

Supporting aging-in-place: Exploring older adults' housing needs and preferences, age-friendly principles, and adaptable housing options

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Executive Summary

In 2011, there were approximately 366,110 older adults (age 65 and above) living in private dwellings within Alberta. It is anticipated this number will rise to well over 400,000 over the next five years.¹ Closer to home, in 2015 there were nearly 120,000 Calgarians over the age of 65, accounting for ~10% of Calgary's population.² This number is expected to double to more than 280,000 older adults by the year 2042.²

To prepare for an aging population and support active aging, the World Health Organization (WHO) initiated a global engagement process that resulted in the creation of the Global Age-Friendly Cities Guide.³ This guide lays out an evidence-informed age-friendly framework for cities and smaller communities to consider and adapt to their particular circumstances. Priority policy and practice areas that address the needs of older adults were highlighted.³

The City of Calgary drew upon this work in creating its own Seniors Age-Friendly Strategy (SAFS). The SAFS is well-aligned with the Global Age-Friendly Cities Guide, but proposes action areas tailored for the City of Calgary that were identified through an extensive community engagement process and lays out a detailed implementation plan. Both the WHO and the SAFS prioritize housing as an area that must be addressed in creating an age-friendly city that promotes aging-in-place (i.e., living safely and independently in one's home and community for as long as possible). The City of Calgary is actively considering evidence-informed approaches to addressing the housing needs of its growing population of older adults.

The purpose of this project was to draw upon the published, peer-reviewed literature to obtain a better understanding of older adults' needs and preferences regarding housing, as well as delineating age-friendly principles for housing and approaches to adapting homes to better meet the needs of older adults. The intent of the review was to hopefully help inform municipal policy on aging-in-place.

Methods

A scoping review methodology was utilized.⁴ To identify relevant literature on the topic of interest, three different databases were searched by the author: Scopus, Environment Complete, and Urban Studies Abstracts. To ensure that literature included in the review was relevant for a policy perspective, the search sequence that was used was: (Seniors OR Older adults OR Older people OR Aging population OR Age-Friendly OR Aging-in-Place OR Aging OR Ageing OR Elder OR Elderly OR Aging-in-Community) **AND** (Housing OR Affordable housing OR Adaptable housing OR Housing adaptations OR Moving house OR Residential relocation OR Laneway housing OR Architecture OR Modifiable housing OR Housing Design OR Co-housing OR Home OR Independent Living OR Multigenerational housing Or Multigenerational living OR Multigenerational families OR Multigenerational dwelling OR Multigenerational homes OR Living arrangements OR Cross-generational housing) **AND** (Policy OR Policies OR Bylaw OR Inventory OR Supply OR Zoning OR Development OR Affordable OR Affordability OR Build).

There were 779 articles identified during the initial search process and four additional articles known to the investigators were also included, for a total of 783. Articles reporting on empirical findings relevant to our research questions and that were published in English language between January 2015 and July 2020 were included in the review. Of the initial 783 titles, 38 articles met our inclusion criteria. Data extraction and synthesis from these papers was informed by the interests of City of Calgary partners and stakeholders. For each of the three categories (older adults' housing needs and preferences, age-friendly design principles, and adaptable housing to support aging) recurring themes were identified to help structure and summarize the data extracted.

Findings

Older Adults' Housing Needs and Preferences - The four recurring themes identified were affordability, choice, the socio-demographic characteristics of the older adult, and social connection. Affordability, as a recurring theme, highlights the regularity with which a shortage of appropriate affordable housing prevents relocation. Having appropriate choices available was also an important and cross-cutting factor that shapes older adults' relocation trajectories. Studies underscored the extent to which the socio-demographic characteristics of older adults shaped housing needs and preferences, with age, marital status and other factors having an influence. Finally, a desire for social connection (which also relates to the built environment) and opportunities for social integration within communities as well as issues related to pet ownership were all important considerations for older persons when it comes to providing housing that supports aging-in-place.

Age-friendly Principles - The themes identified within this category were accessibility, support, and the built environment. Accessibility included different concepts in the design of housing and building principles that could improve the availability of living space for older adults. Examples that came up included having areas for social interaction, meaningful symbolic environments, functionality for care delivery, and physical accessibility. The theme of support focused primarily on technological features available for installation within homes, including unobtrusive (passive) sensors or web-based housing interventions. Within the built environment theme, neighbourhood features such as areas that promote social interaction and convenient access to services were crucial.

Adaptable Housing - Studies pointed to the need for additional services, supports, and resources for home modifications, particularly those of a greater scale than minor add-ins like grab bars in bathrooms. Specific adaptable features that older adults commonly consider in preparing their homes to support aging-in-place were also identified.

Key Recommendations

1. Further research into adaptable housing solutions that either integrate adaptable features into new builds or support post-hoc modifications is needed.
 - a. Affordability and other challenges with implementation are important constraints that require consideration.
 - b. A promising initiative is establishing a Web-based housing counsellor service to help older adults identify appropriate adaptation strategies and connect them with both funding (e.g., the provincial Residential Access Modification Program (RAMP) and Accessible Housing's RAD renovations funding program; see Appendix) and trusted tradespersons who are both familiar with home modifications and willing to take on small scale renovations and repairs.
2. Local community agencies (e.g., Kerby Centre, Carya, Calgary Seniors, and others) that assist lower income seniors in addressing housing needs should be involved in efforts to both identify housing needs and understand adaptation strategies.
3. The creation of cross-disciplinary teams is recommended, including housing providers who deliver affordable housing opportunities to older Calgarians, occupational therapists who can assess living spaces for safety and appropriateness, and animal welfare experts who can assist with improving pet accommodations for both housing providers and older adults who wish to live with a companion animal.
4. When homes are modified, their impact on issues such as the risk for falls should be considered to ensure that the modifications are appropriate and safe. See the Appendix of this report for an example of a home assessment tool used by Glenrose Rehabilitation Hospital.
5. The City offers a Seniors Services Home Maintenance program which requires applicants to meet criteria for eligibility to access funds from the provincial Special Needs Assistance (SNA) for Seniors benefit. Eligible low-income seniors receive \$1,226 annually through secondary benefits towards the cost of their housekeeping, snow and mow services. Minor home repairs are not covered under SNA benefit; however, we recommend that when feasible The City explore opportunities to leverage service providers who can deliver minor home repairs in its offering, such as minor adaptation installations like grab bars and door handles that help support older adults' needs as they age-in-place.

