10.1332/147084408X349837

Antwi-Afari MF, Li H, Pärn EA, and Edwards DJ, (2018) Critical success factors for implementing building information modelling (BIM): A longitudinal review. *Automation in Construction* **91**, 100-110. DOI: https://doi.org/10.1016/j.autcon.2018.03.010

Au AM, Chan SC, Yip HM, Kwok JY, Lai KY, Leung KM, Lee ALF, Lai DWL, Tsien T, and Lai SM, (2017) Age-friendliness and life satisfaction of young-old and old-old in Hong Kong **2017**. *Current Gerontology and Geriatrics Research*. DOI: https://doi.org/10.1155/2017/6215917

Austin C, McClelland R, Sieppert J, Holinda D, Hartley D, Flux D, (2001) *A Place to Call Home: The Final Report of the Elder Friendly Communities Project*. Calgary, Faculty of Social Work, The University of Calgary.

Austin CD, Camp ED, Flux D, McClelland RW, and Sieppert J, (2005) Community development with older adults in their neighborhoods: The elder friendly communities program. *Families in Society* **86**, 401-409.

Beard JR, and Montawi B, (2015) Age and the environment: The global movement towards age-friendly cities and communities. *Journal of Social Work Practice* **29**, 5-11.

Bigonnesse C, Beaulieu M, and Garon S, (2014) Meaning of home in later life as a concept to understand older adults' housing needs: Results from the 7 age-friendly cities pilot project in Québec. *Journal of Housing for the Elderly* **28**, 357-382. DOI: https://doi.org/10.1080/02763893.2014.930367

Bookman A, (2008) Innovative models of aging in place: transforming our communities for an aging population. *Community, Work & Family* **11**, 419-438. DOI: https://doi.org/10.1080/13668800802362334

Brasher K, and Winterton R, (2016) Whose responsibility? Challenges to creating an age-friendly Victoria in the wider Australian policy context. In Moulaert T, and Garon S, (eds) (2016) *Age-friendly cities and communities in international comparison: Political lessons, scientific avenues, and democratic issues*. Springer, Switzerland, 229-245. DOI: 10.1007/978-3-319-24031-2_13

Braun V, and Clarke V, (2006) Using thematic analysis in psychology. *Qualitative Research in Psychology* **3**, 77-101. DOI: 10.1191/1478088706qp063oa

Buffel T, and Phillipson C, (2016) Can global cities be 'age-friendly cities'? Urban development and ageing populations. *Cities* **55**, 94-100. DOI: https://doi.org/10.1017/S0144686X1200150X

Buffel T, McGarry P, Phillipson C, De Donder L, Dury S, De Witte N, Smetcoren A, and Verté D, (2014) Developing age-friendly cities: Case studies from Brussels and Manchester and implications for policy and practice. *Journal of Aging & Social Policy* **26**, 52-72. DOI: 10.1080/08959420.2014.855043

Buffel T, Phillipson C, and Scharf T, (2012) Ageing in urban environments: Developing 'age-friendly' cities. *Critical Social Policy* **32**, 597-617. DOI: https://doi.org/10.1177/0261018311430457

Chadegani AA, Salehi H, Yunus M, Farhadi H, Fooladi M, Farhadi M, and Ale Ebrahim N, (2013) A comparison between two main academic literature collections: Web of Science

and Scopus databases. *Asian Social Science* **9**, 18-26. DOI: https://ssrn.com/abstract=2257540

Chan AW, Chan HY, Chan IK, Cheung BY, and Lee DT, (2016) An age-friendly living environment as seen by Chinese older adults: A "Photovoice" Study. *International Journal of Environmental Research and Public Health* **13**, 913. DOI: 10.3390/ijerph13090913

Chao TS, and Huang H, (2016) The East Asian age-friendly cities promotion–Taiwan's experience and the need for an oriental paradigm. *Global Health Promotion* **23**, 85-89. DOI: https://doi.org/10.1177/1757975916641612

Cho M, and Kim J, (2016) Coupling urban regeneration with age-friendliness: Neighborhood regeneration in Jangsu Village, Seoul. *Cities* **58**, 107-114. DOI: https://doi.org/10.1016/j.cities.2016.05.019

Chodzko-Zajko W, and Schwingel A, (2009) Transnational strategies for the promotion of physical activity and active aging: The World Health Organization model of consensus building in international public health. *Quest* **61**, 25-38. DOI: https://doi.org/10.1080/00336297.2009.10483598

City of Cornwall (2017) Senior friendly community implementation plan. Available at: https://extranet.who.int/agefriendlyworld/wp-content/uploads/2018/08/Senior-Friendly-Community-Implementation-Plan-February-2017.pdf [Accessed on 30 March 2019].

City of Greater Sudbury (2018) Age-friendly community update. Available at: https://extranet.who.int/agefriendlyworld/wp-content/uploads/2018/08/Age-Friendly-Community-Council-Report.pdf [Accessed on 31 March 2019].

City of Reykjavik (2013) The policy of the city of Reykjavik regarding the elderly until 2017. Available at: https://extranet.who.int/agefriendlyworld/wp-content/uploads/2015/06/ReykjavikSeniorsPolicy_2013-17.pdf [Accessed on 30 March 2019].

Cohen WM, Nelson RR, and Walsh JP, (2002) Links and impacts: the influence of public research on industrial R&D. *Management Science* **48**, 1-23. DOI: https://doi.org/10.1287/mnsc.48.1.1.14273

Collins S, Wacker R, and Roberto K, (2013). Considering quality of life for older adults: A view from two countries. *Generations* **37**, 80-86.

Cramm JM, Van Dijk HM, and Nieboer AP, (2018) The creation of age-friendly environments is especially important to frail older people. *Ageing and Society* **38**, 700-720. DOI: https://doi.org/10.1017/S0144686X16001240

CUHK Jockey Club Institute of Ageing (2016) Jockey Club Age-friendly city project action plan for Tai Po District. Available at: https://extranet.who.int/agefriendlyworld/wp-content/uploads/2017/02/Tai-Po-District_Action-Plan.pdf [Accessed on 30 March 2019].

Darko A, and Chan AP, (2016) Critical analysis of green building research trend in construction journals. *Habitat International* **57**, 53-63. DOI: https://doi.org/10.1016/j.habitatint.2016.07.001

De Donder L, Buffel T, Dury S, De Witte N, and Verte D, (2013) Perceptual quality of neighbourhood design and feelings of unsafety. *Ageing & Society* **33**, 917-937. DOI: https://doi.org/10.1017/S0144686X12000207

Del Barrio E, Marsillas S, Buffel T, Smetcoren AS, and Sancho M, (2018) From Active Aging to Active Citizenship: The Role of (Age) Friendliness. *Social Sciences* **7**, 134. DOI: https://doi.org/10.3390/socsci7080134

DeLaTorre A, and Neal MB, (2017) Ecological approaches to an age-friendly Portland and Multnomah County. *Journal of Housing for the Elderly* **31**, 130-145. DOI: https://doi.org/10.1080/02763893.2017.1309931

Dellamora MC, Zecevic AA, Baxter D, Cramp A, Fitzsimmons D, and Kloseck M, (2015) Review of assessment tools for baseline and follow-up measurement of age-friendliness. *Ageing International* **40**, 149-164. DOI: https://doi.org/10.1007/s12126-014-9218-7

Du P, and Xie L, (2015) The use of law to protect and promote age-friendly environment. *Journal of Social Work Practice* **29**, 13-21. DOI: https://doi.org/10.1080/02650533.2014.993945

Elgin of St. Thomas (2017) Age friendly community plan. Available at: https://extranet.who.int/agefriendlyworld/wp-content/uploads/2018/08/Elgin-St-Thomas-Age-Friendly-Final-Report-2017-3.pdf [Accessed on 30 March 2019].