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Problem/Issue

In 2011, there were approximately 366,110 older adults (age 65 and above) living in private dwellings within Alberta. It is anticipated this number will rise to well over 400,000 over the next five years.¹ Closer to home, in 2015 there were nearly 120,000 Calgarians over the age of 65, accounting for ~10% of Calgary's population.² This number is expected to double to more than 280,000 older adults by the year 2042.²

Providing appropriate and adequate housing is fundamental to supporting aging-in-place (i.e., enabling older adults to live safely and independently in the community for as long as possible). In Calgary, as elsewhere around the world, the number of older adults (≥65 years) is expected to increase steadily over the coming years. Furthermore, age-friendly housing is a prominent issue within our city, since existing housing options may not be well-aligned with the needs of older adults. A lack of appropriate housing supply may lead to difficulties in matching older adults with housing that is readily available, appropriate for their health status, and affordable to them.

This challenge calls for flexibility in supporting older adults seeking to age-in-place. In order to address this and other related challenges, The City of Calgary implemented a Seniors Age-Friendly Strategy (SAFS) in 2015, which adapted the Age-Friendly framework introduced by the World Health Organization (WHO) in 2005³. As implementation has progressed, there is growing interest within City business units to better understand the housing needs of Calgary's aging population. Current housing stock, if mis-aligned with the diverse needs of Calgary's older adults, risks disrupting the desire for positive aging-in-place experiences. Barriers to ensuring there is housing that supports aging-in-place include accessibility, affordability, insufficient options, and lack of support for locating appropriate housing options or adapting one's current home to better meet changing needs.

This report contributes to reshaping Calgary's housing approach by drawing upon scoping review methodology⁴ to identify and critically summarize recent peer-reviewed literature relevant to the provision of housing that aligns with age-friendly principles. A number of tentative evidence-based recommendations on ways that The City could better meet the housing needs and preferences of older adults in Calgary are made.

Issues surrounding aging-in-place for older adults extend well beyond Calgary. The research presented in this report includes work from various regions of the world, including the Nordic countries, Hong Kong and South Korea. This global perspective is captured by the WHO Global Age-Friendly Cities guide that we refer to frequently in this report.³ Adopting a global lens may both introduce novel approaches into the Calgary context, while also extending the applicability of this report to settings beyond Calgary and Canada. Furthermore, this approach reaffirms that aging-in-place as both a policy orientation and a preference of older adults is widely adopted and promoted.

Background

Article 25 of the Universal Declaration of Human Rights states that housing is a basic human right that must be addressed in allowing individuals to achieve an adequate standard of living.⁵ Access to proper housing plays a critical role in sustaining the health and wellbeing of any individual, throughout the life course. Housing is considered to be a social determinant of health due to its role in perpetuating vulnerability and health inequities, and the aging population may be especially susceptible to these impacts due to reduced income and changing needs.¹

A recent review of housing as a determinant of health equity suggests four key considerations: cost (affordability of the housing), conditions (overall quality of the housing), consistency (residential stability), and context (neighbourhood opportunity).⁶ All four of these areas are integral to understanding the complex role housing plays as a social determinant of health that reflects structural inequalities. When there is underlying structural inequality within socioeconomic class, it can result in limited housing stock, or areas with an increased density of marginalized and unequal distribution of resources (neighbourhood segregation), as well as fewer opportunities to amass financial resources.⁷ These structurally-contingent inequalities can then lead to patterned increases in chronic stress and diminished access to resources to improve health status, as well as poor health behaviors.⁶ Similarly, the lack of housing stock that meets the current needs of older adults renders them vulnerable to becoming stuck living in housing that is inappropriate. This situation represents a barrier to achieving age-friendly goals around housing provision, while also having deleterious impacts on the health and well-being of many older adults.

The WHO outlined the Global Age-Friendly Cities Guide in order to identify priority areas thought to support at a structural level the aging population's needs and preferences, and housing was one of the areas that guide highlighted.³ Specifically, housing affordability and varied financial situations depending on geographical region, as well as housing design and adaptive strategies are highlighted as key considerations.³ The guide also raises the need for providing housing options and ensuring community integration. Further, the guide reaffirms the important role that the living environment, both in terms of home and neighbourhood, plays in creating a sense of safety and security for older persons.³

The City of Calgary's Seniors Age-Friendly Strategy was developed in 2015 after facilitating a number of focus groups with 137 seniors and caregivers; a telephone survey completed by 500 Calgarians; and hosting several strategic planning sessions with stakeholders representing the seniors-serving sector, healthcare, and academia.² This strategy, like the WHO guide, prioritizes housing as a key area of focus and iterates the need for the City to offer an accessible and affordable range of housing options available that are also situated near the services that are needed by older adults, as they age in their homes and communities.²

Both of these documents highlight the importance of aging-in-place. The term “aging-in-place” describes both the older adult preference and policy strategies to enable older adults to live independently and safely in their homes and neighbourhoods for as long as possible as they age. The terminology particularly refers to the professional and policy standpoints on keeping older adults out of any institutions⁸, given that few older adults use this term to describe their preference to stay at home for as long as possible. Aging-in-place may also involve moving into alternative independent housing, as well as adapting the current home to meet changing needs³. There are many financial barriers to aging-in-place, including both costs of relocation and costs of adaptation, in addition to home maintenance.⁸ However, beyond the financial aspect, the degree of autonomy and control older adults feel in the decision-making process also heavily influences the decision to relocate in order to achieve aging-in-place.⁸

Because of the complex and often interacting factors involved in housing needs, preferences, and provisions, this study focuses on three specific areas of interest that were identified by City of Calgary representatives. These areas of focus are (i) older adults’ housing needs and preferences, (ii) age-friendly housing principles, and (ii) adaptable housing, and current published literature was reviewed to identify recurring themes within each of these categories.

Methods

To address the research objective described above, a scoping review approach was followed.⁴ This approach allowed the researchers to summarize current research findings in order to attain a deeper understanding of the range and nature of relevant research that has been conducted to date.⁴ Although there are similarities between scoping and systematic reviews, scoping reviews look at broader topics that include a range of study designs, with the focus area being adjusted iteratively as familiarity with the literature increases. Systematic reviews focus on a very specific topic defined *a priori* from start to finish, may exclude literature based on methodological considerations, and consider the ranking the quality of evidence of studies reviewed within any conclusions that are drawn.⁴

In the beginning stages of the research process, The City of Calgary’s Age-Friendly team was consulted to identify key categories and topics of interest which were distilled into three broad categories: age-friendly housing principles, older adults’ housing needs and preferences and adaptable housing.

A research librarian from the University of Calgary was consulted to assist with a developing a robust search strategy, including identification of appropriate databases. To ensure an interdisciplinary approach, the three databases selected were Scopus, Environment Complete, and Urban Design Abstracts, which together catalogue literature from a wide range of disciplines including life sciences, social sciences, physical sciences, health sciences, public policy, social impacts, urban planning, community development, and urban design.

To ensure that literature included in the review was relevant for a policy perspective, the search sequence that was used was: (Seniors OR Older adults OR Older people OR Aging population OR Age-Friendly OR Aging-in-Place OR Aging OR Ageing OR Elder OR Elderly OR Aging-in-Community) **AND** (Housing OR Affordable housing OR Adaptable housing OR Housing adaptations OR Moving house OR Residential relocation OR Laneway housing OR Architecture OR Modifiable housing OR Housing Design OR Co-housing OR Home OR Independent Living OR Multigenerational housing Or Multigenerational living OR Multigenerational families OR Multigenerational dwelling OR Multigenerational homes OR Living arrangements OR Cross-generational housing) **AND** (Policy OR Policies OR Bylaw OR Inventory OR Supply OR Zoning OR Development OR Affordable OR Affordability OR Build).