Elsawahli H, Ahmad F, and Ali AS, (2017) A qualitative approach to understanding the neighborhood environmental influences on active aging. *Journal of Design and Built Environment* **17**, 16-26. DOI: http://ajba.um.edu.my/index.php/jdbe/article/view/10188

Emlet CA, and Moceri JT, (2012) The importance of social connectedness in building age-friendly communities. *Journal of Aging Research* **2012**. DOI: 10.1155/2012/173247

Farrelly L, (2014) Redefining, reinventing and realigning design for demographic change. *Architectural Design*.

Feldman PH, and Oberlink MR, (2003) The AdvantAge initiative: Developing community indicators to promote the health and well-being of older people. *Family & Community Health* **26**, 268-274. DOI: 10.1097/00003727-200310000-00004

Fields NL, Adorno G, Magruder K, Parekh R, and Felderhoff BJ, (2016) Age-friendly cities: The role of churches. *Journal of Religion, Spirituality & Aging* **28**, 264-278. DOI: https://doi.org/10.1080/15528030.2016.1155526

Fitzgerald KG, and Caro FG, (2014) An overview of age-friendly cities and communities around the world. *Journal of Aging & Social Policy* **26**, 1-18. DOI: https://doi.org/10.1080/08959420.2014.860786

Frau G, (2015) Natural perceptual wayfinding for urban accessibility of the elderly with early-stage AD. *Techne*.

Garon S, Paris M, Beaulieu M, Veil A, and Laliberté A, (2014) Collaborative partnership in age-friendly cities: Two case studies from Quebec, Canada. *Journal of Aging & Social Policy* **26**, 73-87. DOI: https://doi.org/10.1080/08959420.2014.854583

Goldman L, Owusu S, Smith C, Martens D, and Lynch M, (2016) Age-friendly New York City: A case study. In Moulaert T, and Garon S, (eds) (2016) *Age-friendly cities and communities in international comparison: Political lessons, scientific avenues, and democratic issues*. Springer, Switzerland, 171-190. DOI: 10.1007/978-3-319-24031-2_10

Green G, (2013) Age-friendly cities of Europe. *Journal of Urban Health* **90**, 116-128. DOI: https://doi.org/10.1007/s11524-012-9765-8

Greenfield EA, (2012) Using ecological frameworks to advance a field of research, practice, and policy on aging-in-place initiatives. *The Gerontologist* **52**, 1–12. DOI: https://doi.org/10.1093/geront/gnr108

Greenfield EA, and Mauldin RL, (2017) Participation in community activities through Naturally Occurring Retirement Community (NORC) Supportive Service Programs. *Ageing and Society* **37**, 1987-2011. DOI: https://doi.org/10.1017/S0144686X16000702

Greenfield EA, Oberlink M, Scharlach AE, Neal MB, and Stafford PB, (2015) Age-friendly community initiatives: Conceptual issues and key questions. *The Gerontologist* **55**, 191-198. DOI: https://doi.org/10.1093/geront/gnv005

Hanson D, and Emlet CA, (2006) Assessing a community's elder friendliness: a case example of The AdvantAge Initiative. *Family & Community Health* **29**, 266-278. DOI: 10.1097/00003727-200610000-00005

Harding ED, (2007) *Towards Lifetime Neighbourhoods: Designing Sustainable Communities for All*. London, Department for Communities and Local Government.

Hawkesworth, S, Silverwood RJ, Armstrong B, Pliakas T, Nanchalal K, Jefferis BJ, Sartini C, Amuzu AA, Wannamethee SG, Ramsay SE, Casas JP, Morris RW, Whincup PH, Lock K, (2018) Investigating associations between the built environment and physical activity among older people in 20 UK towns. *Journal of Epidemiology & Community Health* **72**, 121-131. DOI: http://dx.doi.org/10.1136/jech-2017-209440

Hensen KT, (2009) Writing for publication: A shift in perspective. *Phi Delta Kappan* **90**, 776a–776d. DOI: 10.1177/003172170909001023

Hewson JA, Kwan C, Shaw M, and Lai DW, (2018) Developing age-friendly social participation strategies: service providers' perspectives about organizational and sector readiness for aging baby boomers. *Activities, Adaptation & Aging* **42**, 225-249.

Hong Y, Chan DW, Chan AP, and Yeung JF, (2011) Critical analysis of partnering research trend in construction journals. *Journal of Management in Engineering* **28**, 82-95. DOI: https://doi.org/10.1061/(ASCE)ME.1943-5479.0000084

Howard GS, Cole DA, and Maxwell SE, (1987) Research productivity in psychology based on publication in the journals of the American psychological association. *American Psychologist* **42**, 975. DOI: http://dx.doi.org/10.1037/0003-066X.42.11.975

Howitt D, and Cramer D, (2011) *Introduction to research methods in psychology (3rd ed.).* Pearson Education.

Isaacson M, D'Ambrosio L, Samanta T, and Coughlin J, (2015) Life-stage and mobility: an exploratory GPS study of mobility in multigenerational families, Ahmedabad, India. *Journal of Aging & Social Policy* **27**, 348-363. DOI: https://doi.org/10.1080/08959420.2015.1058123

Jeste DV, Blazer II DG, Buckwalter KC, Cassidy KLK, Fishman L, Gwyther LP, Levin SM, Phillipson C, Rao RR, Schmeding E, and Vega WA, (2016) Age-friendly communities initiative: public health approach to promoting successful aging. *The American Journal of Geriatric Psychiatry* **24**, 1158-1170. DOI: https://doi.org/10.1016/j.jagp.2016.07.021

Jeste DV, Blazer II DG, Buckwalter KC, Cassidy KLK, Fishman L, Gwyther LP, Levin SM, Phillipson C, Rao RR, Schmeding E, and Vega WA, (2016) Age-friendly communities initiative: Public health approach to promoting successful aging. *The American Journal of Geriatric Psychiatry* **24**, 1158-1170. DOI: https://doi.org/10.1016/j.jagp.2016.07.021

Johnson R, Hofacker J, Boyken L, and Eisenstein A, (2016) Sustaining Chicago's informal caregivers: an age-friendly approach. *Journal of Urban Health* **93**, 639-651. DOI: https://doi.org/10.1007/s11524-016-0058-5

Joy M, (2018) Problematizing the age friendly cities and communities program in Toronto. *Journal of Aging Studies* **47**, 49-56. DOI: https://doi.org/10.1016/j.jaging.2018.10.005

Kadoya Y, (2013) Toward an age-friendly city: the constraints preventing the elderly's participation in community programs in Akita city. *Working with Older People* **17**, 101-108. DOI: https://doi.org/10.1108/WWOP-05-2013-0012

Kalache (2016) Active ageing and age-friendly cities-A personal account. In Moulaert, T and Garon, S (eds) (2016) *Age-friendly cities and communities in international comparison: Political lessons, scientific avenues, and democratic issues*. Springer, Switzerland, 65-77. DOI: 10.1007/978-3-319-24031-2_5

Kendig H, Elias AM, Matwijiw P, and Anstey K, (2014) Developing age-friendly cities and communities in Australia. *Journal of Aging and Health* **26**, 1390-1414. DOI: https://doi.org/10.1177/0898264314532687

Kerbler B (2015) Population ageing and urban space. Annals for Istrian and Mediterranean Studies. *Series historia et sociologia* 25, 33-48.

Kihl M, Breenan D, Gabhawala N, List J, and Mittal P, (2005) *Livable communities: An evaluation guide*. AARP Public Policy Institute, Washington DC.