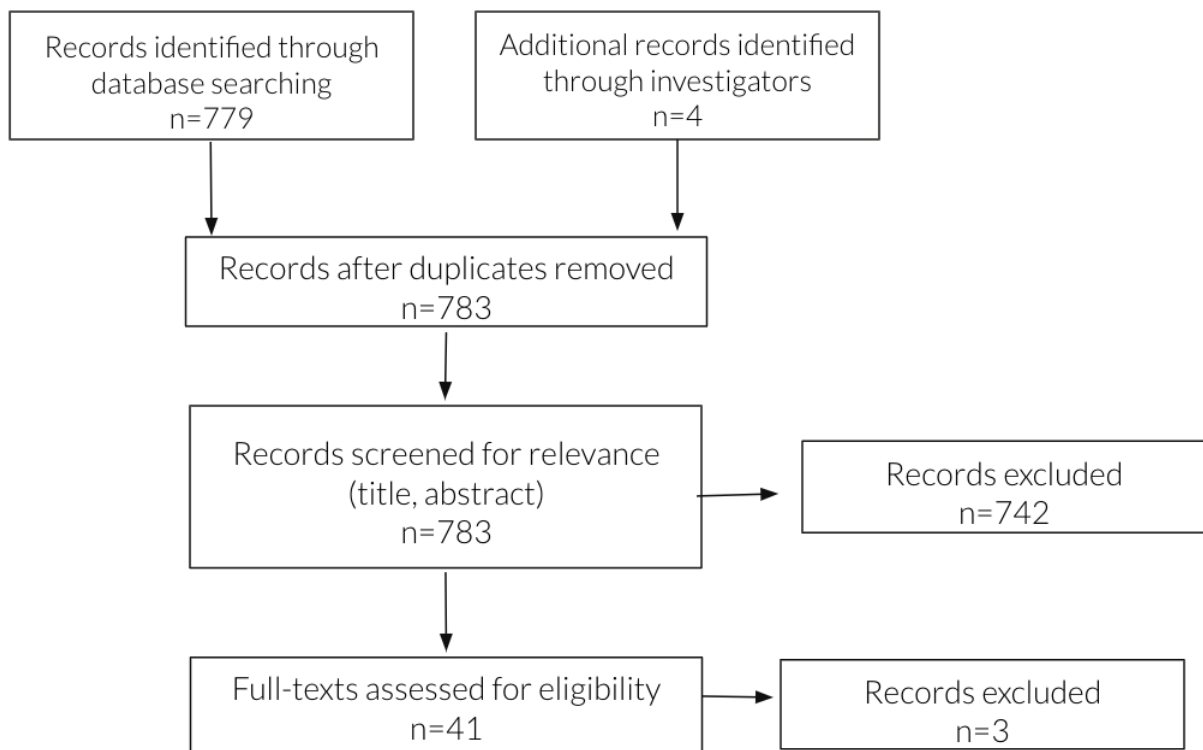


Figure 1. PRISMA model

This PRISMA model depicted in Figure 1 illustrates the process of selecting articles. Only articles reporting on empirical findings that were published in English language between January 2015 and July 2020 were included in the review. No duplicates were found or removed. In total, 779 records found from the three databased searched, and 4 additional papers were identified through the investigators' familiarity with the topic. After screening the titles and abstracts of all articles, 742 articles were excluded. The full text of the remaining 44 articles was read by the author and three additional articles were excluded. Decisions around exclusion were confirmed by a co-supervisor. All 38 papers included were peer-reviewed and there was a mix of both qualitative and quantitative literature with a ranging from different geographical regions. Three of the

papers included were from Canada, with data from Kelowna, Nova Scotia and Nunavut represented in these studies.

A data extraction tool was created to distill the title, year, and author of each article, the source and/or database the paper was retrieved from, the research setting, a summary of key findings, methods, and socio-demographic information, including accessibility needs, marital status/household composition, age, income, ethnicity, and education. When available, descriptions of the study population’s mobility, the built environment, and any theoretical frameworks was also collected. Findings were summarized and organized by relevance to the three key categories of interest and synthesized into key themes. Themes were identified based on the frequency with which they recurred within and between studies.

Key Findings

Table 1. Number of articles contributing data to each thematic area.

Categories	Key Themes	Total number of articles*
Older Adults’ Needs and Preferences	Affordability (n=4) Choice (n=5) Individual socio-demographics (n=9) Social Connection (n=5)	n=23
Age-Friendly Principles	Accessibility (n=4) Support (n=5) Built environment (n=2)	n=11
Adaptable Housing	Need for additional resources and services (n=4) Adaptable features(n=2)	n=6

*Note: Some articles contributed to multiple themes

Table 1 captures key themes identified within each category, and lists the numbers of articles containing thematic content. The theme recurring most frequently was “characteristics of older adults” (n=9) and how these influence housing needs and preferences. The themes with the fewest articles were “adaptable features” (n=2) and “built environment” as related to housing (n=2).

Older Adults’ Needs and Preferences

The first category of interest was the housing needs and preferences of older adults. This category reflects individual needs and preferences, while other categories (i.e., Age-Friendly Principles) relate to population-level considerations around housing to support aging-in-place. The four main themes that recurred in relation to housing were affordability (n=4), choice (n=5), the influence of socio-demographic characteristics on

housing needs (n=9), and social connection (n=5). In total, this thematic category was captured in a majority of articles (n=23).

Affordability

Affordability and the ability to financially manage maintenance and repairs is one of the top barriers to relocation for older adults.²⁰ In a study of aging-in-place set in Kelowna, B.C., older adults 75 years and above were more likely to downsize and relocate from a single family dwelling to an apartment in order to reduce costs and maintenance.²¹ One-quarter of homeowners and two-thirds of the renters in Kelowna mentioned that they were paying more than 30% of their household income on housing, which indicates housing insecurity.²¹ The review also suggested that many older adults struggle to find and maintain affordable and stable housing that can adapt to their changing needs, which is a factor that may contribute to an increased the number of unnecessary nursing home admissions.²² Older adults reporting housing cost burden and who are renters were the most likely to move to a nursing home due to housing affordability.²² Other factors such as self-rated health were weaker predictors of moving, meaning that affordability may play a great role in the decision-making process.²² Older adults of lower income are also more likely to perceive their housing as lower quality, and neighbourhoods as less safe.²³

Choice

The degree of choice older adults feel they have in the moving process also arose in our review. Older renters have fewer opportunities to make proactive choices regarding the decision to move to a new house, and thus are more likely to suffer from negative consequences of inappropriate housing.²⁴ However, for those older adults who are anticipating the moving process with a sense of control, older adults feel a greater sense of choice and also have a better moving experience.²⁴ Such circumstances are advantageous for older adults, and often lead to improved housing suitability.²⁴ Moving is an unsettling experience, especially when older adults feel like they lack control over the decision to move. This is especially true for individuals who require care due to a disability.^{25, 26} Older women of low income who had to move due to a divorce or forms of abuse described the limited control they felt in their decision to relocate, which made the moving process particularly unsettling.²⁷ Overall, choice and adequate preparation for a move play a large role in positive housing mobility for individuals.

Individual socio-demographic characteristics

Different socio-demographic characteristics of older adults such as ethnicity, age, marital status, and others influence their housing needs and preferences. As an example, older First Nations peoples indicate that familial ties, adequate housing conditions, positive community conditions, and being on their own land were the most important factors in relation to housing.²⁸ Additionally, spending time with children and grandchildren acted as a form of social support for aging-in-place.²⁸ For the elders, having adequate housing meant not requiring major adjustments, feeling safe, having space to enjoy quality time with family, feeling “at home”, and being located close to both services and the land.²⁸ Adequate housing was especially important for Inuit

elders who suffered from decreased mobility, activity limitations, or from chronic diseases, and needed material support to address their health conditions, with examples being ramps or bathroom adaptations.²⁸

African Americans, who face systemic discrimination within the American labour market,²⁹ are also an especially vulnerable group. Older African American adults were also more likely to have age-related difficulties and live in older housing stock that could not be modified.²⁹

Older women of lower income stressed the importance of having access to safe and supportive spaces for their wellbeing, while also having space to socialize with family and friends.²⁷

Other characteristics like age and marital status were relevant to the likelihood of downsizing or deciding to rent in order to reduce costs and maintenance.^{11, 30, 31} A study from Poland found a marked difference between the housing preferences of pre-seniors and those of seniors.³² Older adults aged 50-59 years preferred a location in the city center, whereas pre-seniors aged 60-69 years preferred residential units designed specifically for seniors that also provided additional services (e.g., medical and rehabilitative services, catering and grocery delivery, cultural services, and others).³² Older persons aged 70 and above indicated that they wanted to modify their current home to meet their needs.³² Similarly, older adults in Australia also preferred to move at a younger age, and became more attached to their home as they continued to age.³³ Older adults also noted the importance of features like having access to elevators and being located close to nature.³⁴

Social connection

Social connection was frequently mentioned in relation to housing needs and preferences. As a novel example, pet ownership appeared as a barrier to finding alternative housing.²⁷ A pet companion acts as a support mechanism for older women, yet there are frequently rental restrictions on pet ownership, which limits housing options available for older adults with pets.²⁷ Older adults also view characteristics of the built environment as promoting social connection, in relation to developing social contacts in the neighbourhood and engaging in recreational activities.¹¹

As people age, there is a greater need for shared facilities that enable social interaction among older adults, thus helping to build and sustain social networks.¹¹ For regions lacking support for older adults, community initiatives have proven to be increasingly important.³⁵ Furthermore, social support and connection were found to be much more important factors linked to well-being in later life, when older adults seek closer ties to immediate family and support networks.³⁰ Many older adults indicated that they would not relocate if moving diminished the amount of support they would receive from family members.³⁰ At the same time, the introduction of smart technologies into homes can allow older adults to remain connected with family and friends as a means of maintaining levels of social support.¹³

Age-Friendly Principles

The age-friendly principles section focuses on that allow older adults to age-in-place, thus offering a top-down perspective. Key themes identified within this category were accessibility (n=4), support (n=5) and the built environment (n=2).

Accessibility

In the papers we reviewed, accessibility issues focused on design features that help promote independence and quality of life by addressing accessibility within the home for older adults experiencing advancing cognitive or physical limitations. Importantly, the concept of accessibility must be broadened beyond the traditional focus on physical features, to also consider social and psychological needs.⁹ Along these lines, one notable housing design feature to consider is access to privacy, in situations when care needs demand a shift into a residential facility. Specifically, residences should offer older adults a private bedroom connected directly to a bathroom.⁹ Areas for social interaction and spare bedrooms for accommodating guests should also be available.⁹ For older adults who need to relocate, the “symbolic environment” is crucial in making somewhere new feel like a home.⁹ A home-like environment can be created by providing space for self-expression, where residents’ own belongings can be introduced to create a sense of place, while physical accessibility that allows for ease of movement enables a sense of autonomy and control.⁹ Features enabling residence-wide mobility include locating toilets on the ground floor, building wider halls and doorways, providing enough circulation space for people that need wheelchairs, and installing railings in bathrooms.⁹

For older adults who experience hearing impairments, which may affect upwards of 60% of older adults, there are a number design features that can increase accessibility. For example, introducing signal devices that use lighting techniques to notify home residents when someone rings the doorbell or enters the home, and ensuring that rooms have adequate lighting to enable lip-reading.¹⁰ Low ceilings for social activity spaces are also recommended to absorb sound and reduce excess acoustic noise.¹⁰ Having access to a balcony or terrace and a garden are also desirable features to promote well-being of older adults.¹¹ While indoor home accessibility issues were often associated with the decision to relocate within the community, these considerations alone did not lead to the decision to move to a care facility.¹²

Support

The next theme was support through technology, and also by different housing models such as cohousing and multigenerational housing. Technologies of unobtrusive sensors can be applied around the home, which would allow health care services and providers to evaluate the older adults’ activities through the day.¹³ Additionally, it would allow family members or else health care providers to obtain data without getting the way of their daily routine.¹³ However, it is important that any form of technology use within the home is co-designed along with the seniors in order to provide a degree of autonomy and control.¹³ Engaging in a co-design process will also provide a better

understanding of their needs and increase their acceptance of any form of technology within the home.¹³ Web-based housing counselling interventions is another way of supporting older adults with an overview of existing services that can provide a means of support.¹⁴ Again, it is important that these services are human centered in order to improve the fit between the older adult and the living environment.¹⁴ One of the main reasons why seniors decide to age-in-place is due to their desire to remain independent and have a sense of control over their own space.¹⁵ Therefore, it is important for any form of technological support to be unobtrusive and co-designed alongside seniors.