Kim J, Ahn CR, and Nam Y, (2019) The influence of built environment features on crowdsourced physiological responses of pedestrians in neighborhoods. *Computers, Environment and Urban Systems* **75**, 161-169. DOI: https://doi.org/10.1016/j.compenvurbsys.2019.02.003

Lee J, and Yoo SK, (2018) Design of user-customized negative emotion classifier based on feature selection using physiological signal sensors *Sensors* **18**, 4253. DOI: https://doi.org/10.3390/s18124253

Lee M, and Kim K, (2017) Older adults' perceptions of age-friendliness in Busan Metropolitan City. *Urban Policy and Research* **35**, 199-209. DOI: https://doi.org/10.1080/08111146.2016.1140031

Lehning A, Scharlach A, and Wolf JP, (2012) An emerging typology of community aging initiatives. *Journal of Community Practice* **20**, 293-316. DOI: https://doi.org/10.1080/10705422.2012.700175

Liddle J, Scharf T, Bartlam B, Bernard M, and Sim J, (2014) Exploring the age-friendliness of purpose-built retirement communities: Evidence from England. *Ageing and Society* **34**, 1601-1629. DOI: https://doi.org/10.1017/S0144686X13000366

Lin TJ, Lin TC, Potvin P, and Tsai CC, (2018) Research trends in science education from 2013 to 2017: A systematic content analysis of publications in selected journals. *International Journal of Science Education*, 1-21. DOI: https://doi.org/10.1080/09500693.2018.1550274

Liu LC, Kuo HW, and Lin CC, (2018) Current status and policy planning for promoting age-friendly cities in Taitung County: Dialogue between older adults and service providers. *International Journal of Environmental Research and Public Health* **15**, 2314. DOI: https://doi.org/10.3390/ijerph15102314

Lowe M, Whitzman C, Badland H, Davern M, Aye L, Hes D, Butterworth I, and Giles-Corti B, (2015) Planning healthy, liveable and sustainable cities: How can indicators inform policy?. *Urban Policy and Research* **33**, 131-144. DOI: 10.1080/08111146.2014.1002606

Lowen T, Davern MT, Mavoa S, and Brasher K, (2015) Age-friendly cities and communities: Access to services for older people. *Australian Planner* **52**, 255-265. DOI: https://doi.org/10.1080/07293682.2015.1047874

Lu Y, Wu Z, Chang R, and Li Y, (2017) Building Information Modeling (BIM) for green buildings: A critical review and future directions. *Automation in Construction* **83**, 134-148. DOI: https://doi.org/10.1016/j.autcon.2017.08.024

Lui CW, Everingham JA, Warburton J, Cuthill M, and Bartlett H, (2009) What makes a community age-friendly: A review of international literature. *Australasian Journal on Ageing* **28**, 116-121. DOI: https://doi.org/10.1111/j.1741-6612.2009.00355.x

Maltz J, Hunter C, Cohen E and Wright S (2014) Designing for a lifetime in New York and other US cities. *Architectural Design*.

McGarry P, and Morris J, (2011) A great place to grow older: a case study of how Manchester is developing an age-friendly city. *Working with Older People* **15**, 38-46. DOI: https://doi.org/10.5042/wwop.2011.0119

Menec VH, Brown CL, Newall NE, and Nowicki S, (2016) How important is having amenities within walking distance to middle-aged and older adults, and does the perceived importance relate to walking?. *Journal of Aging and Health* **28**, 546-567. DOI: https://doi.org/10.1177/0898264315597352

Menec VH, Means R, Keating N, Parkhurst G, and Eales J, (2011) Conceptualizing age-friendly communities. *Canadian Journal on Aging/La Revue canadienne du vieillissement* **30**, 479-493. DOI: https://doi.org/10.1017/S0714980811000237

Miller G, Harris G, and Ferguson I, (2007) Bracing for the demographic tsunami: How will seniors fare in an aging society. *Plan Canada* **47**, 20.

Minton A, (2009) *Ground control: Fear and happiness in the twenty-first century city*. Penguin Books, London.

Mornington Peninsula Shire (2013) Mornington Peninsula a community for all ages, Positive Ageing Strategy 2013-2018. Available at: https://extranet.who.int/agefriendlyworld/wp-content/uploads/2017/08/Mornington-Peninsula-Shire-Action-Plan.pdf [Accessed on 31 March 2019].

Moulaert T, and Garon S, (2015) Researchers behind policy development: Comparing 'age-friendly cities' models in Quebec and Wallonia. *Journal of Social Work Practice* **29**, 23-35. DOI: https://doi.org/10.1080/02650533.2014.993946

Moulaert T, and Garon S, (2016) Introduction: Toward a better understanding of AFCC. In Moulaert T and Garon S (eds) (2016) *Age-friendly cities and communities in international comparison: Political lessons, scientific avenues, and democratic issues*. Springer, Switzerland, 1-16. DOI: 10.1007/978-3-319-24031-2_1

Namazi-Rad MR, Perez P, Berryman M, and Wickramasuriya R, (2016) A semi-empirical determination of perceived liveability. *Bulletin of Sociological Methodology/Bulletin de Méthodologie Sociologique* **129**, 5-24. DOI: https://doi.org/10.1177/0759106315615510

Neal MB, DeLaTorre AK, and Carder PC, (2014) Age-friendly Portland: A university-city-community partnership. *Journal of Aging & Social Policy* **26**, 88-101. DOI: https://doi.org/10.1080/08959420.2014.854651

Neville S, Napier S, Adams J, Wham C, and Jackson D, (2016) An integrative review of the factors related to building age-friendly rural communities. *Journal of Clinical Nursing* **25**, 2402-2412. DOI: https://doi.org/10.1111/jocn.13299

New York City (2011) Age-friendly NYC: A progress report. Available at: USA: New York City Progress Report 2011 [Accessed on 8 April 2019].

New Zealand Ministry of Social Development (2007) *Positive ageing indicators 2007*. Wellington: Ministry of Social Development.

Novek S, and Menec VH, (2014) Older adults' perceptions of age-friendly communities in Canada: A photovoice study. *Ageing & Society* **34**, 1052-1072. DOI: https://doi.org/10.1017/S0144686X1200150X

Ojha VK, Griego D, Kuliga S, Bielik M, Buš P, Schaeben C, Treyer L, Standfest M, Schneider S, König R, and Donath D, (2019) Machine learning approaches to understand the influence of urban environments on human's physiological response. *Information Sciences* **474**, 154-169. DOI: https://doi.org/10.1016/j.ins.2018.09.061

Orpana H, Chawla M, Gallagher E, and Escaravage E, (2016) Developing indicators for evaluation of age-friendly communities in Canada: Process and results. *Health Promotion and Chronic Disease Prevention in Canada: Research, Policy and Practice* **36**, 214. DOI: 27768558

Owusu EK, Chan AP, and Shan M, (2019) Causal factors of corruption in construction project management: An overview. *Science and Engineering Ethics* **25**, 1-31. DOI: https://doi.org/10.1007/s11948-017-0002-4

Parekh R, Maleku A, Fields N, Adorno G, Schuman D, and Felderhoff B, (2018) Pathways to age-friendly communities in diverse urban neighborhoods: Do social capital and social cohesion matter?. *Journal of gerontological social work* **61**, 492-512.

Park S, and Lee S, (2017) Age-friendly environments and life satisfaction among South Korean elders: person–environment fit perspective. *Aging & Mental Health* **21**, 693-702. DOI: https://doi.org/10.1080/13607863.2016.1154011

Plouffe L, Kalache A, and Voelcker I, (2016) A critical review of the WHO age-friendly cities methodology and its implementation. In Moulaert T, and Garon S, (eds) (2016) *Age-friendly cities and communities in international comparison: Political lessons, scientific avenues, and democratic issues*. Springer, Switzerland, 19-36. DOI: 10.1007/978-3-319-24031-2_2

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**, 146-159. DOI: https://doi.org/10.1080/02763893.2017.1309932

Sargisson L, (2010) *Cohousing: a utopian property alternative?.* University of Nottingham: Centre for the Study of Social and Global Justice.