Another form of support for seniors is their living arrangement. Although most seniors prefer to live on their own, some do enjoy being in the presence of others by cohousing or multigenerational housing. Cohousing allows seniors to live privately, yet still provides a sense of community by the clustering of homes.¹⁶ One study showed that overall, seniors were generally satisfied with the sense of community and support that cohousing provided them as cohousing reduced the level of loneliness they felt prior to moving.¹⁶ A survey conducted in Slovenia with older adults over the age of 50 looked at their attitudes towards different housing options.¹⁷ Living in multigenerational housing or in a household group were seen as the most acceptable.¹⁷ Multigenerational housing doesn't just provide financial and emotional support to the seniors, but it can also help support other family members such as socially disengaged youth.¹⁸

Built environment

The built environment is also another age-friendly principle that seniors often consider when making the decision to relocate.⁸ The built environment is a concept that encapsulates the surrounding community and the services that are provided, as considerations for location of supportive housing. Several important features needed to create a supportive built environment have been identified. For instance, older adults tend to frequent quieter areas of cities, with less traffic and rush, pointing to the value of traffic calming measures to promote access.¹⁹ Public facilities like transit stations, grocery stores, and other key services should consider reduced mobility, for instance with appropriate stairways, wide aisles and hallways, and few physical features that require special navigation to cross or avoid.¹⁹ Secure parking for mobility scooters at key services has also been identified as helpful, both within housing facilities and public spaces frequented by older adults. To ensure a sense of security, lighting and security cameras in public areas frequented by older adults at night, such as concert halls and theatres, are needed.¹⁹ Outdoor benches designed to include a back are needed to support older adults' needs.¹⁹ Pavement should be even-surfaced and dropped kerb cuts provided to accommodate an increasing number of scooters and wheelchairs.¹⁹ Greater integration of evolving technology into built environment features is recommended as a future pursuit.¹⁹

Adaptable Housing

Few articles in our review discussed adaptable housing. The two themes we identified were the need for additional services and resources (n=4) as well as specific adaptable features in a home (n=2).

Resources and services

Being able to provide accessible housing within the community is one means of redressing the unnecessary or prohibitive costs associated with moving house.¹⁵ Many older adults are not fully aware of the housing options available to them. This points to an unmet need for additional support and services for older adults in relation to the housing process. Older adults residing in Kelowna suggested a database that provided a listing of affordable and accessible housing for seniors would be useful, especially for those with lower income.²¹ Lower income older persons require financial and other types of assistance in order to maintain or modify homes they own or rent, and there is a need for a database that can help older adults navigate both the moving process and the home adaptation process.²¹ Adaptable housing options would be beneficial to consider prior to making a decision to move. Supports could include a step-by-step manual describing how to hire contractors.³⁶ Web-based housing counselling interventions are also being utilized to help support seniors with the process of moving and providing adaptable housing options.¹⁴

Adaptable features

Home modifications with accessible design features may be helpful to support aging-in-place as they may delay institutionalization by up to 10 years and may also reduce unnecessary housing costs.^{15, 37} Consideration for universal design features is one strategy that is recommended so that a home will be more easily adapted as people age over time.³⁸ It is important that home modifications can be individualized to meet different needs.³⁷ Straight-forward modifications to the home include allowing space for wheelchairs, placing a bench or ledge near the main entry to the home, installing a non-slip floor, installing lever-style door handles and faucets, installing removable lower cupboards, placing features like appliances and switches within easy reach, installing adjustable-height counters, placing a bathroom on the ground floor of multi-level homes, providing a step-in tub, ensuring that the showerhead is adjustable and temperature controls accessible, and installing grab bars in bathrooms.³⁸ Modifying a home can improve accessibility, and safety by preventing falls while also dependence on caregivers.³⁷ To enhance the effectiveness of home modifications, complementary strategies like fall prevention programs should also be available.³⁷ Barriers to housing adaptations that older persons face, such as costs and engaging with tradespeople, should also be considered,³⁷ as discussed above.

Discussion

It is evident that the need for housing to support aging-in-place is recognized in regions all around the world. In Calgary, like elsewhere, there is an interest in trying to improve housing options for older adults. Given the three overarching topics of interest identified by the Age-Friendly team, multiple themes that appeared in the published literature really help to convey the complexities and factors associated with the housing required to support successful aging.

The first category was older adults' housing needs and preferences. Within this topic, four themes were identified: affordability, choice, characteristics of older adults, and social connection. Adapting one's home has been shown to reduce unnecessary housing costs and nursing home admissions for seniors.³¹ However, many older adults struggle to secure affordable housing that can adapt to their needs and thus are left to downsize to congregate living facilities.¹⁶ Having choices available and being able to participate in the decision-making process was also a recurring theme. It is crucial that older adults are able to make proactive choices and are prepared for the moving process to increase housing suitability.¹⁹ Specific sociodemographic groups whose voices are often missing from public processes, such as First Nations peoples, older women with low income, and African Americans, have particular housing needs that must be considered, and housing preferences also shift as age increases. The final recurring theme was the importance of social connection in relation to one's home, with a focus on the importance of the built environment and opportunities to keep pets. Pet restrictions in rental homes is an underexplored housing barrier for older adults who rely on the emotional support of their pet companions.²²

The second category of this review were published findings that engaged with age-friendly principles. These themes encompassed higher-level factors that enable aging-in-place. Accessibility was the first theme which emphasised the importance of both the physical and symbolic environment created within housing offerings, and the ways these both promote accessibility.⁴ Emerging areas of support for aging-in-place were also mentioned, including technology as well as alternative living arrangements such as cohousing and multigenerational housing. Technology such as unobtrusive sensors that detect measures or motions linked to well-being, smart technologies, and web-based housing counselling services were included.^{8,9,10} Cohousing and multigenerational housing were found to support older adults' emotional well-being.^{11,13}

The final theme for this topic described the importance of the built environment as a factor that is linked to supportive housing. This theme described features that help create a well-balanced built environment, which then allows for social integration of older adults who are aging-in-place. Supportive built environments may help to improve social connection and reduce the levels of loneliness that older persons often feel.¹⁴ Many older adults consider quality of the built environment as well as the surrounding services and resources in the community before making the decision to move. Older women in particular value having opportunities to contribute to the community.²² However, it was one of the themes with the least number of articles that

covered the topic. This is likely because the built environment is not always directly linked to housing, or the housing of older individuals. However, it is important that housing needs are understood in the context of the built environment, given the important role that the surrounding community plays in supporting successful aging.

The final category of interest was adaptable housing, and two themes were identified within this category: adaptable features and supportive housing services or resources. There is a notable need for more support for older adults whose housing needs shift as they age-in-place, and many would benefit greatly from accessible resources that outline more information on adaptable housing options, opportunities for making supportive home modifications, and trusted contractors available to assist with installations and renovations. Current databases listing all available and affordable housing options were also recommended.¹⁶ Although more information is needed on adaptable housing models, our search did not identify any articles that covered information on such adaptable housing models as flex housing, secondary suites, grow homes, or lifetime homes. This may reflect a dearth of research on a relatively new view of adaptable housing models as a gateway to aging-in-place.

Strengths

A strength of this study was the scoping review methodology employed. This allowed our search to cover a wide range of literature with different study designs, to understand the complex and multi-faceted nature of housing for older adults. Partners and stakeholders from The City of Calgary were very involved in the research process and provided guidance based on the City's interests and scope. Another strength of this review was the multidisciplinary nature of the literature included. Together the three databases searched covered a wide range of topics that are relevant to housing that supports aging-in-place, such as life sciences, social sciences, physical sciences, health sciences, public policy, social impacts, urban planning, community development, and urban design.

Limitations

A limitation of this paper was the relative scarce amount of literature available that covered housing and aging-in-place for seniors within the timeframe we used. To further explore literature related to the topic of housing to support aging-in-place, a more expansive set of search terms and a wider time range may be beneficial. Furthermore, consideration of grey literature would likely provide further insights into topics like adaptable housing models and home modifications. A deeper focus on health-related literature may also have revealed more information on links between housing situations and health outcomes for older persons who are aging-in-place. Finally, many of the articles reviewed did not offer clear, effective solutions, though many offered evidence-informed recommendations around ways to approach housing that supports aging-in-place.

Recommendations

As this review found few studies on the availability and efficacy of adaptable housing solutions, we recommend that The City of Calgary continues to seek resources, and potentially collaborate with the University of Calgary for another summer research project focusing purely on adaptable housing models that can look more into grey literature available. Further research into adaptable housing solutions and ways to either integrate adaptable features into new builds or else support post-hoc adaptations is needed, both in terms of affordability and implementation.

1. Further research into adaptable housing solutions that either integrate adaptable features into new builds or support post-hoc modifications is needed.
 - a. Affordability and other challenges with implementation are important constraints that require consideration.
 - b. A promising initiative is establishing a Web-based housing counsellor service to help older adults identify appropriate adaptation strategies and connect them with both funding (e.g., the provincial Residential Access Modification Program (RAMP) and Accessible Housing's RAD renovations funding program; see Appendix) and trusted tradespersons who are both familiar with home modifications and willing to take on small scale renovations and repairs.
2. Local community agencies (e.g., Kerby Centre, Carya, Calgary Seniors, and others) that assist lower income seniors in addressing housing needs should be involved in efforts to both identify housing needs and understand adaptation strategies.
3. The creation of cross-disciplinary teams is recommended, including housing providers who deliver affordable housing opportunities to older Calgarians, occupational therapists who can assess living spaces for safety and appropriateness, and animal welfare experts who can assist with improving pet accommodations for both housing providers and older adults who wish to live with a companion animal.
4. When homes are modified, their impact on issues such as the risk for falls should be considered to ensure that the modifications are appropriate and safe. See the Appendix of this report for an example of a home assessment tool used by Glenrose Rehabilitation Hospital.
5. The City offers a Seniors Services Home Maintenance program which requires applicants to meet criteria for eligibility to access funds from the provincial Special Needs Assistance (SNA) for Seniors benefit. Eligible low-income seniors receive \$1,226 annually through secondary benefits towards the cost of their housekeeping, snow and mow services. Minor home repairs are not covered under SNA benefit; however, we recommend that when feasible The City explore opportunities to leverage service providers who can deliver minor home repairs in its offering, such as minor adaptation installations like grab bars and door handles that help support older adults' needs as they age-in-place.

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Appendix

i. Ramp link

<https://www.alberta.ca/residential-access-modification-program.aspx>

ii. RAD Renovations link

<http://accessiblehousing.ca/radrenos/apply/>

iii. Occupational Therapist Home Assessment Form

The form that appears on the following pages is primarily used to evaluate mobility and safety.



Home Assessment

Diagnosis: _____ Date of Visit: _____

Persons Present: _____

Address: _____

Mode of Ambulation/Mobility: _____

Household Members/Available Help: _____

SURROUNDING ENVIRONMENT:

Terrain: _____

Sidewalks: _____

Community Access: _____

Transportation used: _____

Vehicle Access: - building
 - parking location

TYPE OF HOME

Apartment: Floor _____ Elevator _____ Stairs _____

 Walk-up _____ Highrise _____

House: Owned _____ Rented _____

 One/two storey _____

Garage: Attached _____ Detached _____

 Manual door _____ Electric door _____ Other _____

COMMENTS/RECOMMENDATIONS:

(Patient Name, Date of Birth and Patient Number)

Page 2

HOME ENTRY:

APARTMENT/HOUSE:

Landing: Front - width _____ depth _____ surface _____
Back - width _____ depth _____ surface _____

Total elevation from ground level to landing:

Front _____ Back _____

Stairs: Front - number _____ depth _____ rise _____ railings _____
Back - number _____ depth _____ rise _____ railings _____