Savio L, Bosia D, Thiebat F, and Zhang Y, (2017) Age-friendly cities: spazio pubblico e spazio privato. *Techne* **14**, 319-327. DOI:10.13128/Techne-20834

Scharlach A, (2012) Creating aging-friendly communities in the United States. *Ageing International* **37**, 25-38. DOI: https://doi.org/10.1007/s12126-011-9140-1

Sodhi MS, and Tang CS, (2018) Corporate social sustainability in supply chains: A thematic analysis of the literature. *International Journal of Production Research* **56**, 882-901. DOI: https://doi.org/10.1080/00207543.2017.1388934

Steels S, (2015) Key characteristics of age-friendly cities and communities: A review. *Cities* **47**, 45-52. DOI: https://doi.org/10.1016/j.cities.2015.02.004

Sun Y, Chao TY, Woo J, and Au DW, (2017) An institutional perspective of "Glocalization" in two Asian tigers: The "Structure− Agent− Strategy" of building an age-friendly city. *Habitat International* **59**, 101-109.

Sun Y, Phillips DR, and Wong M, (2018) A study of housing typology and perceived age-friendliness in an established Hong Kong new town: A person-environment perspective. *Geoforum* **88**, 17-27. DOI: https://doi.org/10.1016/j.geoforum.2017.11.001

Taj-Eldin M, Ryan C, O'Flynn B, and Galvin P, (2018) A review of wearable solutions for physiological and emotional monitoring for use by people with autism spectrum disorder and their caregivers. *Sensors* **18**, 4271. DOI: https://doi.org/10.3390/s18124271

Temelová J, and Slezáková A, (2014) The changing environment and neighbourhood satisfaction in socialist high-rise panel housing estates: The time-comparative perceptions of elderly residents in Prague. *Cities* **37**, 82-91. DOI: https://doi.org/10.1016/j.cities.2013.12.002

Temelová J, and Slezáková A, (2014) The changing environment and neighbourhood satisfaction in socialist high-rise panel housing estates: The time-comparative perceptions of elderly residents in Prague. *Cities* **37**, 82-91. DOI: https://doi.org/10.1016/j.cities.2013.12.002

Tompkins L, (2008) Planning for the seniors surge—one municipality's response. *Plan Can* **48**, 30-33.

Tsai CC, and Wen M, (2005) Research and trends in science education from 1998 to 2002: A content analysis of publication in selected journals. *International Journal of Science Education* **27**, 3-14. DOI: https://doi.org/10.1080/0950069042000243727

Tsai SY, Chen TY, and Ning CJ, (2016) Elderly people's social support and walking space by space-time path. *International Review for Spatial Planning and Sustainable Development* **4**, 4-13. DOI: https://doi.org/10.14246/irspsd.4.3_4

Van Dijk HM, Cramm JM, Van Exel JOB, and Nieboer AP, (2015) The ideal neighbourhood for ageing in place as perceived by frail and non-frail community-dwelling older people. *Ageing & Society* **35**, 1771-1795. DOI: https://doi.org/10.1017/S0144686X14000622

van Hoof J, Kazak J, Perek-Białas J, and Peek S, (2018) The challenges of urban ageing: Making cities age-friendly in Europe. *International Journal of Environmental Research and Public Health* **15**, 2473. DOI: https://doi.org/10.3390/ijerph15112473

Walker A, (2016) Population ageing from a global and theoretical perspective: European lessons on active ageing. In Moulaert T and Garon S (eds) (2016) *Age-friendly cities and communities in international comparison: Political lessons, scientific avenues, and democratic issues*. Springer, Switzerland, 47-64. DOI: 10.1007/978-3-319-24031-2_4

Wang Y, Gonzales E, and Morrow-Howell N, (2017) Applying WHO's age-friendly communities framework to a national survey in China. *Journal of Gerontological Social Work* **60**, 215-231. DOI: https://doi.org/10.1080/01634372.2017.1292980

WHO (2002) *Active aging: A policy framework*. WHO, Geneva.

WHO (2007) *Global age-friendly cities: A guide*. WHO Press, Geneva.

WHO (2017) *Global strategy and action plan on ageing and health*. Geneva. Licence: CC BY-NC-SA 3.0 IGO. Available at: https://www.who.int/ageing/WHO-GSAP-2017.pdf [Accessed on 31 March 2019].

WHO (2018a) *Membership to the global network - Age-friendly world*. Available at: https://extranet.who.int/agefriendlyworld/membership/ [Accessed on 5 December 2018].

WHO (2018b) The Global Network for Age-friendly Cities and Communities: looking back over the last decade, looking forward to the next. WHO, Geneva, Switzerland.

WHO (2020) *About the global network for age-friendly cities and communities - age-friendly world*. Available at: https://extranet.who.int/agefriendlyworld/who-network/ https://extranet.who.int/agefriendlyworld/who-network/ [Accessed on 6 January 2020].

WHO (1996) The Heidelberg guidelines for promoting physical activity among older persons: guidelines series for healthy ageing. WHO Regional Office for Europe, Copenhagen.

Wild KV, Mattek N, Austin D, and Kaye JA, (2016) "Are you sure?" Lapses in self-reported activities among healthy older adults reporting online. *Journal of Applied Gerontology* **35**, 627-641. DOI: https://doi.org/10.1177/0733464815570667

Wong M, Chau PH, Cheung F, Phillips DR, and Woo J, (2015) Comparing the age-friendliness of different neighbourhoods using district surveys: An example from Hong Kong. *PLoS one* **10**, e0131526. DOI: https://doi.org/10.1371/journal.pone.0131526

Wong M, Yu R, and Woo J, (2017) Effects of perceived neighbourhood environments on self-rated health among community-dwelling older Chinese. *International Journal of Environmental Research and Public Health* **14**, 614. DOI: https://doi.org/10.3390/ijerph14060614

Yuan H, and Shen L, (2011) Trend of the research on construction and demolition waste management. *Waste Management* **31**, 670-679. DOI: https://doi.org/10.1016/j.wasman.2010.10.030

Zhang Q, Oo BL, and Lim BTH, (2019) Drivers, motivations, and barriers to the implementation of Corporate Social Responsibility practices by construction enterprises: A review. *Journal of Cleaner Production* **210**, 563-584. DOI: https://doi.org/10.1016/j.jclepro.2018.11.050

Table 1: Score matrix based on the order of authorship

Number of authors (*n*)	Order of specific author (*i*)							
	1	2	3	4	5	6	7	8
1	1.000							
2	0.600	0.400						
3	0.474	0.316	0.211					
4	0.415	0.277	0.185	0.123				
5	0.384	0.256	0.171	0.114	0.076			
6	0.365	0.244	0.162	0.108	0.072	0.048		
7	0.354	0.236	0.157	0.105	0.070	0.047	0.031	
8	0.347	0.231	0.154	0.103	0.069	0.047	0.030	0.020

Note: The sum of *i* for multi-authored papers may not be exactly one due to approximation

Table 2: Origins of identified AFCC research publication

Country/Region	Number of Institution(s)	Number of Paper(s)	Score
USA	30	26	23.541
Canada	18	19	13.708
UK	13	17	11.511
Hong Kong	5	7	5.846
Switzerland	1	4	4.000
Australia	9	4	4.000
The Netherlands	6	4	3.538
Taiwan	5	4	3.277
Belgium	5	5	3.085
Japan	4	3	2.106
Italy	2	2	1.723
Brazil	1	2	1.316
China	2	2	1.277
Spain	2	2	1.100
Singapore	1	1	1.000
South Korea	2	2	1.000
Malaysia	1	1	1.000
Slovenia	1	1	1.000
New Zealand	4	1	0.925
Ireland	2	2	0.611
Czech Republic	1	1	0.600
Poland	2	1	0.462
Estonia	1	1	0.400
India	1	1	0.400
Kenya	1	1	0.369
Thailand	1	1	0.211
South Africa	1	1	0.158

Table 3: Institutions publishing AFCC research

Institution	Country	Score
World Health Organisation	Switzerland	4.000
Portland State University	USA	3.144
The Chinese University of Hong Kong	Hong Kong	3.110
University of Sherbrooke	Canada	3.042
University of Manitoba	Canada	2.384
University of Manchester	UK	2.345
The State University of New Jersey	USA	2.098
Erasmus University Rotterdam	The Netherlands	2.000
The University of Melbourne	Australia	1.848
University of California at Berkeley	USA	1.842
Massachusetts Institute of Technology	USA	1.600
The Hong Kong Polytechnic University	Hong Kong	1.597
Vrije Universiteit Brussel	Belgium	1.574
University of Calgary	Canada	1.401
International Longevity Center Brazil (ILC-Brazil)	Brazil	1.316
National Cheng Kung University	Taiwan	1.277
Manchester City Council	UK	1.231
Center for Home Care Policy and Research, Visiting Nurse Service of New York	USA	1.046
University of Reading	UK	1.000
American Institute of Architects	USA	1.000
Singapore University of Technology and Design	Singapore	1.000
University of Leeds	UK	1.000
Virginia Tech	USA	1.000
University of Southern California	USA	1.000
JTP, London	UK	1.000
Renmin University of China	China	1.000
Sheffield Hallam University	UK	1.000
Università di Sassari	Italy	1.000
Nagoya University	Japan	1.000
Richmond	Canada	1.000
University of Washington Tacoma	USA	1.000
University of Texas at Arlington	USA	1.000
Urban Planning Institute	Slovenia	1.000
University of Wollongong	Australia	1.000
Concordia University	Canada	1.000
University of Malaya	Malaysia	1.000
University of Illinois at Urbana-Champaign	USA	1.000

Table 4: Authors contributing to AFCC research corpus

Researcher	Affiliation(s)	Country(s)	Score
Moulaert, T.	Université Catholique de Louvain, Louvain-la-Neuve, Belgium/ Université de Liège, Liège, Belgium/University of Sherbrooke, Canada	Belgium/Canada	2.274
Buffel, T.	University of Manchester/ Vrije Universiteit Brussel/ Free University of Brussels	UK/Belgium	2.164
Scharlach, A.E.	University of California, Berkeley	USA	2.096
Garon, S.	University of Sherbrooke	Canada	1.810
Kalache, A.	New York Academy of Medicine/International Longevity Center Brazil (ILC-Brazil)	USA/Brazil	1.716
Greenfield, E. A.	The State University of New Jersey	USA	1.714
Neal, M. B.	Portland State University	USA	1.588
DeLaTorre, A.	Portland State University	USA	1.316
Menec, V.H.	University of Manitoba	Canada	1.199
Phillipson, C.	University of Manchester/ Vrije Universiteit Brusse/ Keele University	UK/Belgium	1.081
Plouffe, L.	University of Ottawa/Public Health Agency of Canada	Canada	1.074
Wong, M.	Chinese University of Hong Kong	Hong Kong	1.069
Farrelly, L.	University of Reading	UK	1.000
Steels, S.	University of Leeds	UK	1.000
Green, G.	Sheffield Hallam University	UK	1.000
Frau, G.	Università di Sassari	Italy	1.000
Kadoya, Y.	Nagoya University	Japan	1.000
Tompkins, L.	Richmond	Canada	1.000
Kerbler, B.	Urban Planning Institute, Slovenia	Slovenia	1.000
Joy, M.	Concordia University	Canada	1.000

Table 5: AFCC concepts

Author (s)	Concept	Characteristics
Elder-friendly community (University of Calgary, Canada) Austin *et al.* (2001)	PE • A place to call home • Building community • Making ends meet • Being valued and respected • Staying active • Getting what you need • Getting around SE • Feeling safe	This concept focused on the assessment of the assets, capacities and needs of older adults. However, this concept is not generalisable to other locations.
Elder-friendly community (AdvantAge Initiative) Feldman and Oberlink (2003: 269)	PE • Maximises independence for frail and disabled • Addresses basic needs • Promotes social and civic engagement SE • Optimises physical and mental health and well-being	This concept solely focused on older adults and includes both physical and social elements that sustain active participation, independence and engagement. This concept is unique in that it includes items such as the "percentage of people age 65+ who would like to be working for pay" and "percentage of people age 65+ who had problems paying for medical care". This concept provides quantified results of lacking needs and it is easier to identify and prioritise ageing issues that need immediate attention.
Liveable community (American Association Of Retired Persons) Kihl *et al.* (2005)	PE • Transportation • Walking • Housing • Shopping • Safety and security • Recreation and culture • Health services SE • Caring and mutual support	This concept emphasised more on the availability, suitability and affordability of the physical environment and the supportive community services for facilitating independence and social engagement for dependent (frail) and independent older adults and the general population. It includes items such as "Are the sidewalks adequately lighted at night?" and "Does your community have an information hotline or a directory of services for older persons?". Unlike the Feldman and Oberlink (2003: 269)'s concept, this concept only identifies the presence or absence of physical and social environmental needs.
Elder-friendly community Alley *et al.* (2007: 7)	PE • Accessible and affordable transportation • Housing • Safety • Health care • Community involvement opportunities SE	This concept stressed on important characteristics of becoming age-prepared. This concept is in alignment with Feldman and Oberlink (2003: 269) and Kihl *et al.* (2005) concepts. Although this concept captured a wide variety of physical and social environmental factors, it may be limited in that it only included the most important characteristics which may limit its adoption in different settings. The other concepts presented various physical and social environmental age-friendly features for communities to identify issues that its members consider as important.
Age-friendly city and community WHO (2007)	PE • Outdoor Spaces and buildings • Transportation • Housing • Social participation • Respect and inclusion • Civic participation and employment • Communication and information • Community supports and health services SE	This concept includes physical settings and structures; social policies and services for active ageing. This concept consists of eight domains (physical and social environment) with several items within each domain. Unlike Feldman and Oberlink (2003: 269), Kihl *et al.* (2005) and Alley *et al.* (2007: 7)'s concepts, this concept is very flexible, can be used to generate qualitative and quantitative results of lacking needs depending on the users' preference. As a result, it captures more essential information that can be rigorously analysed for developing age-friendly interventions and policies.
Lifetime neighbourhood (Department for Communities & Local Government, UK) Harding (2007)	PE • Built environment • Housing • Social inclusion • Social cohesion and sense of place • Innovation and cross-sectoral planning SE • Services and amenities	The concept is underpinned by the principle of inclusive design, sustainability and participation. Similar to the lifetime home concept and the WHO (2007)'s concept, this concept focus on the neighbourhood with a number of key features to plan a sustainable community.
Positive ageing framework New Zealand Ministry of Social Development (2007)	PE • Housing • Transport • Access to facilities and services • Income • Employment • Opportunities • Health • Living in the community • Cultural identity SE • Attitudes	The concept is underpinned by the principle of inclusive design, sustainability and participation. Similar to the lifetime home concept and the WHO (2007)'s concept, this concept focus on the neighbourhood with a number of key features to plan a sustainable community.
Menec *et al.* (2011: 484)	PE • Outdoor Spaces and buildings • Transportation • Housing • Social participation • Respect and inclusion • Civic participation and employment • Communication and information • Community supports and health services SE	Menec *et al.* (2011: 484)'s concept is consistent with the WHO (2007)'s concept. However, this concept focused on the interaction between older adults and the environmental conditions (social connectivity) to advance age-friendly policy decisions. This concept argued that some of these domains proposed in previous concepts such as respect and inclusion (WHO, 2011) and safety (Alley *et al.* (2007: 7; Kihl et al., 2005) do not fit as an aspect of the environment but rather the outcome of implementing age-friendly interventions.

PE = Physical environment SE = Social environment

Table 6: AFCC implementation and development approaches

Theme	Sub-theme	Focus	References
Implementation	Top-down approach; Bottom-up approach; Mixed approach	Leadership Commitment Empowerment Citizen participation and governance	DeLaTorre and Neal (2017); Buffel and Phillipson (2016); Cho and Kim (2016); Kendig *et al.* (2014); Neal, DeLaTorre and Carder (2014); Fitzgerald and Caro (2014); Garon *et al.* (2014); Buffel *et al.* (2014); Alley *et al.* (2007); Beard and Montawi (2015); Green (2013); Del Barrio *et al.* (2018); Tompkins (2008); Miller, Harris and Ferguson (2007); Alidoust and Bosman (2016); Buffel *et al.* (2012); Austin *et al.* (2005); Chao and Huang (2016); Sun *et al.* (2017); Buffel, Phillipson and Scharf (2012); Greenfield and Mauldin (2017)
	Implementation of AFCC from a local perspective	Enabling local solutions Community-led and oriented Local government action Local ageing policy Local policy networks Local institutional framework	DeLaTorre and Neal (2017); Cho and Kim (2016); Kendig *et al.* (2014); Neal, DeLaTorre and Carder (2014); Garon *et al.* (2014); Buffel *et al.* (2014); Alley *et al.* (2007); Beard and Montawi (2015); Del Barrio *et al.* (2018); Tompkins (2008); Miller, Harris and Ferguson (2007); Hewson *et al.* (2018); Alidoust and Bosman (2016); Buffel *et al.* (2012); Austin *et al.* (2005); Chao and Huang (2016); Sun *et al.* (2017); Emlet and Moceri (2012); Joy (2018); Andrews (2008); Chodzko-Zajko and Schwingel (2009); McGarry and Morris (2011); Buffel, Phillipson and Scharf (2012)
	Collaborative partnership	Collaboration Interdependence Local partnerships An integrated and multidisciplinary approach	DeLaTorre and Neal (2017); Buffel and Phillipson (2016); Cho and Kim (2016); Collins, Wacker and Roberto (2013); Kendig *et al.* (2014); Neal, DeLaTorre and Carder (2014); Fitzgerald and Caro (2014); Garon *et al.* (2014); Buffel *et al.* (2014); Isaacson *et al.* (2015); Alley *et al.* (2007); Parekh *et al.* (2018); Beard and Montawi (2015); Moulaert and Garon (2015); Du and Xie (2015); Green (2013); Del Barrio *et al.* (2018); *Savio et al.* (2017); Lowe *et al.* (2015); Tompkins (2008); Miller, Harris and Ferguson (2007); Alidoust and Bosman (2016); Buffel *et al.* (2012); Austin *et al.* (2005); Chao and Huang (2016); Sun *et al.* (2017); Neville *et al.* (2016); McGarry and Morris (2011); Buffel, Phillipson and Scharf (2012)
Development	Design approach	Community and city accessibility Multigenerational community	Frau (2015); Maltz *et al.* (2014); Farrelly *et al.* (2014); Kerbler (2015); Rémillard-Boilard, Buffel and Phillipson (2017); Scharlach (2012)

	Modifying existing community
	Recycling spaces, places, buildings and materials
	Re-inhabitation
	Re-greening
	Redevelopment

Table 7: AFCC assessment methods

Author(s)	Study Aim	Assessment Method (Data Collection Method)	Participants
Hawkesworth *et al.*, 2018	To investigate associations between the built environment and physical activity among older people	Actigraph GT3x accelerometers	1433 adults aged 69–92 years
Liu, Kuo and Lin, 2018	To assess the perception of the older adults and service providers with regards to WHO (2007) AFCC domains	Qualitative method (Interview and focus group) Quantitative method (Questionnaire)	803 adults aged 55 years and older were recruited using a stratified sampling technique
Sun, Phillips and Wong, 2018	To examine older people's perceptions towards the urban environment and their spatial experiences through a person-environment perspective	Mixed-methods (Questionnaire and focus groups)	302 adults aged 65 years and older
Elsawahli, Ahmad and Ali, 2017	To explore the experience of older adults' active ageing as influenced by neighbourhood characteristics	Interview Thematic analysis	12 adults aged 60 years and older
Wong, Yu and Woo, 2017	To assess the perceived friendliness of neighbourhood environment on the self-rated health of older adults	Quantitative method (Structured questionnaire) Multiple logistics regressions	719 adults aged 60 years and older were recruited using stratified and quota sampling technique
Lee and Kim, 2017	To assess older adults' perception of age-friendliness	Quantitative method Uni and Bivariate Analyses	1000 adults aged 60 years and older were recruited using a stratified random sampling technique
Park and Lee, 2017	To examine the role of environment on the well-being of vulnerable older adults	Face-to-face interviews Multilevel regression models	1657 adults aged 65 years and older were recruited using stratified random sampling technique
Au *et al.*, 2017	To identify specific aspects of age-friendliness associated with life satisfaction and examine similarities and differences in age-friendliness and life satisfaction in young-old and old-old adults.	Structured questionnaire survey	682 adults aged 65 years and older were recruited using a convenience sampling technique
Fields *et al.*, 2016	To examine the role of churches in age-friendly cities	Focus groups and semi-structured interviews	60 adults aged 55 – 92 years
Chan *et al.* 2016	To assess the features of the housing environment that will facilitate ageing in place	Photovoice technique and Semi-structured interview	44 adults aged 55 years and older recruited using a purposive sampling technique
Menec *et al.*, 2016	To assess how important walking to amenities is to older adults	Qualitative method (Interview) Objective measurement using a pedometer	778 adults aged between 45-94 were using a purposive sampling technique
Johnson *et al.*, 2016	To analysis ratings of caregivers and noncaregivers on age-friendly features	Qualitative method (Interview)	397 caregivers and 1737 noncaregivers

		Quantitative method (Questionnaire)	
Namazi-Rad *et al.*, 2016	To estimate the level of satisfaction a person with a certain socio-economic profile would have when living in that location	A computer assisted telephone interviewing	503 surveys with population over 15 years of age
Orpana *et al.*, 2016	To develop indicators for the evaluation of age-friendly communities	Online questionnaire survey	191 respondents included stakeholders, including provincial and territorial representatives, municipal representatives, members of non-governmental organizations, researchers and project staff or volunteers on age-friendly projects.
Tsai, Chen and Ning, 2016	To assesses the walking space and the living path of elders	GPS location tracking function and in-depth in person interviews	22 elderly people
Van Dijk *et al.*, 2015	To assess the perception of older adults with regards to the comparative importance of the characteristics of AFCC	Q-methodology Qualitative method (Interview) Quantitative method (Questionnaire)	32 adults aged 70 years and older were recruited using a purposive sampling technique
Lowen *et al.*, 2015	To investigate which services are used and considered essential by older people themselves to support their wellbeing in their communities.	Qualitative research (focus groups and interviews)	
Wong *et al.*, 2015	To examine the differences in age-friendliness of different neighbourhoods	Structured questionnaire survey	801 adults aged 50 years and older
Novek and Menec, 2014	To assess older adults' perception of age-friendliness	Photovoice technique and Interview	30 adults aged between 54-81 years were recruited using word of mouth and poster advertisement
Bigonnesse, Beaulieu and Garon, 2014	To assess older adults' perception of their housing needs	Qualitative method (Focus group and case study) Thematic analysis	392 adults aged 65 years and older
Liddle *et al.* (2014)	To explore the age-friendliness of purpose-built retirement communities	Interviews and focus groups	Longitudinal study with residents and stakeholders
De Donder *et al.*, 2013	To assess how the perceived design of the environment can promote or hinder the feelings of unsafety among older adults.	Quantitative method (Questionnaire) Multiple regression analysis	25,980 adults aged 60 and older were recruited using random and stratified sampling techniques
Hanson and Emlet, 2006	To assess the friendliness of the community to older adults	Telephone survey	514 adults aged 65 years and older were randomly recruited

Table 8: General AFCC challenges and opportunities

Theme	Sub-theme	Focus	References
Challenges	Political	Administrative procedures Bureaucratic rules Uncertain political players Changes in policy interest Constrained opportunities for older adult participation in policymaking	Walker (2016); Kendig *et al.* (2014); Garon *et al.* (2014); Fitzgerald and Caro (2014); Aboderin, Kano and Owii (2017); Buffel *et al.* (2014)
	Financial	Economic austerity Poor economy Lack of support from government for ageing programs Economic insecurity among older adults Lack of affordable housing	Kendig *et al.* (2014); Buffel and Phillipson (2016); Jeste *et al.* (2016); Fitzgerald and Caro (2014); Aboderin, Kano and Owii (2017); Buffel, Phillipson and Scharf (2012); Novek and Menec (2014); Temelová and Slezáková (2014); Rémillard-Boilard, Buffel and Phillipson (2017); Buffel *et al.* (2014)
	Social	Unequal ageing Ageist attitudes Prejudice Stereotypes Social exclusion Passivity	Walker (2016); Jeste *et al.* (2016); Buffel *et al.* (2014); Isaacson *et al.* (2015); Rémillard-Boilard, Buffel and Phillipson (2017); Kadoya (2013); Buffel, Phillipson and Scharf (2012)
	Sustainability and Monitoring	Sustaining AFCC initiatives Monitoring Benchmarking Evaluation	Jeste *et al.* (2016); Fitzgerald and Caro (2014); Buffel *et al.* (2014); McGarry and Morris (2011)
	Physical barrier/ Environmental characteristics	Physical accessibility Transportation Characteristics of community change Privatisation of public space	Novek and Menec (2014); Temelová and Slezáková (2014); Aboderin, Kano and Owii (2017); McGarry and Morris (2011); Buffel and Phillipson (2016); Buffel, Phillipson and Scharf (2012)
Opportunities	New market	Development in technology and innovation New market and service approach New residential development	van Hoof *et al.* (2018); Fitzgerald and Caro (2014)
	Maximising resource	Accomplishment of AFCC on the basis of existing resource Potential to harness the knowledge and experience of older adults	Fitzgerald and Caro (2014); Isaacson *et al.* (2015); Buffel, Phillipson and Scharf (2012)
	All-inclusive	AFCC initiative benefits all ages Maintaining and extending social networks	Fitzgerald and Caro (2014); Rémillard-Boilard, Buffel and Phillipson (2017); McGarry and Morris (2011); Kadoya (2013)

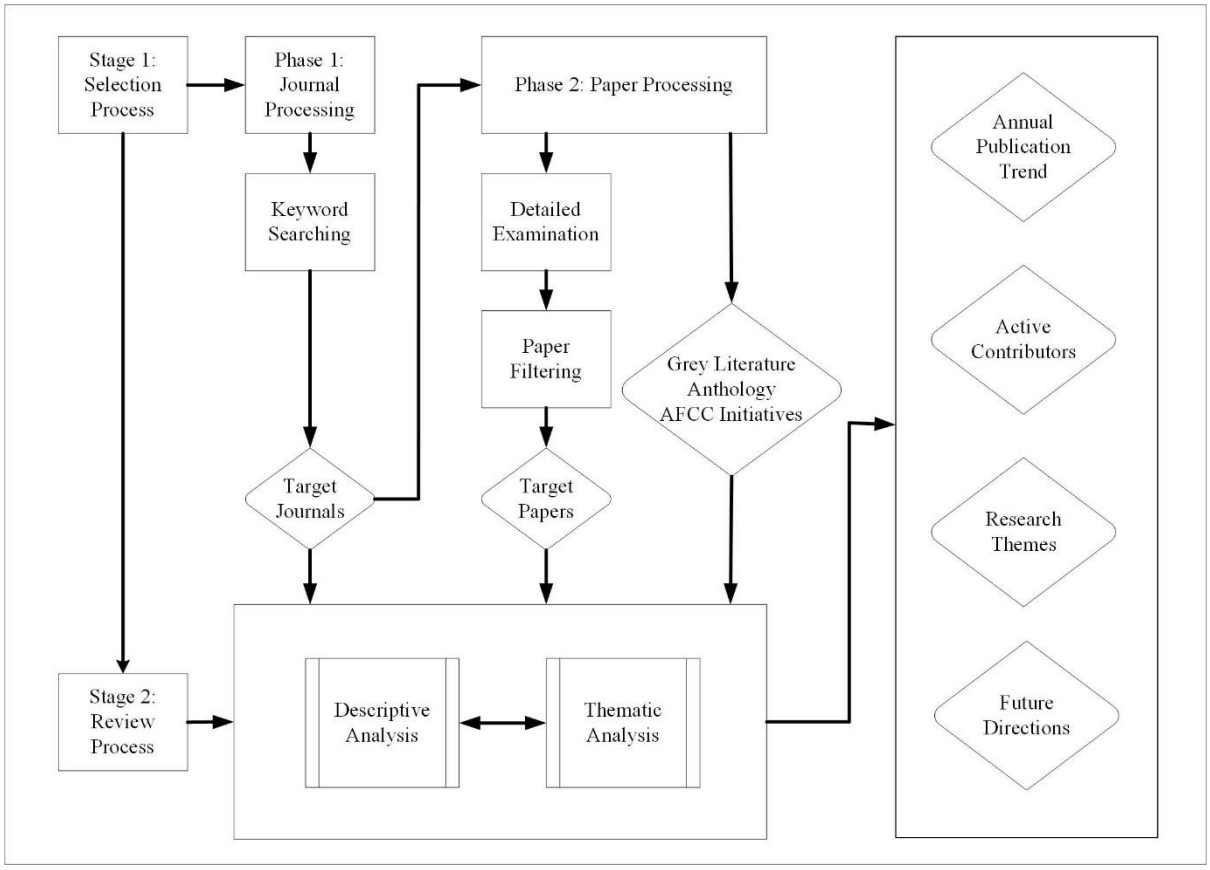

Figure 1: Two-stage analysis process

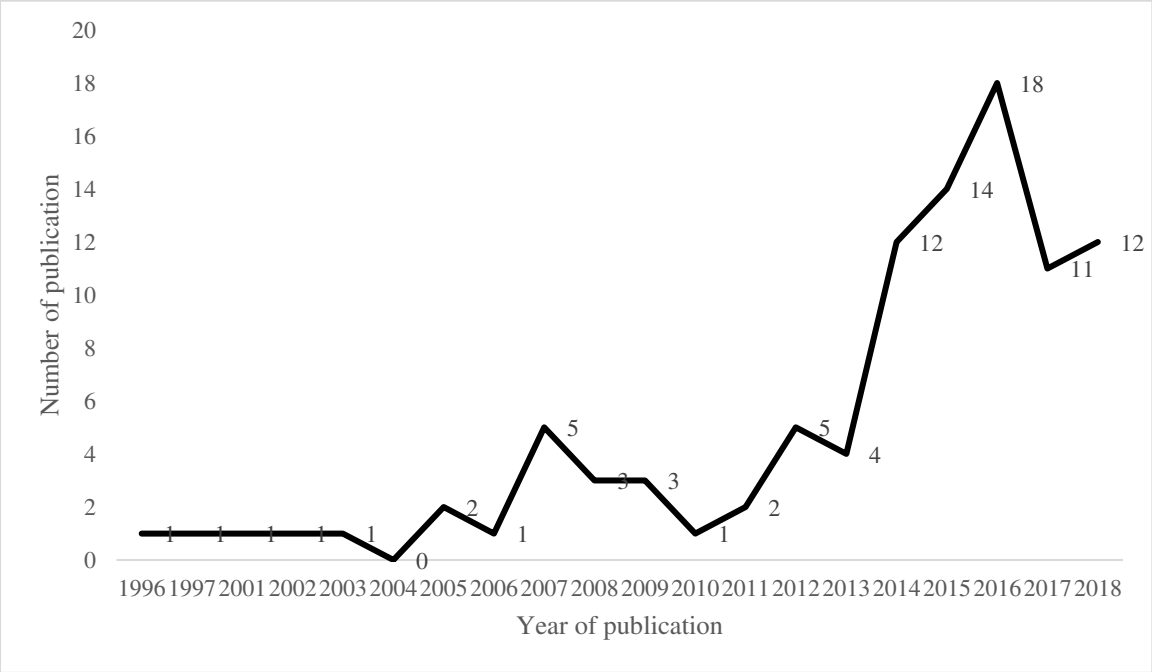

Figure 2: Annual publication trend of AFCC research

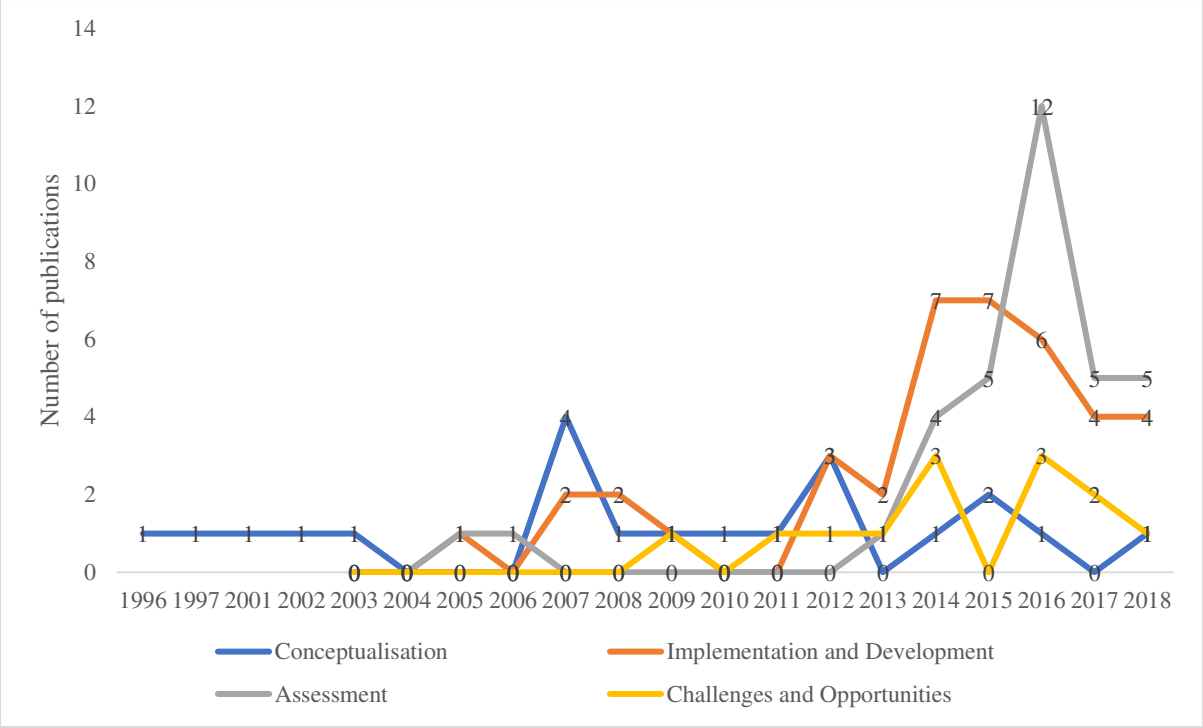

Figure 3: AFCC research theme trend

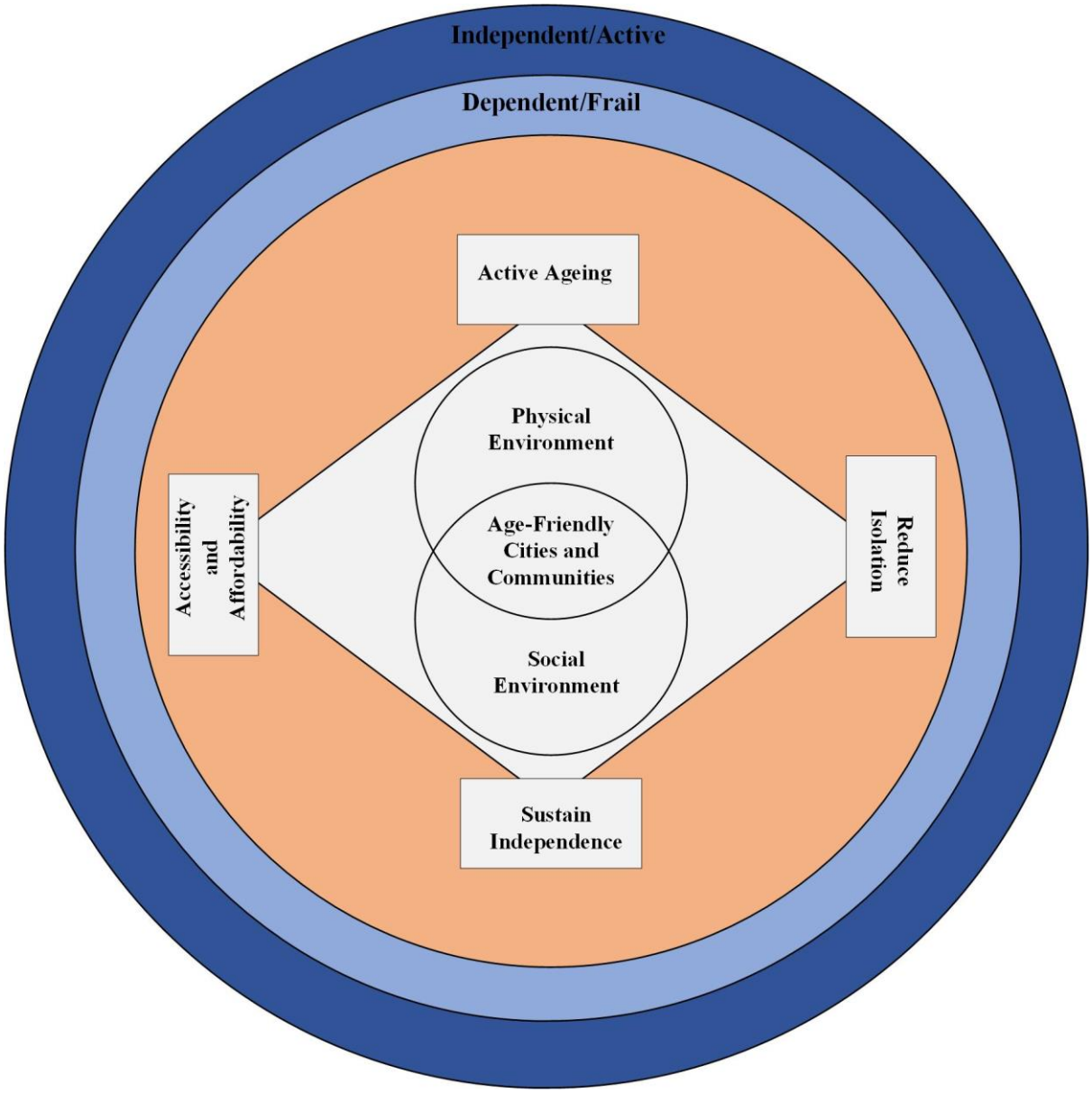

Figure 4: Commonality among AFCC concepts