Threshold: Front - height _____ depth _____
Back - height _____ depth _____

Door Openings:

Front - Outer Door - in/outward, width _____
- Inner Door - in/outward, width _____
Back - Outer Door - in/outward, width _____
- Inner Door - in/outward, width _____

Door handle/Lock:

Front _____
Back _____

House: Foyer _____
Corridors (flooring/width) _____
Stairs - number _____ depth _____ rise _____ railings _____
Landings _____

Apartment: Vestibule - width _____ depth _____
Intercom (type/height) _____
Elevator (access/controls) _____
Corridor (flooring/width) _____
Will management modify? _____
Balcony/Deck: _____

COMMENTS/RECOMMENDATIONS:

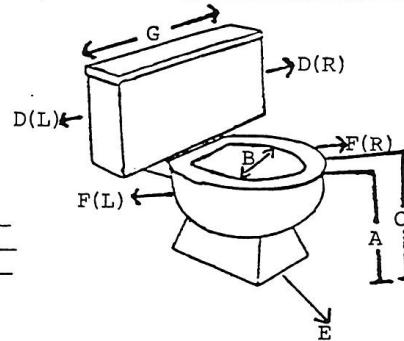
Home Assessment

BATHROOM ASSESSMENT

Location _____
 Door type: sliding _____ swing in/out _____
 Width of door _____
 Open/close door _____
 Light/fan switch (height/type) _____
 Wash basin access, type _____
 Drainpipe insulated? _____
 Countertop (height/dimensions) _____
 Mirror _____
 Taps _____
 Medicine cabinet/storage space _____
 Electrical outlet _____
 Flooring _____

TOILET

A) Height - floor to top of toilet bowl _____
 B) Width of toilet bowl inside rim _____
 C) Height - floor to top of toilet seat _____
 D) Clear space from toilet tank (L) _____ (R) _____
 E) Clear space in front of toilet _____
 F) Clear space at side of toilet (L) _____ (R) _____
 G) Width of toilet tank _____
 Toilet paper dispenser location: _____
 Existing equipment: _____
 Toilet transfer: _____



COMMENTS/RECOMMENDATIONS:

(Patient Name, Date of Birth and Patient Number)

Page 4

BATHTUB

- A) Total width of tub _____
- B) Inside width of tub at top _____
- C) Width of tub halfway down _____
- D) Width of tub at bottom _____
- E) Width of inside rim _____
- F) Width of outside rim _____
- G) Depth of tub _____
- H) Height of tub, floor to rim _____
- I) Clear space in front of tub _____
- J) Overall length of tub _____
- K) Inside length of tub _____
- L) Height of soap dish handle from tub rim _____
- M) Mark location of tub taps and describe _____

Tub type: fiberglass porcelain enamel
Shower: doors/curtains two/three panel door/accordion
 shower head/telephone shower

Wall type: tile plastic wall unit fibreglass wall unit

Bathmat: non slip decals

Existing equipment: _____

Bathtub transfer: _____

SHOWER STALL

Location: _____

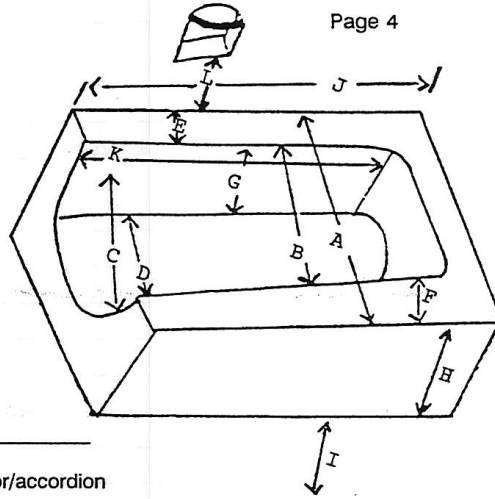
Type: aluminum fiberglass tile
 doors curtains

Door width _____ lip height _____

Stall dimension: width _____ depth _____

Existing equipment: _____

BATHROOM LAYOUT:





Home Assessment

Page 5

LIVING ROOM

Entrance access: _____

Manoeuvrability: _____

Flooring: _____

Access to television: remote control yes no

 stereo: remote control yes no

 lights: _____

 other: _____

Couch transfer tested? _____

Armchair transfer tested? _____

COMMENTS/RECOMMENDATIONS:

KITCHEN:

Entrance Access: _____

Manoeuvrability: _____

Access to kitchen utilities:

1. counters _____

2. cupboards _____

3. sink _____

4. stove _____

5. oven _____

6. microwave _____

7. refrigerator _____

8. table, kitchen _____

9. table, other _____

10. dishwasher _____

11. outlets _____

12. other _____

Flooring _____

COMMENTS/RECOMMENDATIONS:

BEDROOM

Location: _____

Entrance: _____

Door width (clearance): _____

Open/close door: _____

Turning space: _____

Flooring: _____

Light switch: _____

Outlets: _____

Bed (type/height): _____ Accessible: one both sides

Furniture: _____

Closets: _____

Windows: _____

Bed transfer tested? _____

ACCESS TO: Mailbox: _____

Disposal of garbage: _____

Laundry facilities: _____

Smoke detector: _____

Fuse box: _____

Fire extinguisher: _____

Heat controls: _____

Other: _____

COMMENTS/RECOMMENDATIONS:

EMERGENCY:

1. Location/style of telephone: _____

2. Could patient exit rapidly? _____

3. Are emergency phone numbers at hand? _____

4. Are special measures (Lifeline, daily contacts) needed? _____

COMMENTS/RECOMMENDATIONS: