Planning the home environment and home modifications ahead of time for middle-aged and older adults

By

Roslyn Aclan
Bachelor of Health Sciences and
Master of Occupational Therapy, 2015 Flinders University

Thesis
Submitted to Flinders University
for the degree of

Doctor of Philosophy
College of Nursing and Health Sciences
23 September 2024

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

LIST OF PUBLICATIONS AND CONFERENCE ABSTRACTS ARISING FROM THIS THESIS

Peer reviewed publications

Aclan, R., George, S., Block, H., Lane, R., & Laver, K. (2023). Middle aged and older adult's perspectives of their own home environment: a review of qualitative studies and meta-synthesis. BMC Geriatrics, 23(1), 707. https://doi.org/10.1186/s12877-023-04279-1

Aclan, R., George, S., & Laver, K. (2023). Considering the home environment and planning for the future: A qualitative exploration of the views of older adults and individuals with older relatives. Scandinavian Journal of Occupational Therapy, 1-13. https://doi.org/10.1080/11038128.2023.2192027

Aclan, R., George, S., & Laver, K. (2023). Common home hazards among healthy older aged adults and potential modifications required for age-friendly housing. Australian Occupational Therapy Journal. https://doi.org/10.1111/1440-1630.12918

Aclan, R., George, S., & Laver, K. (2023). A Digital Tool for the Self-Assessment of Homes to Increase Age-Friendliness: Validity Study. JMIR Aging, 6, e49500. https://doi.org/10.2196/49500

Conference presentations and poster

Signifies presenting author

Aclan, R*., George, S., & Laver, K. (2023). Middle aged and older adults' perspectives of their own home environment: A qualitative systematic review: preliminary finding. Poster presentation accepted at Southern Adelaide Local Health Network Research Week (September 2021).

Aclan, R*., George, S., Lane, R., Block, H., & Laver, K. (2023). Middle aged and older adult's perspectives of their own home environment: A qualitative meta-synthesis. Oral presentation accepted at the Australian Occupational Therapy National Conference and Exhibition (June 2023).

Aclan, R*., George, S., & Laver, K. (2023). The validation of an occupational therapy digital tool for self-assessment of the home environment: preliminary findings. Oral presentation accepted at the Australian Occupational Therapy National Conference and Exhibition (June 2023).

LIST OF ABBREVIATIONS

ACAT   Aged care assessment team

ADL   Activities of daily living

C   Credible

CAT   Cognitive adaptation training

CI   Confidence interval

COREQ   Consolidated criteria for Reporting Qualitative Research

GES   Generic Environmental Supports

GP   General practitioner

HV   Home visit

IADL   Independent activities of daily living

M   Mean

OFTA   Office of Ageing

OT   Occupational therapy and/or occupational therapist

P   P-value

PRISMA   Preferred Reporting Items for Systematic Reviews and Meta-Analyses

QOL   Quality of life

RCT   Randomised controlled trial

U   Unequivocal finding

WHO   World Health Organization

ABSTRACT

With the growing number of older people worldwide, governments are investigating how to support health and wellbeing in older age (World Health Organization, 2021b). Most older people prefer to age in place, aligning with the Australian government's objective of providing care within the home environment (Hatcher et al., 2019; Kramer & Pfaffenbach, 2015; Stones & Gullifer, 2014; Tanner et al., 2008). Staying in one's own home reflects a desire to maintain independence, autonomy and community connections as residential care is generally viewed as a service for end-of-life care. Remaining in one's own home is influenced by factors such as the home's design and surroundings, evolving care requirements, and the availability of alternative housing choices (like retirement communities) in one's own neighbourhood (Hatcher et al., 2019). Age-friendly communities and homes are considered a priority in Australia and globally, with numerous initiatives underway, including access to a home with age-friendly features such as elevators or wide passages to accommodate wheelchairs, access to affordable health services along the continuum of aged care and access to affordable public transport to enable people to remain engaged int their communities (World Health Organization, 2020a). Less attention has been given to the development of viable solutions for ageing adults to remain and age in their own homes. It is not only necessary but also a preferred alternative to residential care. There is currently limited information about the perspectives and opinions of older adults regarding living independently in older age and the factors that are essential to their future housing requirements.

This thesis outlines a program of research consisting of four research studies that were undertaken to explore home and home safety for people as they age. The first study identified and synthesised international evidence related to the perspectives of the significance of home for middle-aged and older individuals, the consequences of any alterations to their home environment and factors that influence their housing decisions. The second study aimed to gain insight into the perceptions of middle-aged and older individuals regarding their home environment, home safety and the ageing process at home. Furthermore, the study sought to explore the difficulties faced by individuals with older relatives and the challenges that their older relatives encounter as they age. In the third study, a prospective cohort design was used to explore the hazards present in the living environments of healthy older adults, with the aim of gaining a deeper understanding of the necessary environmental modifications and supportive requirements for ageing in place. Then in fourth study, a validity study was conducted to investigate whether middle-aged and older people could self-assess their own homes through the use of a digital self-assessment tool. This study aimed to determine agreement (validity) by recruiting older adults to complete the home environment self-assessment tool normally used by an occupational therapist. The agreement (validity) was used to evaluate whether older people could assess their own homes and produce the same information that could be gained from an occupational therapy assessment.

This thesis offers a significant contribution to the field of age-friendly housing research, with the intention of developing effective strategies that support active ageing. The first study showed that individuals over the age of 50 prefer to stay in their homes. To achieve this, these adults require information on enhancing their homes' safety and accessibility. In addition, middle-aged and older adults consider several factors when making future housing choices, such as financial constraints, societal stigma, aging perspectives, emotional aspects, and support networks. Urban and rural planners and policy makers should consider these factors when designing and planning communities. Findings from the second study indicated, when middle-aged and older individuals embrace the ageing process, they typically have a more positive outlook on their future housing choices. In contrast, those who wait for crises tend to overlook the need for adjustments to their homes. Furthermore, these findings suggest that ageing adults are open to learning and would benefit from a tool in either printed or digital format to aid them in future housing decisions. The third study revealed common living spaces that could pose potential risks for older adults. The areas of the bathroom, toilet, and backyard may require attention or modification in the future. This study once again highlighted the significance of offering education and resources at an earlier stage to empower ageing adults to proactively plan for ageing in place. The fourth study demonstrated that older people can self-assess their homes using a digital health tool. It showed that digital heath tools can enable older people to start thinking about their future housing needs whilst reducing the likelihood of being forced to leave one's current living situation or relocate to a residential care facility. The use of such tools has demonstrated that older adults can effectively perform self-assessments in their own homes and arrive at results that align with those of an occupational therapist. This study confirms the usefulness of a digital health intervention in fulfilling the needs of older individuals, thereby enabling them to age in place, while also emphasising the importance of occupational therapy assessments for those with more complex requirements. This advanced digital solution offers practical guidance and support, empowering individuals to make informed decisions that enhance their quality of life as they age, ultimately enabling them to continue living in their homes as they grow older.

DECLARATION

I certify that this thesis:

1. does not incorporate without acknowledgment any material previously submitted for a degree or diploma in any university

2. and the research within will not be submitted for any other future degree or diploma without the permission of Flinders University; and

3. to the best of my knowledge and belief, does not contain any material previously published or written by another person except where due reference is made in the text.

Roslyn Aclan

Signed...

Date........26/09/2024...

ACKNOWLEDGEMENTS

First and foremost, I would like to thank God and the help of our Lady, for continuing to guide me on this roller coaster. I truly believe without the help of His grace; I would not have been able to push through the ups and downs of having to complete a higher degree in research whilst having to work and balance my life from start to finish. I also thank Him for the blessings he has continued to grant me throughout the completion of these studies; His continued gifts of strength and perseverance have shaped me into the person I am today.

I wish to extend my heartfelt thanks and express my deepest gratitude to those who have supported me in undertaking this research endeavour. To my supervisors, my primary supervisor, Professor Kate Laver, I thank you so much for your continued support and guidance, especially in challenging me in my academic writing skills and grammar, and ensuring I was always on track. I thank you again for accepting me as PhD student, being patient with me when I did not always get things right and seeing my potential in research and as an occupational therapist. To my co-supervisor, Professor Stacey George, I also thank you for your continued support and guidance during this PhD journey. I thank you for your continued advice and teaching opportunities granted throughout this journey as well. In general, I express my gratitude to both of you for the extensive research knowledge and expertise that imparted to me. I have acquired a considerable amount of knowledge from you both, and I am truly appreciative of the opportunity to have been supervised by such distinguished individuals. To Ms Siew Siang Tay who undertook professional copyediting of the thesis in accordance with the Australian Standards for Editing Practice (specifically Chapter 4 and 5) in a timely manner.

I would like to acknowledge the Australian Research Council Discovery Early Career Research Fellowship grant, which has made it possible for me to successfully complete my work. I am truly grateful for this opportunity to pursue this research path. Many thanks to the transition services team in the Southern Adelaide Local Health Network, who also granted me the opportunity to continue working whilst I completed this thesis.

I would like to extend my gratitude to my family and friends for their unwavering support and consolation during the most trying times. I would like to acknowledge both my mother, Nelia, and mother-in-law, Purita, whom I know would be most proud about the completion of my thesis. Having to grieve the loss of Purita whilst trying to complete my thesis was one the most challenging tasks, but the challenge gave me strength, knowing that it was all part of God's will. I thank my father, who had sacrificed most of his time to ensure that I was looked after and given the best whilst trying to be a mother figure at the same time. The successful completion of these studies is a testament to his unwavering dedication and commitment that have been consistently imparted to me. Lastly, I thank my husband, Allan, who has continued to

CHAPTER 1   INTRODUCTION AND RATIONALE FOR THESIS

Most older people prefer to continue living in their own homes for as long as possible. According to a large survey conducted by the Productivity Commission, 83% of people aged 60 stated that living in their own home was their preferred living arrangement, as opposed to other alternatives, such as retirement villages (Productivity Commission, 2015). Staying in one's own home reflects a desire to maintain independence, autonomy and community connections, and residential care is generally viewed as an end-of-life care service (Almevall et al., 2022). However, the ability to remain in one's own home depends on factors such as the design and environment of the home, changing care needs, and the availability of other housing options, such as retirement villages, within the community. As people age, the need to consider home modifications or moving into more suitable accommodation increases. Approximately 80% of older Australians own their own homes, and contrary to common belief, downsizing to a smaller home is not a common practice among them (Productivity Commission, 2015).

If moving from one's home is not the preferred or available option as one ages, improving access and safety by making simple modifications could make the option viable. These modifications can include installing grab rails in the shower, decluttering overcrowded bedrooms, or replacing uneven pavers with smooth concrete paths. There is strong evidence from randomised controlled trials that home assessments conducted by an occupational therapist can improve function in older adults and reduce the rate and risk of falls (Stark et al., 2017). However, access to occupational therapy home visits is often limited, as they are typically only available after an injury or illness and not always possible in rural areas.

Active ageing depends on a range of influences or determinants that surround individuals, which can include social factors, personal determinants and their physical environment (Figure 1.1). A life course perspective is necessary to understand these determinants as it recognises that older individuals are not a homogenous group and that diversity among them increases with age (World Health Organization, 2007). In 2007, the World Health Organization created a guide based on their active ageing framework to enhance quality of life as people age (World Health Organization, 2007). The purpose of the guide is to assist cities in viewing themselves through the lens of older individuals, thereby allowing them to pinpoint areas and methods for enhancing their age-friendliness (World Health Organization, 2007). The main objective of this initiative is to enable older adults to continue living in their homes for as long as possible, without being forced to relocate or move suddenly. However, the challenge lies in determining what knowledge and tools are necessary to support this goal.

Figure 1.1: Determinants of active ageing

Note. **Sourced from World health Organization (2002)**

1.1 Issues to be addressed in this study

Promoting the ability of older Australians to continue living independently in their own homes for as long as feasible is a shared objective for both the Australian government and the individuals concerned (Australian Institute of Health and Welfare, 2018). The financial burden associated with providing residential care is a key consideration for the government, while for older Australians, the desire to maintain their independence and quality of life is a primary concern. As individuals age, they must make decisions about their living arrangements, including the possibility of home modifications or relocating to alternative accommodation (Productivity Commission, 2013). It is important to take into account the social costs involved, such as disruptions to family and community networks, when considering changes in living circumstances. Despite physical, cognitive and functional declines that often accompany ageing, most people prefer to maintain their autonomy and independence, and therefore wish to remain in their own homes.

The utilisation of digital health tools presents innovative solutions to the challenges associated with an ageing population. Globally, there is a trend towards engaging the public in their own care through models such as client-centred care (Sumsion & Law, 2006), consumer-directed care, self-management (Bodenheimer et al., 2002), and patient-mediated tools (Gagliardi et al., 2016). This approach recognises the diversity in preferences and values among the public. As taxpayer-funded services, such as home supports, face increasing demands, consumers expect to be informed and have a role in decision-making. Furthermore, the Australian government's establishment of the Digital Health Agency aims to enhance the quality and efficiency of care through the use of technology (Australian Digital Health Agency, 2023).

Insufficient efforts are currently being made to enable individuals to remain in their own homes through home assessment and modification. Although occupational therapy home assessments offer numerous advantages, limited resources lead to constraints in the provision of such services. Conducting a home assessment requires a significant amount of time; one study found that the average duration of an assessment is 80 minutes (Lannin et al., 2011). Additionally, travel time can be considerable, especially in rural and remote areas, further exacerbating the issue of limited access to occupational therapy home assessments in these regions. 'A Matter of Care: the Australian Government Aged Care Workforce Strategy', a report commissioned by the Aged Care Workforce Strategy Taskforce, underscores the difficulties in recruiting and retaining healthcare professionals in aged care and highlights the necessity of innovative strategies to address this challenge (Aged Care Workforce Stategy Taskforce, 2018).

Options currently available for individuals who are contemplating home modifications or those who have concerns about them, particularly children and caregivers, are listed in Table 1.1.

Table 1.1: Current options for people considering home modifications

Current options	Limitations
Explore and peruse online resources on home safety from a diverse range of organisations.	The majority of current resources are designed for individuals with a specific medical condition, such as arthritis, and are typically presented as fact sheets rather than serving as self-guided tools. To locate and evaluate a variety of websites, an individual would need to conduct a thorough search.
Seek an occupational therapist to assess the house.	This service is considered the gold standard in its field, but access to it is limited due to factors such as workforce shortages, high costs, waiting lists, and the fact that most of these services are located in metropolitan areas.
Devise individually tailored solutions and innovative ideas for improving living spaces on an informal basis.	The general public tends to have a lack of knowledge on accessible design principles and home hazards. Furthermore, they are generally uninformed about the various options that exist for simple home modifications.

1.2   What drives my interest in this research?

My interest in identifying ways of enabling our ageing population to remain at home as long as possible arose from my extensive experiences as a clinical occupational therapist. As an experienced occupational therapist over nine years who has mainly worked within the aged care sector, I have seen several ageing adults who aim to return home after a lengthy stay in hospital following a fall, a stroke or an age-related illness. Many of these ageing adults are seen due to deconditioning and require ongoing therapy to learn new compensatory techniques associated with personal care or their everyday household duties.

Moreover, numerous individuals in this category frequently face obstacles that necessitate thorough examination and assessment of their home environments. These obstacles may include limited access to their homes due to the presence of steps, bathroom configurations, particularly those with showers over the bath, and insufficient space for movement. These concerns have required several occupational therapy home assessments which have commonly posed a barrier to individual discharge leading to extended stays in hospital.

Following individual occupational therapy home assessments, I have encountered several delays in the process of installing minor or major modifications through the government funded system. I have witnessed people waiting up to two to three months within the hospital system for minor or major modifications. In my time as an occupational therapist, as more people enter hospital for lengthy admissions, the need of an occupational therapy home assessment and major or minor modifications has become more prevalent. Many people I have come across have not considered their future housing requirements, and their family members or support system have indicated that they have not yet modified or thought about their future housing needs since they do not currently require it. I have observed numerous elderly individuals postponing necessary actions until they are confronted a medical crisis necessitating hospitalisation, home assessments by occupational therapists, and potential modifications, as well as relocation or, in unfortunate cases, admission to residential care facilities.

When I take individuals home for a visit, I have noticed that the home plays a crucial role in enabling ageing adults to improve their function. However, I was not aware of why this was the case until now. My experiences as an occupational therapist have motivated me to push for change and provide more support for older adults who want to make adjustments to their housing plans, and to assist those who may not have access to the necessary information about preparing for ageing in place. Additionally, I strive to educate ageing people on alternative housing solutions beyond residential care. Through my personal experiences, I have come to realise that it is essential to strike a balance between allowing individuals to return to their homes, which hold significance to them, and implementing changes necessary to support their ageing in place. The timeline of my PhD studies can be found in Appendix N.

1.3 Research aim and study objectives

This thesis aims to create new knowledge on important features of the home for middle- and older-aged adults, to understand the acceptability of digital tools for self-assessment and to test the validity of a digital self-assessment tool which enables people to assess their own home for access and, safety, and to arrange for modifications that will enable them to remain in their own home for as long as possible. In order to do so, the following six objectives were identified:

1. To examine how middle-aged and older adults perceive their current home environment and the concept of 'home', and the factors they consider when making decisions about their future housing.
2. To describe the views of older individuals regarding their home environment, home safety and ageing in place.
3. To explore the perspectives of individuals with older family members who are ageing in place, and the challenges that these older family members face as they continue to age in their own homes.
4. To identify common home hazards among healthy older-aged adults and what modifications may be required for age-friendly housing.
5. To investigate whether it is feasible for older people to self-assess their own home environment using a digital health tool.
6. To evaluate whether a self-assessment tool can be used to accurately assess the home environment of older individuals and produce results that are comparable to the current widely accepted gold standard, which is an occupational therapy assessment, in terms of validity.

1.4   Chapter structure and outline

The following section provides an overview of the thesis chapters. The body of research contains four main studies to address the aim and objectives of the thesis. Chapters 3, 4, 5 and 6 are edited versions of published manuscripts (see Appendix O-R) and thus some repetition in the introduction and discussion sections will occur. Chapter 3 and chapter 4 were undertaken from 2021 to 2022, whilst chapter 5 and chapter 6 were undertaken from 2022 to 2023 (see Appendix S).

Chapter 2: Literature review

This chapter provides a comprehensive review of the current literature on population ageing, including its global context, the concept of age-friendly housing, and the challenges faced by older people in accessing and maintaining suitable housing options. Factors that influence the housing needs of the ageing population are examined, and the various housing options currently available are described in detail. Additionally, the chapter delves into the difficulties that older adults encounter when it comes to occupational therapy and home assessments, using the person-environment-occupation model as a framework for discussion. Lastly, the chapter concludes by exploring potential solutions for age-friendly housing that can help address the needs of the ageing population.

Chapter 3: Qualitative meta-analysis

This chapter covers the first research endeavor, which is a qualitative meta-synthesis of existing literature that addresses Objectives 1 and 2. The objective is to investigate the significance of 'home' for middle-aged and older individuals, as well as the consequences of any alterations to their home environment.

Additionally, it assesses the key factors that influence their housing decisions in the future and the external influences that impact these decisions.

Chapter 4: Qualitative study

This chapter details the second study of the thesis and involves a qualitative research investigation that delves into the perspectives and experiences of middle-aged and older individuals regarding the challenges of remaining in their own homes, as well as their attitudes on self-assessment of their living spaces. In this chapter, Objective 3 is addressed which explores the significance of middle-aged and older individuals conducting a self-assessment of their homes and whether they would seek assistance in determining their thought process regarding safety as they age in their homes.

Chapter 5: Prospective cohort study

This chapter covers the third study, a prospective cohort study, aimed at addressing Objective 4. This chapter describes the common home hazards among older aged adults as little is currently known about the existing home hazards that may potentially hinder healthy ageing in place. This chapter highlights the critical role of occupational therapists in fostering age-friendly settings and identifying potential home risks among this demographic, in order to educate health and design specialists on future house design, construction, and renovation, and the housing needs of our growing elderly population. This chapter subsequently addresses how early identification of home hazards may result in age-friendly home and communities, enabling people to live at home for longer.

Chapter 6: Agreement (validity)

This chapter details the fourth study which aimed to establish validity of a digital self-assessment tool by assessing it against the current gold standard: an occupational therapy home assessment. It includes a summary of whether healthy older adults can self-assess their own home using a new digital health tool through a comparison of the levels of agreement between an occupational therapist and an older person. Specific areas where the occupational therapist and older person do not agree are also explored to provide answers to Objectives 5 and 6. The chapter then explores the potential research implications of using a digital tool for older individuals, while also discussing the advantages of evaluating the home environment to assist older individuals in assessing and preparing their homes for ageing in place.

Chapter 7: Discussion and conclusion

This chapter provides a final summary on the overall findings and conclusions from all key study findings. The key findings are analysed in relation to existing research, in order to highlight any similarities and differences with current studies. The text provides insights into initiatives that can enhance future housing planning for older individuals, as well as recommendations for further research and practical application.

CHAPTER 2   LITERATURE REVIEW

2.1 Introduction

The objective of this chapter is to examine the existing literature on population ageing and housing for older adults who wish to maintain independence in their homes. Specifically, this review aims to explore the various housing options available for older individuals, the role of occupational therapy in supporting ageing adults, and solutions that could enable people to age comfortably in their own homes.

2.2 Population ageing

2.2.1 Ageing

In Australia, 'middle-aged people' are referred to as those aged 45 years or older (Australian Bureau of Statistics, 2020b; Australian Human Rights Commission, 2010). Among Aboriginal and/or Torres Strait Islander communities, individuals aged 50 and above are considered to be in the older age category (Australian Institute of Health and Welfare, 2024). While people generally experience good health in middle age, a number of significant life changes are also commonly experienced during this time, which may include loss of parents, becoming grandparents, or acting as caregivers for ageing parents or spouses (Lachman, 2004). Middle-aged people can also begin to experience changes in vision, hearing, weight, muscles and joints (Lachman, 2004). These biological changes can result in possible sarcopenia (loss of muscle tissue and function), diabetes, depression, osteoporosis or chronic inflammation as a result of muscle loss from ageing (Loecker et al., 2021).

The term 'older people' usually refers to people aged 65 years and over (Australian Institute of Health and Welfare, 2023c). Worldwide, the population is ageing because of the decline in fertility rates and improvements in longevity (World Health Organization, 2021b). The global population of people aged 60 years and over is expected to increase to 2 billion by 2050 (World Health Organization, 2021b). In Australia, the proportion of older people is projected to increase steadily over the coming decade (Australian Institute of Health and Welfare, 2018). It is estimated that there will be 8.8 million older people in Australia (22% of the population) by 2057, compared to the current number of 4.2 million in 2020 (16% of the population) (Australian Institute of Health and Welfare, 2018, 2023c).

As people go through different life stages (birth, childhood, adolescence, and adulthood), their average life expectancy and chance of reaching older age increases (Australian Institute of Health and Welfare, 2023b). Life expectancy has increased over the last 20 years from 66.8 years in 2000 to 73.4 years in 2019 (World Health Organization, 2019). In fact, Australia has been marked as one of the countries with the highest life expectancy in the world (Australian Institute of Health and Welfare, 2023b). The life expectancy for Australian men aged 65 in 2019-2021 was 85.3 years, while Australian women aged 65 in 2019-2021 could

be expected to live to the age of 88 years (Australian Institute of Health and Welfare, 2023b). Figure 2.1 shows life expectancy in Australia at birth by sex. Data from the United States shows that men and women aged 65 years could be expected to live for another 18.4 years (National Center for Health Statistics, 2023).

Removed due to copyright restriction

Figure 2.1: Life expectancy (years) at birth in Australia, 1891-1900 to 2019-2021

Note. **Sourced from Australian Institute of Health and Welfare (2023b)**

Older adults frequently begin to experience reduced physical and cognitive function and multimorbidity. Multimorbidity is more common in older people, and in 2017-2018, approximately 51% of older adults had two or more chronic conditions (Australian Institute of Health and Welfare, 2023a). The prevalence of disability increases with age, and it is observed that one in every five older individuals has a severe or profound disability (Australian Institute of Health and Welfare, 2023c; World Health Organization, 2022). In 2018, among Australians aged 65-69, the rate of disability increased with age, from 36% to 85%. Figure 2.2 shows the increasing percentage of disability among older Australians in the period 2003-2018.

Removed due to copyright restriction

Figure 2.2: Percentage of older Australians with disability by sex and age group, 2003-2018

Note. **Sourced from Australian Institute of Health and Welfare (2023c)**

In 2018, the leading causes of disease burden among older Australians were cancer, cardiovascular disease and neurological conditions. Figures 2.3 and 2.4 depict the leading causes of disease burden in older Australians for both males and females.

Removed due to copyright restriction

Figure 2.3: Male Australians' leading causes of total burden by age group, 2018

Note. **Sourced from Australian Institute of Health and Welfare (2023c)**

Figure 2.4: Female Australians' leading causes of total burden by age group, 2018

Note. **Sourced from Australian Institute of Health and Welfare (2023c)**

With an increasing ageing population in Australia, the implications of population ageing will continue to shape the nation's future. The baby boomer generation, born between 1946 and the mid-1960s, had a positive impact on the economy because of the large workforce they produced (Commonwealth of Australia, 2023b). However, as this cohort began to reach 65 years of age in the early 2010s, the old-age dependency ratio rapidly increased. This increase is expected to gradually decrease in the 2030s but increase again at a slower rate in the 2040s (Commonwealth of Australia, 2023b). These shifts in age structure and old-age dependency ratio will have significant economic and fiscal implications, including a higher demand for health and aged care services (Commonwealth of Australia, 2023b).

Spending on aged care, particularly for residential and community care, is projected to increase in the future. This is due to the increasing number of people aged 80 and over, which is expected to triple in the next 40 years to more than 3.5 million by 2062-2063 (Commonwealth of Australia, 2023b). Other factors that impact aged care spending include changes in the cost of living, such as wage changes and the cost of providing care, as well as the occurrence of disease, frailty or disability (Commonwealth of Australia, 2023b). Additionally, changes in government policies and shifts in preferences among older Australians, such as for ageing at home rather than in residential care, can also impact spending on aged care.

Due to the ageing population, there will be a decrease in the number of people participating in paid work. Over the next four decades, the labour force is expected to decrease as people retire, and the participation rate is projected to decrease from 66.6% in 2022-2023 to 63.8% in 2062-2063 (Commonwealth of Australia, 2023b). This indicates a growing number of older Australians who will participate less in the workforce, and a decline in taxpayers. Additionally, among employed people, the Commonwealth of Australia (2023) reports that workers are working fewer hours on average as the population ages, particularly older Australians, who may participate in paid work. It is projected that the average number of hours worked per

week will decrease from approximately 20 hours to 19 hours by 2062-2063 (Commonwealth of Australia, 2023b). This decline in workforce participation presents further challenges for the economy, budget, society and environment (Figure 2.5). The information presented in Figure 2.5 highlights the potential consequences of alterations to the population's size, composition, and geographic distribution. These changes can have far-reaching effects on various aspects of our economy, budget, society, and environment (Commonwealth of Australia, 2023b). As the population of Australia is expected to increase over the next 40 years, it is crucial for governments to consider how to maximise the benefits associated with population growth while simultaneously grappling with the potential decline in the workforce and ensuring that the strain on infrastructure, housing, and services is effectively managed (Commonwealth of Australia, 2023b).

Removed due to copyright restriction

Figure 2.5: Effects of population change

Note. **Sourced from Commonwealth of Australia (2023b)**

2.3   Housing across lifespan

Worldwide, most of the population live in private dwellings (Productivity Commission, 2013, 2015). The majority of older Australians aged 65-74 live either in private dwellings or rental properties (99% of people aged 65-74 and 75% of those aged 85 or older) (Australian Institute of Health and Welfare, 2021a). Data suggests that older Australians appear to prefer large homes; in fact, three-quarters of those aged 75 and over live in homes with three or more bedrooms (Productivity Commission, 2015). Large homes are considered desirable because they can accommodate guests and provide room for people to conduct hobbies within the house (Productivity Commission, 2015). Most Australians are homeowners, with two-

thirds of households (66%) in 2021 owning their home outright or with a mortgage (Australian Bureau of Statistics, 2021). Most of the remaining households were living in rental properties (30.6%) (Australian Bureau of Statistics, 2021).

Most older adults report living with family (70.5%), whereas others report living alone (25.6%) or living with others (3.9%) (Australian Bureau of Statistics, 2021). Most middle-aged and older Australians hold a large share of their overall home equity (Australian Bureau of Statistics, 2021; Productivity Commission, 2015). For instance, in 2011-2012, people aged 55 and older held 59% of total equity as depicted in Figure 2.6 (Productivity Commission, 2013, 2015).

Removed due to copyright restriction

Figure 2.6: Share of aggregate value of home equity by age group in Australia, 2011-2012

Note. **Sourced from Productivity Commission (2015)**

Housing is considered an important asset as people age, particularly for those who have lived and remain in the 'family home'. However, homes that have been suitable in previous years may not necessarily meet the needs of all ageing adults, especially if they develop disabilities or functional changes (Judd et al., 2010). Research suggests that even middle-aged people should start to consider moving homes to reduce the size of their houses (Gibler & Tyvimaa, 2015). Crisp et al. (2013) indicated people in their late fifties and early sixties were most likely to consider relocating to retirement villages. According to the Australian Productivity Commission (2015), housing needs change over time and across the lifespan as physical abilities change (Figure 2.7). As people age, it becomes more important for homes to be located close to essential services and public facilities to support ongoing participation in the community (Rudnicka et al., 2020). Some people may choose to relocate, downsize or modify their homes to suit their needs as they age (Lindley & Wallace, 2015). Population ageing will present a key challenge for society, and governments will need to consider how to ensure the availability of age-friendly housing. Alternative options to

residential care will be desirable due to the costs associated with this form of housing and care (Standfield et al., 2018).

Removed due to copyright restriction

Figure 2.7: Housing needs and care

Note. **Sourced from** *Productivity Commission (2015)*

2.4 Age-friendly communities

2.4.1 Age-friendly homes and communities

Given the demographic shift towards an ageing population, prioritising efforts to make communities and cities age friendly is of paramount importance and urgency. The World Health Organization (WHO) first introduced the concept of age-friendly communities to promote the integration of older adults into a society that supports their well-being (World Health Organization, 2007). The essence of an age-friendly community lies in providing equal access to outdoor spaces, buildings, housing, social inclusion and participation for all age groups as people grow older (Greenfield & Buffel, 2022). The establishment and sustainability of age-friendly communities are crucial strategies for addressing population ageing.

The WHO advocates the implementation of age-friendly communities as a global priority. This concept emphasises the need for universal access to clean environments, green spaces with adequate seating and pathways, safe pedestrian crossings, accessible homes and secure environments for all older individuals (World Health Organization, 2007) (Figure 2.8). For example, many parks in India and Japan are in disrepair and pose a safety risk to older individuals, preventing them from utilising these green spaces (World Health Organization, 2007).

Figure 2.8: Age-friendly city priority areas

Note. **Sourced from World Health Organization (2007)**

The Australian government has adopted the WHO's age-friendly community concepts to ensure that older individuals are provided with opportunities to optimise their health, participation and security as they age (Kendig et al., 2014). For instance, local governments in Melbourne and Sydney have incorporated positive ageing plans into their budget processes, and efforts have been made to improve accessibility, utilise infrastructure more efficiently and enhance housing choices (Kendig et al., 2014). Furthermore, in Canberra, more emphasis has been placed on developing affordable and suitable housing for frail and disabled older individuals (Kendig et al., 2014). In South Australia, efforts are being made to provide sufficient and affordable housing for older people who are frail and disabled (Goverment of South Australia, 2024). Importantly, the Goverment of South Australia (2024) are partnering with older people and a range of government and community organisations and universities across metropolitan and regional South Australia to help shape age-friendly strategies, projects and programs.

Age-friendly homes are intended to facilitate the ability of individuals to continue residing in their own homes as they age, while remaining integrated into their surrounding communities (Government of South Australia, 2012; World Health Organization, 2021a). The WHO stresses the importance of age-friendly homes in promoting ageing in place without sacrificing autonomy and independence, while also preserving older individuals' connections to their families and communities (Chau & Jamei, 2021; World Health Organization, 2020a). Age-friendly homes are designed to enable individuals to continue participating in activities that they value despite any potential decline in their capacity (Luciano et al., 2020). To meet the evolving needs of home residents, designing age-friendly homes that account for their changing requirements is crucial (Chau & Jamei, 2021; Phillipson, 2011).

Age-friendly homes are crafted to provide versatility, accessibility and adaptability by utilising universal design principles to cater to the changing needs of individuals over time. These homes may feature wide passageways to accommodate wheelchairs, the absence of stairs and uneven floors, low kitchen cabinets with easily accessible shelves, and ambient lighting (Roden, 2023; World Health Organization, 2021a). Implementing universal home designs that can cater to the diverse needs and abilities of individuals across various stages of life to prevent the exclusion of certain groups from participating in valued occupations is crucial (Roden, 2023).

Housing is closely intertwined with financial stability, social inclusion, and physical, mental and emotional well-being (Productivity Commission, 2015). As individuals grow older, the need for home modifications or alternative living arrangements becomes more pressing (Figure 2.7) (Productivity Commission, 2015). Retirement villages and independent living units have been established to promote community integration and accommodate the ageing process (Davey et al., 2004; Productivity Commission, 2015). A literature review and economic evaluation indicated that these physical environments, specifically designed for older individuals, can support their daily activities, reduce frailty and lower the cost of publicly funded healthcare services, while delaying entry into residential care (Slaug et al., 2017; Thornton, 2014; Wahl et al., 2009). Furthermore, a longitudinal study revealed that age-friendly homes can enhance quality of life and mitigate loneliness among frail older adults (Garner & Holland, 2020).

The creation of age-friendly environments and healthy ageing opportunities are of critical importance to all members of society. According to the WHO (2020a), everyone should be provided with the opportunity to be and do what they want, and live wherever they desire. In 2020, the WHO launched the Decade of the Healthy Ageing Initiative (World Health Organization, 2020a). The initiative aims to introduce actions towards healthy ageing worldwide and demonstrate how older people and stakeholders could optimise functional ability (World Health Organization, 2020a). Underpinning this initiative is a model for healthy ageing (Figure 2.9). The model comprises three components: 1) intrinsic capacity, 2) environment, and 3) functional ability (World Health Organization 2021b). Intrinsic capacity refers to the physical and mental capacity of a person. The environment refers to the place in which a person lives and conducts their lives. Functional ability is a combination of individual intrinsic capacities with the environment in which they live and how they interact with it. Over time, ageing can reduce an individual's intrinsic capacity and functional ability, which can affect their ability to remain in their home environment.

Figure 2.9: World Health Organization healthy ageing model

***Note.* Sourced from World Health Organization (2020a)**

The WHO (2020a) is currently working on devising public health strategies to support the decline in both intrinsic capacity and functional ability by collaborating and coordinating with multiple sectors and diverse stakeholders, including older individuals, to establish age-friendly environments. Establishing suitable age-friendly housing that meets the needs of older people will require communication and collaboration among policymakers, governments, researchers, and the housing, health and aged care sectors (Laver, 2023). Investment in time, energy and reform will be required as the population ages and expenditures on health and aged care continue to increase (Knickman & Snell, 2002).

Quine and Carter (2006) conducted a literature review of 94 studies and concluded that a significant proportion of baby boomers prefers living in co-housing communities or other housing options over aged-care housing. Those who are now approaching older age are expected to reject residential aged care facilities (Hugo, 2003; Rogers & Mitzner, 2017). The negative portrayals of aged care facilities in the media (Miller et al., 2013) may contribute to the public's perception of poor-quality care for residents living in these facilities (Miller et al., 2017).

2.4.2 Supporting older people to remain at home

The most preferred housing choice for people continues to be their own residence (Productivity Commission, 2015; Thornton, 2014). Most people want to remain in their homes for as long as possible (Kendig et al., 2012; Wiles et al., 2012). Many middle-aged adults and older people consider their house to be more than a building or place but a 'home.' According to Pani-Harreman et al. (2021) 'ageing in place' refers not just to the 'home' but the person's surrounding social networks and supports, whereas Grimmer et al. (2015) describe ageing in place more practically as a way of enabling older adults to remain in their

homes without needing to relocate to long-term care facilities. One's ability to age in place is determined by a person's intrinsic capacity (physical and mental abilities), the home environment, and how these affect the person's functional ability (Wahl & Weisman, 2003; Woolrych et al., 2022). Furthermore, the context of 'ageing in place' is diverse and depends on the socio-economic and cultural background of the person and individual abilities (Pani-Harreman et al., 2021).

Ageing adults consider their homes a place where they can feel comfortable, maintain privacy and be connected to their past and present self (Stones & Gullifer, 2014). Both Dahlin-Ivanoff et al. (2007) and Saarnio et al. (2016) reported on how people hold strong emotional and environmental attachments to where they live. For instance, older adults describe their homes as places where they can retain their identity, sense of self, security, safety, well-being, control, freedom and social connections (Board & McCormack, 2018; Lewis & Buffel, 2020). As people age, feeling in control and choosing how and where to live is important (Fjordside & Morville, 2016). Exploring and understanding the value and meaning of 'home' is therefore an area of importance, particularly among middle aged and older adults. This is further explored and justified in Chapter 3. Additionally, there is limited information available regarding individuals who wish to age in place independently and plan for future modifications. There is also a lack of understanding of the factors that these ageing adults consider when making necessary modifications to enhance home safety and housing accessibility, as expounded in Chapter 4.

In Australia, the provision of home care packages has become increasingly important as a means of supporting older adults to age in place. Home care packages also help manage rising aged care spending and help avoid premature relocation into residential care. Countries such as Hong Kong, Japan, Australia and the United States have started to increase their expenditures on home care services (Wu et al., 2022). In Australia, the number of people receiving home care packages has increased fourfold over the past 10 years, from 55,000 in 2012 to 216,000 in 2022 (294% increase) (Australian Institute of Health and Welfare, 2023e). The provision of home care packages is much less expensive for governments than that of aged care beds in residential care facilities. Australian data shows that it costs $85,818 in total operational costs per residential aged care bed per annum, verses $26,382 per annum for the cost of home care packages (Productivity Commission, 2015).

2.4.3   Housing options for older people

2.4.3.1   *Home modifications*

When faced with environmental barriers to remaining at home, home modifications or alterations are usually considered in the first instance (Clemson et al., 2023; Daley et al., 2006). Modifications can be made throughout the home to reduce the risk of falls and to increase safety. Modifications are most commonly required in the toilet, bathroom and kitchen (Stark et al., 2009). Simple modifications, such as the removal of throw rugs, addition of night lights, and decluttering and reorganisation of spaces are typically cost-

effective (Hutchings et al., 2008; Judd et al., 2010). Modifying a home can also be expensive, especially when it involves complex tasks such as remodelling bathrooms and installation of large ramps to enable wheelchair access, stair lifts or overhead ceiling hoists (Struckmeyer et al., 2022).

A significant proportion of older adults modify their homes to support their independence and safety. A survey in Australia showed that 34% of older homeowners had modified their homes, and that bathrooms and stair areas were commonly modified (Judd et al., 2010). Furthermore, 40% of older adults indicated that they were likely to modify their homes in the future (Judd et al., 2010). A qualitative study by Ainsworth et al. (2022) reported that modifications provided older adults with a sense of freedom and autonomy. One participant in this qualitative study reported feeling depressed when trying to manage stairs prior to modifications being undertaken as she was unable to perform the activities she had always done (Ainsworth et al., 2022). A quantitative study by Grasso et al. (2023) indicated that older adults who had modifications done to their homes experienced significant improvements in their function and a decrease in the fear of falling. Australian people can organise home modifications privately or through national aged care or disability funding bodies (Layton et al., 2023). Older Australians can obtain government subsidies for modifications to their homes, regardless of age, disability or function (Australian institute of Health and Welfare, 2022a; Commonwealth of Australia, 2023a).

2.4.4 Retirement villages

Retirement villages provide an alternative housing option specifically designed to address the needs of older individuals, offering social support while promoting functional independence (Petersen et al., 2017). Despite this, they are not the preferred option for people as they age. As of 2011, 4.7% of older Australians lived in retirement villages (Productivity Commission, 2015), which increased to 5.7% in 2014 (Thornton, 2014). A national report by Thornton (2014) projected that this rate would increase to 7.5% by 2025. Retirement villages require an entry fee before residents can move in, which includes options for home ownership or leasing.

Retirement villages are designed to meet an individual's social, financial and environmental requirements as a person ages (Park & Porteous, 2019). Older people in retirement villages have reported that they have more opportunities to make friends and worry less about home maintenance (Gardner et al., 2005). Others indicated that their units were more manageable than their large family homes because of their smaller size and gardens (Gardner et al., 2005). Despite the potential benefits of retirement villages and reports of positive experiences, some have concerns regarding the cost of entry fees and service levies (Judd et al., 2010). As an example, the Australian Competition and Consumer Commission (ACCC) has characterised the payment models and exit terms of retirement villages as unattractive, which makes them a less desirable option for older individuals (Australian Competition & Consumer Commission, 2024). The ACCC (2024) has

indicated that purchasing properties in retirement villages can be more complex than buying or selling other types of properties.

2.4.4.1 Social housing

Some older adults may be eligible for social housing, which offers affordable rent and a secure tenure (Productivity Commission, 2015). Social housing refers to government-subsidised short and long-term rental accommodations, primarily utilised by older Australians (Australian Housing and Urban Research Institute, 2023). This type of housing option has been utilised by older Australians who have low incomes, have experienced homelessness, family violence, or have other complex needs (Australian Housing and Urban Research Institute, 2023). Two types of social housing exist: public housing, which is owned and managed by state and territory governments, and community housing, which is managed by non-profit organisations (Australian Housing and Urban Research Institute, 2023). Most social housing is designed to be age-appropriate, so that even if functional decline occurs, residents can feel supported. Several studies have reported that living in social housing helps residents feel safe and secure in their homes (Baldwin et al., 2019; Berg-Warman & Brodsky, 2006; Glass & Vander Plaats, 2013). The construction and availability of social housing has not increased in parallel with the increase in demand by ageing adults with a low socioeconomic status wanting to remain in the community. These older Australians currently face long wait times because of the insufficient availability of social housing (Faulkner et al., 2021; Productivity Commission, 2015). Sheppard et al.'s (2022) scoping review involving 146 articles also reported a high level of vulnerability among older adults living in social housing. In the review, it was found that many older adults experience chronic physical and mental health challenges, high rates of disability and loneliness (Sheppard et al., 2022). As a result, many adults are forced to wait in the private rental market for long periods, placing them at a high risk of disadvantage (Sheppard et al., 2022). Some people have also reported that obtaining home modifications in social housing can be a long process, forcing some to move away from family, friends and familiar services (Aplin et al., 2020). Furthermore, social housing is particularly lacking in rural areas (Choi, 2004).

2.4.4.2 Residential care facilities

Residential care facilities cater to the high needs of older individuals who can no longer manage their daily lives on their own by offering a spectrum of living arrangements and care services (Miller & Burton, 2023). In Australia, the need for care and support increases with age, and it is predicted that one-third of all men and half of all women will require permanent residential aged care during their lifetime (Productivity Commission, 2011). Currently 1% of those aged 65-74 and 24% of those aged 85 and over live in cared accommodation (Australian Institute of Health and Welfare, 2021a). Across developing countries, residential care facilities are used by 4-6% of adults over 65 (Organisation for Economic Co-operation and Development, 2011).

Negative views about residential aged care facilities are common because of public perceptions that residents are lonely, lack control and have a poor quality of life (Royal Commission into Aged Care Quality and Safety, 2020b). According to a qualitative study conducted by Martin et al. (2019), the general public perceived nursing homes as unhappy miserable places. Likewise, the Royal Commission into Aged Care Quality and Safety (2020a) reported many people were adamant that they did not want to age in residential aged care facilities which were described as 'depressing', 'clinical', 'bleak' and 'scary.'

2.5 Occupational therapy and ageing

The term 'occupation' refers to meaningful or everyday activities that people perform as individuals while taking into consideration their physical and mental capacities (Occupational Therapy Australia, 2023). These may include working, taking care of oneself or participating in hobbies. Occupational therapists work with people of all ages and functional abilities to help them find ways to maintain or improve their functional independence, quality of life and social participation (Hammond, 2004). A systematic review by Stav et al. (2012) revealed that the objective of occupational therapy interventions for older adults is either to maintain or improve their social engagement, functional independence, overall quality of life and well-being. For example, occupational therapists promote healthy ageing in older adults by recognising and supporting their occupational needs (Papageorgiou et al., 2016). With their specialised knowledge and skills, occupational therapists can also analyse and help older adults overcome the access and safety challenges they may face in their own homes (Johansson & Björklund, 2016). Specifically, occupational therapists are trained to recognise that an individual's overall occupational performance is largely influenced by the interaction between the person, their environment and the occupations or activities in which they are engaged (Anzai et al., 2023).

2.5.1 Occupational therapy and the Person-Environment-Occupation model

The Person-Environment-Occupation (PEO) model (Figure 2.10) is a theoretical model used by occupational therapists to guide practice (Metzler & Metz, 2010). Occupational performance is the ultimate outcome and is influenced by the interaction between the person, environment and occupation (Law et al., 1996). Occupational therapists use this model to modify and adapt environments to enable participation in occupations, analyse occupations in relation to a person's health status, and co-advocate with service users (Laver, 2023).

This model is represented by three circles that overlap to shape occupational performance dynamically and indicate the level of congruence between the person, environment and occupation (Ivanoff et al., 2006; Law et al., 1996). As the level of congruence increases, meaningful participation also increases, whereas poor congruence can threaten engagement or performance (Metzler & Metz, 2010). The use of the PEO framework can guide occupational therapists in developing strategies, removing barriers and increasing

support to improve occupational performance (Vrkljan, 2010). The PEO model can explore the factors that influence the development of age-friendly homes and communities. For example, occupational therapists can collaborate with policymakers in the health, aged care and housing sectors to ensure that individuals have access to funding for home modification and age-friendly environments. Other examples that support ageing in place with the use of the PEO model include a person performing rehabilitation or exercises to maintain their physical function, modifying their home environment, using aids to assist with tasks, or simplifying their occupation to accommodate their physical limitations.

Removed due to copyright restriction
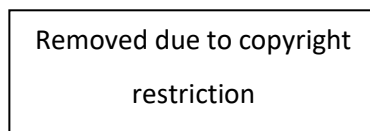
Figure 2.10: Person-Environment-Occupation model

Note. **Sourced from Strong et al. (1999)**

2.5.2   Occupational therapy home assessments and modifications

In practice, occupational therapists frequently conduct home assessments for older adults to identify environmental issues and recommend modifications to their homes. Occupational therapists consider an individual's intrapersonal and interpersonal abilities in addition to their occupational performance when working with older adults to support their understanding of environmental needs and issues. Simultaneously, they assess safety, accessibility and overall well-being. Environmental hazards include clutter, stairs and inaccessible spaces. Home assessments can be undertaken at any time for people in the community; however, they are usually conducted during discharge from the hospital after suffering from an illness, injury or age-related change (Atwal et al., 2007). Assessments can also involve the provision of equipment, such as walking sticks, orthotic footwear or spectacles, or the implementation of behavioural changes, such as avoiding ladder use (Clemson et al., 2023).

Strong evidence suggests that home assessments and modifications completed by occupational therapists improve function and reduce the rate and risk of falls among older adults (Stark et al., 2017). For instance,

Clemson et al. (2023) conducted a Cochrane review of randomised controlled trials that assessed the impact of environmental interventions on the occurrence of falls among older individuals residing in the community. Specifically, this review included 22 randomised controlled trials, involving 8463 older individuals with an average age of 78 years and showed that occupational therapy home visits could decrease the incidence of falls. Clemson et al. (2023) indicated that home fall-hazard interventions such as home visits and making environmental safety adaptations or the implementation of behavioural changes could reduce the overall rate of falls by 26%. Furthermore, Clemson et al. (2023) explained that these interventions were more effective in people who were deemed at a higher risk of falling, reducing their risk by 38%. This review also indicated that home assessments administered by occupational therapists tended to be more efficacious than those performed by trained nurses, community work volunteers or non-professionally qualified domiciliary support workers (Clemson et al., 2023; Gillespie et al., 2009). Overall, Clemson et al. (2023) uncovered strong evidence that home visit assessments conducted by occupational therapists, who identified and eliminated fall hazards in the home, could lead to a decrease in falls among older individuals living in the community, particularly those who were at a higher risk, such as those who had experienced a fall in the past year or had been recently hospitalised.

Home visit assessment also enable occupational therapists to assess an individual's home environment and pinpoint any potential hazards and primarily enhance the discharge process (Atwal et al., 2014; Pardessus et al., 2002). According to Lannin et al. (2011), pre-discharge home visits provide both caregivers and in-patients with reassurance about the discharge process, thereby helping to alleviate anxiety and minimise its impact. Furthermore, home visit assessments have several advantages over hospital-based assessments as they utilise a collaborative approach to decision-making in the patient's home environment (K. Lockwood et al., 2020).

A range of home assessment tools and checklists are used by occupational therapists to help older people detect home environment hazards and prevent falls. An overview of common tools and their characteristics is presented in Table 2.1. These home assessment tools have been utilised to evaluate potential fall hazards or home hazards that may affect individuals with physical limitations.

Table 2.1: Common home assessment tools and checklists used by occupational therapists

Author (year)	Name of assessment	Purpose	Study design	Population and Intervention	Content	Results
Clemson et al. (2014)	The Westmead Home Safety Assessment tool	Identify home falls hazards for elderly people	Qualitative study	324 home safety fall prevention visits; in-depth interviews with 8 occupational therapists and 2 program coordinators.	Has a 72-item checklist to identify safety hazards in the home.	The Westmead checklist was considered time consuming compared to usual practice. The tool was considered comprehensive and evidence-based, enabling clients to recorganise their environment or make behavioural changes.
Mackenzie (2017)	Home and falls Accident Screening Tool (HOME FAST)	Screen and identify older people at risk of falling within their own home	Mixed methods approach	Survey data (n = 32), focus group data (n = 46) and interview data (n = 5) from occupational therapists, physiotherapists, community nurses and other health professionals	Consists of 25 items with each item being scored dichotomously to identify a hazard and a 'not applicable' rating means the feature of the home does not exist	The HOME FAST tool can contribute to preventing falls in the homes of older people or a general screening tool for older people who were at a high falls risk. Participants suggested additional items for the HOME FAST such as medication use, fatigue and home maintenance tasks.
Iwarsson (1999)	Housing Enabler tool	Assess a person's functional limitation and potential home environment hazards	Quantitative study	133 people aged 77-84 living in private housing were collected with the tool; data was collected with the use of the tool by occupational therapists	Assesses 1) person's functional limitations and dependence on mobility aids, 2) environmental barriers, 3) overall accessibility score from step 1 and 2	The tool is a useful and reliable instrument for community-based occupational therapy. This tool is able to generate data regarding a person's functional capacity, possible environmental demands to help occupational therapists plan for future individual plans.
Robnett et al. (2002)	SAFE AT HOME screening tool	Assess potential unsafe situations at home	Quantitative study	126 older participants, 65 years old or older; 12 potentially unsafe situations were set up and clients were asked to identify what is unsafe	Checklist of 12 main home areas: front/back access, bathroom, kitchen, etc.	The tool has the potential to distinguish who can live independently and those who may need assistance for home safety.

In summary, these studies indicate that occupational therapy home assessments offer substantial benefits in reducing falls among older adults. Additionally, there are various tools available to cater to different goals and populations. However, despite the wide benefits of home assessments and modifications, as shown in Table 2.2, access is limited in both urban and rural areas (van Gaans & Dent, 2018). Studies have shown that home assessments can take a considerable amount of time, averaging 80 minutes per home assessment (Atwal et al., 2014; Hoy et al., 2008; Lannin et al., 2011). As home assessments are time-consuming interventions, this places more demands on occupational therapists providing this service (Hoy et al., 2008). Ongoing staff shortages also mean that additional time needs to be allocated for this service and some home visit assessments being turned down and not completed in hospitals (Lannin et al., 2011). Shortages of workers have had a particularly significant effect on the availability of home assessments in the aged care industry, indicating that alternative approaches are necessary (Cheng et al., 2019).

Table 2.2: Studies evaluating home assessment modification interventions among older people

Study/author/year	Study design	Population	Intervention	Control	Findings
Pardessus et al. (2002)	RCT	60 patients hospitalised for falling and recruited from the acute department, aged 60>	Home assessment conducted by an OT and ergo therapist to assess falls and environmental hazards. Telephone follow-up at 6 and 12 months.	2-hour home visit assessment	The decline in autonomy experienced by the intervention group at the 12-month mark was not as pronounced as that of the control group. Visits to an older person's home during their hospitalisation could help improve their long-term independence by allowing a therapist to observe the patient in their natural living environment and identify any hazards, as well as suggest modifications to address them.
Avlund et al. (2002)	RCT	149 patients aged >60, had a geriatric problem and needed ongoing treatment/rehabilitation	Patients were randomly assigned to receive either comprehensive geriatric assessment with follow-up by the interdisciplinary geriatric team at least 5 times during the first 6 weeks after discharge, or they underwent the existing discharge procedures.	Functional ability measured by Barthel Index	The intervention group who was admitted to the medical ward, pulmonary patients and patients with fractures had a beneficial effect on functional ability in hospital and at home. Patients who had been hospitalised at a geriatric ward and patients with cardiac failure did not have beneficial effects on their functional ability.
Patterson et al. (2001)	Descriptive	239 hospitals in the United Kingdom	Investigation of current practice of pre-discharge home visits among elderly patients.		Out of the 238 units, 155 (65%) home visits were conducted with a range of 11 to 40 visits per month. Level 1 occupational therapists spent the equivalent of one day per week or more on home visits in 45% of the units, while level 2 occupational therapists did the same in 53% of the units. The number, complexity and professional involvement of pre-discharge home assessment visits were on the rise, despite a lack of evidence supporting their effectiveness.

Robertson and Blaga (2013)	Cross-sectional survey	70 New Zealand occupational therapists	A survey consisting of both closed and open-ended questions was distributed to therapists who work in physical acute care settings through a method of convenience sampling.		The most common method of evaluation used to assess daily living skills and gather information about the home environment, cognition, transferring, leisure and upper limb function was informal assessments, such as interviews and observations. In complex situations, cognitive assessments (56%) and home visits were employed with prudence to probe assumptions about safety in discharge procedures. Only 35% stated that they conducted home visits 'frequently'. While standardised assessments were not commonly utilised, they were generally considered when there was a need to verify cognitive ability. The primary objective of overall assessments should be to prioritise both safety and client/carer concerns in the decision-making process.
K. Lockwood et al. (2020)	RCT	77 participants recovering from hip fractures	To investigate the number and type of recommendations made by an OT during a pre-discharge home visit for patients recovering from a hip fracture.	Home Falls and Accidents Screening Tool to gather information about the home environment	The participants in the home visit group received more recommendations than those in the usual care group (with a mean difference of 2.8 and a 95% CI of 1.6 to 3.9), and they also adhered to a greater proportion of recommendations for assistive technologies (with a difference of 11.4%, within a 95% CI of 2.6 to 20.2), as well as for task modifications (with a difference of 10.0% within a 95% CI of 0.7 to 19.3). However, both groups had lower rates of adherence to recommendations for home modifications compared to other types of recommendations. Participants overall who were involved in a home visit had fewer re admissions to hospital 30 days post discharge, compared to those who were assessed via a hospital-based assessment only.
Pighills et al. (2011)	RCT	238 adults aged >70 with a history of falls	To compare the effectiveness of home assessments and modifications among	Westmead Home Safety Assessment	The outcome for the fear of falling assessment showed no discernible variation between the trained assessor and control

			older people who are at a high risk of falls.		groups (P = 0.92) or the occupational therapy and control groups (P = 0.90). The adherence to recommendations was considerably higher for participants in the OT group, considering the number of recommendations given, and this difference was statistically significant (P = 0.04). Overall, OT led environmental assessment and modification was clinically effective.
Huang and Acton (2004)	RCT	120 cognitively intact residents of a community aged >65 Intervention group = 60, M aged 72.37yr Control group = 60, M aged71.58yr	Use of individualised brochure based on fall-related risk factors, and standardised fall prevention teaching used over 3 home visits in a 4-month period.	Standardised fall-prevention brochure	In the post test for both groups, the findings indicated that the incidence of falls was reduced in the post-test in both groups at a p value of 0.05 level and the number of environmental hazards was less at post-test in the experimental group at the p value of 0.01. Several environmental hazards significantly diminished at the post-test in the experimental group.
Hagsten et al. (2004)	RCT	100 aged >65, living independently and not using walking or technical aids OT training group and usual care = 50 Mean age = 81yr	OT provided 45-60min ADL training during the hospital stay. HV conducted during inpatient stay to determine how to prepare and adapt the home environment. Outcome measures: - Klein-Bell ADL Scale - Disability Rating Index (ADL and IADL performance)	Usual care, no OT	All participants after 2 months regained ADL and IADL function. Half of control group received 90% preventive changes (e.g. removal of rugs), technical aids and home modifications. Upon discharge, the OT group demonstrated superior capability in independently performing activities such as dressing, maintaining personal hygiene, and using the restroom.
Hendriks et al. (2008)	RCT	333 older adults aged >65 who presented in the emergency room	A functional and environmental assessment conducted	Usual care	Adherence to referrals and OT recommendation was 75%. No notable differences were observed in falls (odds ratio = 0.86,

		after a fall Intervention group = 166 (M age = 74.5yr); usual care group 167 (M age = 75.2yr)	by an OT with written recommendations. Adults requiring modifications or additional support were referred to social and community services Outcome measures: • Falls (self-report) • Frenchay Activities Index • Groningen Activity Restriction Scale • Fear of falling • Social participation • EuroQual quality of life measure		95% (CI) = 0.50–1.49) or daily functioning (regression coefficient = 0.37, CI = −0.90 to 1.63) between the groups. However, in participants aged >80, a significant improvement in daily functioning was noted in the intervention group compared to the control group.
La Grow et al. (2006)	RCT	391 people aged >75 with a distance visual acuity of 6-24 months or worse, living in the community and ambulatory Home safety group = 100 Otago exercise program and Vit D group = 97	Home safety group = home safety checklist provided with discussion by an OT Otago exercise program = 1 yr of modified exercise program with Vit D supplementation.	2-hour long home visits	90% of the home safety group reported compliance or partial compliance with one or more of the recommendations. The incidence of both hazard-related and non-hazard-related falls was lower in the home safety group than in the control group (incidence rate ratios = 0.40 [95% CI, 0.21 to 0.74] and 0.43 [0.21 to 0.90], respectively).

Petersson et al. (2009)	Quasi-experimental pretest-posttest	103 community-dwelling adults aged >40 (M age = 75.0yr) ageing with disabilities and in need of home modifications Home modifications group, n=74 (69% women, 59% living alone; M age = 75.19 yr). Wait-list control, n=29 (66% women; 66% living alone; M age = 74.5).	Home modifications for shower and toilet, elevator, ramp, handrail, automatic door-openers and other modifications (unspecified).		The intervention group experienced less difficulty than the comparison group in everyday life at 2 months and 6 months post modifications. Small to moderate effect size for home modifications was seen in the intervention group. The waiting time for home modifications exacerbated the challenges encountered in daily life.
Nikolaus and Bach (2003)	RCT	360 adults; M age = 81.5 showing functional decline particularly in mobility, admitted from home to geriatric hospital Home intervention team = 181; M age = 81.2 Control group = 179; M age = 81.9	During the hospitalisation of participants, home hazards were discovered, and after they were discharged, a follow-up home visit was conducted to eliminate these hazards and educate them on how to safely utilise environmental modifications, such as technical and mobility aids. Control measures: • Falls (self-report)	Usual care at home	The intervention resulted in a 31% decrease in reported falls. In the intervention group, 76% of participants made more than one recommended change, and those who did experienced a substantial reduction in falls. However, the number of falls among participants in the intervention group who made no home modifications did not significantly differ from the control group. The proportion of frequent fallers (more than two falls) was not significantly different between the intervention and control groups.

			• Barthel Index (ADLs) • Lawton-Brody Questionnaire (IADLs)		
Stark (2004)	Nonrandomised pretest-posttest design	29 low-income older adults with functional limitations (22 African American, 5 white, 1 Asian, 1 other- 23 women, 6 men, M age = 67.3yr	Comprehensive assessment on abilities and environmental barriers provided to participants. Modifications provided with the therapist training participants on their use.		Participants' occupational performance scores increased significantly post intervention. Satisfaction scores significantly increased.
Stark et al. (2009)	Quasi-experimental design, pretest–posttest–posttest prospective study	67 people age >60yr(88% women; M age = 81.7yr) with functional limitations	OT conducted a comprehensive in-home evaluation, which included assessing the need for home modifications, assistive technology, education and follow-up training. Control measure: • FIM		80% of the recommendations were implemented, resulting in a notable improvement in functional independence, performance and satisfaction with performance within the first month. No observed change in functional independence and performance from the post-test to the 2-year follow-up.
Szanton et al. (2011)	RCT	40 low-income older adults with difficulty with >1 ADLs or >2 IADLs. Control group, n=16; intervention group, n= 24; M age = 79 yr	Intervention group received <6 occupational therapy led home visits, <4 visits with a nurse and an average of $1300 in handyman repairs. Control measure:	Control group received equivalent time with a research assistant.	The effect sizes for the intervention group were 0.63 for a reduction in difficulty with ADLs, 0.62 for a reduction in difficulty with IADLs, 0.89 for QOL, and 0.55 for in falls efficacy.

		Attention control (social visits) group, n=16; M age = 77yr	• Difficulty performing ADLs, and IADLs		
Tomita et al. (2007)	RCT	78 adults aged >60 and older living alone with difficulty in ADLs or IADLs and interest in using a computer. Treatment group, n=34; M age = 72yr Control group, n=44; M age = 75.6yr	A 2.5-hr home assessment was completed by an OT or a nurse. The home was retrofitted with sensors. Control measure: • FIM • OARS (IADL) • SIP: mobility subsection of dysfunction section • Craig Handicap Assessment and Reporting • Technique Mobility for Handicap Measure • Mini-Mental State Examination	Usual care	The cognitive function scores of the treatment group were significantly higher on the FIM and they maintained their functional status after 2 years, while the control group experienced a statistically significant decline over the same period. The treatment group did not show a significant decline in IADLs, unlike the control group. Furthermore, the rate of independent living was significantly higher in the treatment group compared to the control group.
Velligan et al. (2008)	RCT	120 adults aged 18–60yr with schizophrenia or schizoaffective disorder receiving services from community clinics	CAT group: Manual-driven series of environmental supports based on a comprehensive assessment of abilities and environment.	Usual care	The CAT group showed a substantial difference compared to the assessment-only group, with a higher mean SOFAS score at the 3-month mark. The GES group showed a significant improvement in their SOFAS score compared to the control group at the 3-month mark.

			GES group: Generic set of environmental supports. Outcome measures: • Adherence and utilization • SOFAS • Multnomah Community Ability Scale		The CAT group 45tilizat a greater proportion of supports compared to the GES group participants. The CAT group demonstrated a greater likelihood of enhancing particular targeted behaviours in comparison to the GES group. Participants in both groups with higher 45tilization rates exhibited improved SOFAS scores.

Abbreviations: ADL= activities of daily living; CAT= cognitive adaptation training; CI= confidence interval; FIM= Functional independence measure; GES = Generic Environmental Supports; HV= home visit; IADL=instruments of daily living; M: mean; OARS= Oxford Arthroplasty early recovery score; OT= occupational therapy; p= p value; QOL= quality of life; RCT= randomised controlled trial; SIP= Sickness impact profile; SOFAS=Social and occupational functioning assessment scale

2.6 Possible solutions for age-friendly housing

Solutions that lead to accessible and age-friendly housing for older adults are required. Ideally, solutions will be proactive rather than reactive (i.e., waiting for a health crisis) (Powell et al., 2017). A study conducted by Cheek et al. (2007) utilised a qualitative and descriptive approach, which revealed that older individuals hesitated to make modifications to their homes due to a lack of understanding about ageing in place and the services necessary to maintain their functional abilities at home. Bergland and Slettebø's (2018) qualitative study indicated that older individuals tended to refrain from discussing future prospects even though their mobility and health were declining.

There is an increasing focus on empowering the public to be involved in and take control of their health needs (Hibbard & Greene, 2013). Many people do not usually see themselves as competent in managing their health as they feel they lack the necessary skills or confidence (Hibbard & Gilburt, 2014). However, when people are given a sense of control over their health, their activation levels increase (Hibbard & Gilburt, 2014). Importantly, this approach is believed to inspire individuals to take control of their choices, initiate their own behavioural change, and motivate themselves autonomously. Enabling individuals to take control of their health not only grants them mastery, confidence and problem-solving skills but also empowers them to feel more in charge of their well-being (Ryan & Deci, 2000)**.** Based on the patient activation report by Hibbard and Gilburt (2014)**,** personalised or educational interventions aimed at addressing patients' healthcare concerns can enhance patient activation. For example, digital or paper-based tools or checklists may be used as a proactive approach to enable people to think about what they might need to age in place. The use of these tools may encourage forward planning, particularly during the early stages of ageing. These tools may educate people about age-friendly environments to help them continue the occupations they value as they age.

The health belief model aligns well with the work presented in this thesis. The health belief modelis a theoretical framework designed to elucidate health behaviour change (figure 2.11) (Vincenzo et al., 2022) . It comprises six key constructs, including: (1) an individual's perceived susceptibility to developing a health condition, (2) their perceived severity of the health condition, (3) the perceived benefits of taking the recommended action to prevent the health condition, (4) the perceived barriers to taking the recommended action to prevent the health condition, (5) cues to action that encourage engagement in the health behaviour, and (6) an individual's self-efficacy to engage in the health behaviour (Vincenzo et al., 2022). According to this model, it is essential for older adults to have access to the appropriate knowledge and resources that will enable them to make necessary actions to their homes and enhance their sense of self-efficacy. For example, in situations where individuals are worried about falling and believe that modifying their living environment can help prevent or reduce the likelihood of such occurrences, and they possess the means to evaluate the safety of their home, they are more inclined to adopt recommended

behavioural changes. Additionally, if we could assist people in comprehending the 'perceived benefits' of using a self-assessment tool, particularly for older adults, they may be more inclined to act, reduce potential barriers within the home and use the tool to age in place.

Removed due to copyright restriction
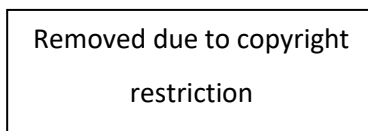
Figure 2.11: Health Belief Model

Note. **Sourced from Vincenzo et al. (2022)**

2.7   Use of technology in home assessments

Digital health technology is rapidly evolving and is increasingly used in health and aged care settings (Curtis & Price, 2017). Digital health technologies offer numerous benefits, including the potential to improve patient healthcare and health outcomes, enhance patient engagement, and improve disease management (Sarah et al., 2022). For instance, telemedicine platforms can provide remote consultations, reduce the need for in-person visits, and expand access to healthcare services, particularly in underserved areas (Australian Digital Health Agency, 2023). The National Digital Health Strategy and Framework (2023) reports that Australians want to use digital apps and services to support their healthcare needs. Additionally, healthcare professionals want to take advantage of innovative tools to improve workflow and efficiency (Australian Digital Health Agency, 2023).

Digital health technologies are also being utilised to expand access to and enhance the delivery of occupational therapy home assessments (Ninnis et al., 2018). A scoping review by Ninnis et al. (2018) identified 14 studies that used technology in occupational therapy home assessments. Ninnis et al. (2018) discovered two main applications of technology: the creation of novel applications, and the implementation of existing and readily accessible technologies (Ninnis et al., 2018). This review also revealed that technology may offer multiple advantages in conducting home assessments. For example, Daniel et al. (2013) and Sim et al. (2015) investigated the use of digital photos and teleconferencing equipment to supplement or replace traditional home assessments. These studies showed that digital

technologies for equipment prescriptions were reliable and could be a cost-effective solution for environmental assessments (Nix & Comans, 2017). The use of smartphones, tablets and videoconferencing equipment boosted home assessment efficiency, leading to enhanced productivity of occupational therapy staff in three community and rural hospitals (Nix & Comans, 2017).

A recent integrative review by Carrington and Shahidul Islam (2022), including ten studies, confirmed that telehealth technology could increase the delivery of occupational therapy home assessments. Carrington and Shahidul Islam (2022) discovered that telehealth technology was beneficial in decreasing the time needed for home assessments, increasing access to services and shortening hospital stays. In particular, the reduction in travel time to and from the client's home significantly benefited occupational therapists. Similarly, Read et al. (2020) examined the feasibility, acceptability and potential benefits of home assessment. Researchers found that technology could offer easy remote access to the home environment, facilitating prompt conversations between patients and healthcare professionals about discharge planning (Read et al., 2020).

However, research indicates that the technology used for home assessments requires further refinement and is not yet ready for widespread implementation (Ninnis et al., 2018). Both Ninnis et al. (2018), Carrington and Shahidul Islam (2022) agreed that although technology is feasible and effective, most studies were generally small-scale pilot studies with small sample sizes and required further refinement. Breeden (2016), Hoffman & Russell (2008) and Russell et al. (2005) conducted small-scale pilot studies that have not yet proven the efficacy or non-inferiority of the technologies, and as a result, these technologies used for home assessments have been underutilised in clinical practice. Although there are many tools that have been developed (Table 2-1), all are tailored for people with impairments, fall prevention or discharge planning (Ninnis et al., 2018). As a result, there are currently no digital home assessment tools readily available for healthy individuals, middle-aged adults and older people who wish to age in place. To ensure that all client groups, including healthy individuals or middle-aged and older individuals who intend to age in place, have access to appropriate tools, innovative solutions must be developed that cater to their specific needs.

2.8 Current gaps and conclusions

With an ageing population who want to remain in their own home for as long as possible, solutions are required to promote successful ageing in place. Not only is ageing in place highly desired by individuals, it also represents a positive fiscal benefit for governments as it provides a more cost-effective alternative to residential care (Royal Commission into Aged Care Quality and Safety, 2020a; Sixsmith & Sixsmith, 2008). The creation of age-friendly communities and homes is seen as a priority both in Australia and worldwide, and numerous initiatives are underway (World Health Organization, 2007). However, there is limited

evidence on how to best support this. While there are many qualitative studies exploring the meaning of 'home' to older people, synthesis of these studies is lacking.

Further understanding of the personal meaning of 'home' and how it can affect ageing at home and older peoples' future housing decisions is required (synthesised in Chapter 2). Previous studies have primarily focused on older individuals who have already experienced age-related disability and functional decline. There is limited information available on the perceptions of older adults regarding ageing in place before the onset of illness or disability. There is a need to understand the perspectives of middle-aged people on their long-term plans for housing, especially as some are less likely to consider home modifications but may consider renovation plans or downsizing to accommodate their future needs when. This information is vital for creating solutions that foster ageing in place, enhance older adults' autonomy, and encourage their involvement in society.

To achieve the WHO's goal of creating age-friendly environments, it is crucial to examine older individuals' concerns about ageing in their homes and whether safety is a consideration (synthesised Chapter 3). Most research has focused on older adults with an existing disease/condition who have needed changes to their homes. To date, there has been limited research on older adults who are physically fit, self-sufficient and are contemplating the prospect of ageing in place. The experiences of relatives being taken into account in the housing decisions of older individuals have also not been explored in previous research, and this provides valuable insights into the phenomenon of ageing in place. These findings may contribute to the development of resources that enable older people to remain at home, leading to the optimal use of health and aged care resources. Providing the public with education on age-friendly design and home modifications could aid future planning and potentially prevent injuries, reduce the financial burden on the healthcare system, and compensate for workforce shortages in healthcare and aged care.

While existing home environment assessments and checklists have been created by occupational therapists, they have all been utilised with individuals who already have physical limitations and have primarily focused on falls and safety. While much research has focused on identifying hazards and preventing falls among older individuals with impaired functional ability or disability, there is limited knowledge on the hazards that may hinder the ability of healthy older adults to remain in their homes in the future. Identifying potential hazards in the home environment of healthy older individuals can provide valuable insights into the support and environmental modifications required to enable successful ageing in place in the future (synthesised in Chapter 4).

To this point, there has been no thorough examination of the potential use of a new tool for future housing planning, specifically for healthy individuals, middle-aged adults and older people who wish to age in place. Existing tools have mainly been designed to serve the needs of older individuals with reduced functional capacity, rather than those planning for future requirements to age in place. Additionally, most home

environment tools have been designed for use by occupational therapists. Although the current tools may be promising, there are still no tools with established reliability and validity and that can help the ageing population prepare for ageing in place. Recently, self-assessment tools for evaluating home safety have gained prominence, thanks to their capacity to encourage individuals to take a more active interest in their future health outcomes. To determine the accuracy of a self-assessment tool for older individuals and whether older people can accurately assess their homes and arrive at similar conclusions as an occupational therapy assessment, the validity of the tool needs to be explored (discussed in Section 6.3.2, Chapter 5).

CHAPTER 3   MIDDLE-AGED AND OLDER ADULTS' PERSPECTIVES ON THEIR OWN HOME ENVIRONMENT: A QUALITATIVE META-SYNTHESIS

This chapter addresses Objective 1 of the thesis: to examine how middle-aged and older adults perceive their current home environment and the concept of 'home', and the factors they consider when making decisions about their future housing. This chapter describes a qualitative meta-synthesis conducted and is presented with minor changes for thesis formatting from the article, 'Middle aged and older adult's perspectives of their own home environment: a review of qualitative studies and meta-synthesis', published in *BMC Geriatrics,* within Appendix O (Aclan, George, Block, et al., 2023).

This research was initiated as part of a Master's research program before being elevated to a PhD candidacy. As a result, this meta-synthesis was carried out before the remaining studies in this thesis. This study addresses the significance and experiences of home in middle-aged and older individuals who are not yet experiencing any loss of function and are relatively self-sufficient. After finishing the initial research and upgrading to a PhD, it was determined that a qualitative study was necessary to delve deeper into the perspectives of aging adults on home safety as they grew older and to examine the opinions of individuals with older family members. Additionally, an agreement (validity) study was proposed to explore the potential usefulness of a digital tool in supporting these individuals to remain in their own homes.

As the lead author of this publication, the candidate's contribution was 80% of this chapter, was the major contributor to the write up and editing of this publication. The candidate conceived the idea and concept for this qualitative meta-synthesis, and with guidance from and collaboration with co-authors, developed and conducted the search strategy, quality appraisal, data screening, data extraction and data analysis. Co-author approval was obtained for permission to include this publication in the thesis.

3.1 Introduction

Globally, there are an estimated 1 billion people aged 60 years and older (World Health Organization, 2021b). This number is expected to rise and nearly double from 12% of the population to 22% due to the continued decline in fertility rates and increased life expectancy (World Health Organization, 2010). Functional ability is determined based on: the intrinsic capacity of the individual, the environment a person lives in, and how they interact within their environment (World Health Organization, 2022). Ageing can reduce a person's intrinsic capacity thereby reducing their functional ability (World Health Organization, 2020a). As a result, their ability to live independently may be compromised. When this occurs, support may be needed to help the person 'age in place' through modifications to the home (e.g. installing ramps or rails).

A review by Pani-Harreman et al. (Pani-Harreman et al., 2021) found that 'ageing in place' refers not only to the characteristics of the home but also to social and support networks that surround the person. Most people prefer to remain in their homes for as long as possible and supporting ageing in place (within the home) is much less expensive for governments than funding residential care facilities (Hatcher et al., 2019; Kramer & Pfaffenbach, 2015; Productivity Commission, 2013; Stones & Gullifer, 2014; Tanner et al., 2008). Research suggests that formal support to the older person in their home is an effective method of enabling the ageing population to remain at home (Kok et al., 2015; Potter, 2010). Many countries are now attempting to improve the provision of home care to support ageing in place, rather than investing in residential care facilities (Mah et al., 2021). Worldwide, the expenditure on long term care is expected to increase from 1.5% in 2010 to more than 3% in 2050 (Kok et al., 2015). For example, in Australia, total operational costs amount to AUD85,818 per residential aged care bed per annum, versus $26,382 per annum for the cost of home care packages (Productivity Commission, 2015; Standfield et al., 2018). Other research shows that in Germany, the average cost of nursing home care is US$49,218 per annum, whilst long term care costs an average of US$43,997 per annum (König et al., 2014). Similarly, in America, the average cost of home care per month is approximately US$3500 per month versus US$7000 per month for the cost of care in a nursing home (Cox & Pardasani, 2017). Previous studies show that older adults have a strong emotional attachment to their home and the home is not just a building but a place of meaning (Oswald & Wahl, 2005; Sherman & Dacher, 2005). Qualitative research has described a clear relationship between older people, their physical environment and their personal views on ageing (Aplin et al., 2020; Coleman & Wiles, 2020). Home is usually considered a place of comfort, freedom, independence and safety (Aplin et al., 2020; Coleman & Wiles, 2020; Hatcher et al., 2019; Tanner et al., 2008). Living at home provides older adults with a sense of being anchored to their living environment and a sense of individuality where they are able to decorate/alter their home based on their preferences, or the ability to fulfil valued roles and activities (Hatcher et al., 2019). Possessions within the home carry memories and allow opportunities for self-reflection (Coleman & Wiles, 2020). Being close to family, friends, neighbours, social activities and local shops contributes towards a positive ageing process (Hatcher et al., 2019; Kramer & Pfaffenbach, 2015; Stones & Gullifer, 2014). In contrast, Aplin et al. (2020) reported that for younger adults (aged 39-40 years), home is a place for functionality and comfort.

Most of the research in this field has been conducted with older people who may already be experiencing disability and loss of function due to ageing. Less is known about the views that older adults have about ageing at home prior to the onset of illness or disability. This is important in order to inform healthy ageing interventions and help older people to maintain independence and participation in the community. Furthermore, there is a dearth of research regarding the perspectives of middle-aged people on housing and their longer-term housing plans. Adults are unlikely to be considering home modifications (such as ramps or rails) in middle age, however they may be considering longer term needs when planning

renovations or downsizing once their children leave home. Understanding the value and meanings of 'home' in both middle-aged and older adults is an area of critical importance, and synthesis of existing literature has not yet been conducted. This review therefore seeks to explore what home means to middle- and older-aged adults. The aim of this qualitative meta-synthesis systematic review is to synthesise and understand middle- and older-adults' perspectives on their home environment and the concept of 'home' in order to determine the factors that are important for decision-making about their future housing.

3.2 Methods

This review followed the JBI methodology for systematics review of qualitative evidence (C. Lockwood et al., 2020). The protocol for this review was developed *a priori* and stored within the Flinders University repository (see Appendix A) (Tufanaru et al., 2020). The Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) statement adhered to (see Appendix B) (Page et al., 2021).

3.2.1 Inclusion criteria

Articles were included if the studies: a) included middle- (aged over 50) and older-aged adults (aged over 65) (either within metropolitan or rural areas) in any country, b) explored personal experiences, beliefs and attitudes towards ageing within the home, c) used qualitative methodologies, d) were conducted in any community setting, e) were published from 2005 to 2022 to represent contemporary literature. Studies which focused on specific diagnostic populations (e.g. post hip fracture) were excluded. Studies were excluded if they were not in English. Mixed method studies were only considered if data from the qualitative components could be extracted.

3.2.2 Search strategy and study selection

The search aimed to locate both published and unpublished studies. Full search strategies are detailed in the supplementary material (Appendix C). The reference lists of all eligible studies were screened for additional studies. Initial database searches occurred on 19 May 2021 and 12 July 2022. The search strategy was verified by an experienced academic librarian. Databases searched were MEDLINE, PsycINFO (Ovid), Scopus (Elsevier) and CINAHL (EBSCOhost). Sources of unpublished studies and grey literature searched were Google Scholar and Council on the Ageing (COTA), ProQuest Dissertations and Theses and WorldWideScience.org. All identified citations were collated and uploaded into Endnote X9.3 (Clarivate Analytics, 2021) then transferred to Covidence (Covidence systematic review software, 2021)where duplicates were removed.

3.2.3 Quality appraisal

Studies were assessed by two reviewers independently to rate the methodological quality of the studies using the standardised JBI Critical Appraisal Checklist for Qualitative Research located in JBI SUMARI (System for the Unified Management of the Assessment and Review of Information) (The Joanna Briggs

Institute, 2019). All included studies underwent data extraction and synthesis, where possible, in order to employ an inclusive approach with diverse studies and datasets (Drisko, 2020).

3.2.4 Data screening and extraction

Two reviewers (RA and KL) independently screened titles and abstracts and selected those that appeared to meet the inclusion criteria for full-text review. The same process involving two reviewers was conducted for review of full texts. Any disagreements between the two reviewers were resolved by discussion and/or consultation with a third reviewer to arrive at a consensus. Included studies were imported into JBI SUMARI for extraction and synthesis (The Joanna Briggs Institute, 2019). Qualitative data were extracted by one author (RA) using the standardised JBI data extraction tool. Data extracted included specific details about the populations, context, culture, geographical location, study methods and the phenomena of interest relevant to the review question and specific objectives (Appendix D). Findings (a verbatim extract of the author's interpretation of results) and illustrations (direct participant quotes) were extracted from the included studies into JBI SUMARI. Findings and illustrations were extracted by the primary reviewer (RA) and confirmed by the secondary reviewer (KL) after thorough review of the papers.

3.2.5 Meta synthesis

Extracted findings were categorised based on meaning. Findings were aggregated into categories and grouped into synthesised findings using the JBI meta-aggregative approach (Drisko, 2020; Lockwood et al., 2015; The Joanna Briggs Institute, 2019). In meta-aggregation, the author does not re-interpret the findings of included studies but instead synthesises and accurately presents the findings as reported by the original authors (Lockwood et al., 2015). Once findings are extracted and allocated a level of credibility, they are grouped (on the basis of having a similar meaning or concept) and then combined into synthesised findings (where each synthesised finding contains at least two categories) (Lockwood et al., 2015). The final categories and synthesised findings were discussed by three reviewers (RA, KL and HB) and revised until a consensus was reached.

3.3 Results

3.3.1 Characteristics of included studies

The search yielded 14,093 studies. In total, 4653 duplicates were removed, 9440 titles and abstracts were screened. Of these, 86 studies were reviewed in full text and 46 studies were included in the review. The PRISMA flowchart illustrating this process is shown in Figure 3.1 (Page et al., 2021). Included studies were published between 2006 and2022 in 15 countries: Australia, Canada, United States, Norway, Spain, Sweden, Finland, United Kingdom, Malaysia, Korea, New Zealand, France, India, Brazil and China. The number of participants in the studies ranged from 10 to 1680. All studies collected data through focus groups, semi-structured/in-depth interviews, surveys, photo diaries and field notes. Overall, the findings

comprised data on 5183 middle- or older-aged adults. Twelve studies included participant groups comprising both middle-aged and older adults (Aplin et al., 2013; Baron et al., 2020; Brim et al., 2021; Burgess & Quinio, 2021; de Jonge et al., 2011; Dendle et al., 2021; Finlay et al., 2020; Lewis & Buffel, 2020; Webber et al., 2022; Wiles et al., 2012; Woolrych et al., 2020; Yu & Rosenberg, 2017). However, middle-aged adults were in the minority and their data was not analysed or presented separately. In the 12 studies that included middle aged participants, the age range was large, varying from 50 to 92 years.
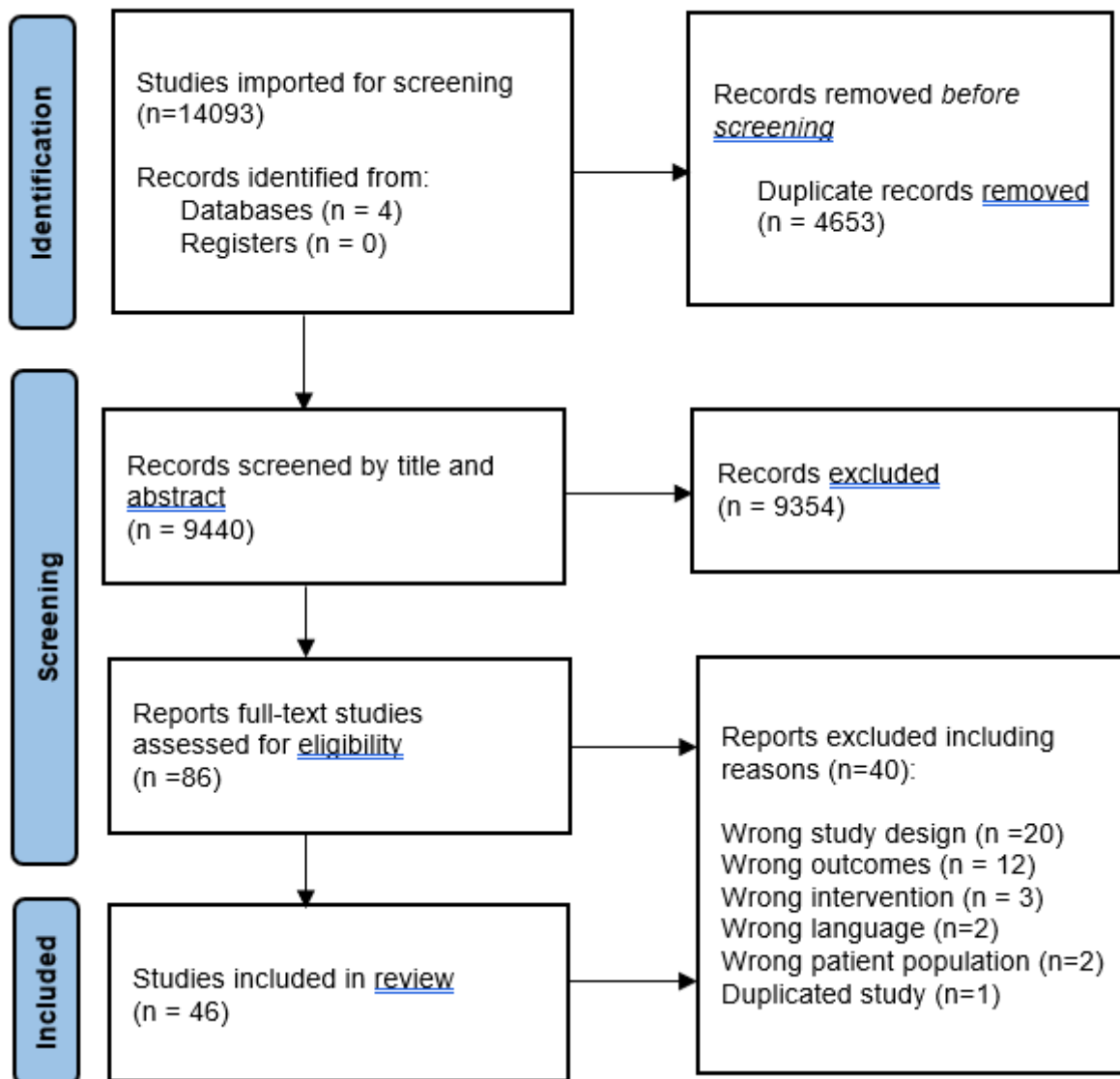
Figure 3.1: PRISMA flow chart of search results and selection process

3.3.2   Methodological quality

The methodological quality of the 46 studies is summarised in Appendix E (Aromataris et al., 2020). Four studies met 100% of the criteria and the remaining 42 met 80% of the criteria. Overall, the methodological quality of the 46 eligible studies was considered good and no studies were excluded following critical appraisal.

3.3.3 Data extraction and meta-synthesis

A total of 429 findings were extracted and categorised into 17 categories. The 17 categories were synthesised into seven synthesised findings (see Table 3.1 for full details). A total of 12 out of the 46 studies included perspectives of middle-aged participants over the age of 50.

Table 3.1: Summary of synthesised findings

Synthesised finding 1: People valued independence, autonomy and housing that fitted with their functional abilities	Category 1.1- Individuals perceived themselves as 'independent' if they remained in their own home
	Category 1.2- The need for the 'right fit' between an older person's abilities and the environment
Synthesised finding 2: Finances and costs constrained decisions about future housing decisions	Category 2.1- Financial resources were a factor when making housing decisions
Synthesised finding 3: People experienced feelings of stigma regarding ageing and were concerned about being a burden	Category 3.1- Negative views associated with moving house
	Category 3.2- Individuals did not want to be a burden
	Category 3.3- Stigma
	Category 3.4- Acceptance of ageing impacted housing decisions
Synthesised finding 4: People experienced both positive and negative attitudes and feelings about future housing	Category 4.1- Individuals with positive attitudes to future housing
	Category 4.2- Some individuals avoid thinking about future housing
Synthesised finding 5: Emotions, meaningful activities and attachments to the home played a part in housing decisions	Category 5.1- Emotions related to home
	Category 5.2- Meaningful activities within the home
	Category 5.3- Strong sense of attachment to the home
Synthesised finding 6: Safety, accessibility and aesthetics in the home were important	Category 6.1- Individuals valued safety and accessibility for their homes
	Category 6.2- Individuals valued the aesthetics of their home
Synthesised finding 7: Family, community support and connection were essential to support remaining at home	Category 7.1- The importance of access to essential community services
	Category 7.2- The importance of being close or connected to family
	Category 7.3- Individuals felt a sense of connection towards their community

3.3.4 Synthesised finding 1: People valued independence, autonomy and housing that fitted with their functional abilities

This synthesised finding comprised two categories, as presented in Tables 3.2 and 3.3.

3.3.4.1 Category 1.1: Individuals perceived themselves as 'independent' if they remained in their own home

Participants reported a strong desire to remain independent and in their own home, as depicted in Table 3.2. They believed that if they were 'independent', they would be able to remain in their home. They appeared to take pride in being independent in daily activities and not requiring help. Having choice over when and where to go was valued; being 'forced' into housing decisions made some participants feel trapped. In their daily lives, participants spoke of the importance of being able to choose what they wanted to do, where they spent their time and being in control of their own routines. Having a home with a garden was also described as having a sense of freedom. Some participants did acknowledge that home modifications enabled them to remain independent at home.

Table 3.2: Synthesised finding 1 illustrations for category 1.1

Finding	Illustration
Freedom facilitated autonomy and control in their planning of everyday (U)	"I'm used to being on my own and when you're on your own you can do what you like, you can eat what you like, you can go to bed and get up when you feel like it...I like to be able to do things my way. If you've got me living with anyone they say well you do so and so and they might do it different to what I would do it... I feel happy living in my own home... Doing what I want to do and doing it when I feel like doing it."pg. 5(Hatcher et al., 2019)
The sense of self-reliance was highly associated with their own homes (U)	"I feel free and.. I am still able to do the things (that) need to be done and the things I want to do." pg. 108(Mortenson et al., 2016)
Home is a meeting-place where everything happens, and a place family or friends can be received into (U)	"A home is your own, of course, and you can close your door and be by yourself when you want, and then it's great fun to open up and be able to receive your friends and enjoy being at home." pg. 29(Dahlin-Ivanoff et al., 2007)
Older adults stress the importance of freedom of choice about the moment they relocate (U)	"When you lose your autonomy, then the game is different. Sometimes you don't have the choice anymore. If you wait until the last minute [to relocate], you can't choose for yourself. The kids will decide for you, and you will be admitted for the best or the worst."pg.375(Bigonnesse et al., 2014)
Being socially connected with others out of home activities was important (U)	"Mondays are shopping day. We go out and shop somewhere. She bowls on Monday afternoons after we shop. Tuesday, after swimming, Tuesday is usually her day to go out with the girls, so I'll stay home while she goes out with the girls, so I'll stay home while she goes out. Wednesday we go swimming again and usually Wednesday afternoon we meet friends. Either go out for lunch or even just go out for a coffee. We met all these people at the pool...they aren't old friends. They are people we met at the pool- now we're all friends."pg. 154(Vrkljan et al., 2011)
Living independently provided freedom to perform everyday living	"I do all my own work."pg. 4(Hatcher et al., 2019)

tasks which may not be possible if they relocated (U)	
Changes were made to retain independence (U)	"I could get more help if I needed it, but I said no that'll do for the moment." pg. 1806(Grimmer et al., 2015)
Being able to make their own choices was important in being independent. (U)	"We don't like to go into these retirement villages that they're trying to get everybody into today Int: Why is that? C: We like our own space, you know, and like to be independent. We had friends who moved into one out [that] way and they've got a nice little two bedroom place, but they can't do anything to the gardens. Everything is done. They had a name on the door of their old house and they wouldn't let them put that up there. And you can't have animals. . . . Some people are quite happy to have organised things around them and that, you know, like these friends of mine, that's why they have fitted in so well. They have little concerts up in the hall . . . the gardens are done and everything . . . [but] we still like gardening, we always did and we always swore we wouldn't get a place unless it had a little bit of dirt, not a big bit, but just a little bit for therapy, you know." pg. 363(Wiles et al., 2012)
Remaining in the home was central towards independence (U)	"I'll fight till the last for that (to stay here)." pg. 43(de Jonge et al., 2011)
There was a strong desire to remain in their own home due to its link to independence and autonomy. (U)	"That's independence too, isn't it? It just sort of makes you more able to do things [general agreement]." pg. 362(Wiles et al., 2012)
Being able to live in one's own home is enough to constitute successful ageing (U)	"A good old age is this, like mine, this is good. It makes me sick when I watch the telly, showing old people in those institutions. And they always say they're not doing well. And it just makes me ill to see that, but my situation is good." pg. 55(Nosraty et al., 2015)
Not everyone wants to live in cohousing communities (U)	"I mean, it's not an option for everybody, probably for relatively a small proportion of the population, which is too bad. Having to think about somebody other than your own, your own immediate household." pg. 412(Puplampu et al., 2020)
They felt trapped if they were unable to move in a place (U)	"It means I'm stuck, I can't move (laughter)." pg. 360(Wiles et al., 2012)
People who lived in the country and in a family, house appreciated the abundance of space in their residential milieu, because space guaranteed privacy (U)	"I have my own yard and freedom." pg. 252(Juvani et al., 2005)
The elderly felt that their homes and communities were free and comfortable places (U)	"In my house, I can do whatever I want. I go where I want to because no one stops me from doing that. But, you see, (in the facilities for the elderly) you have to eat what you are given, and when they tell you to sit still, you have to sit still. (informant 5)." pg. 101(Park & Ko, 2020)
Absence of community supports services influences an older adult's meaning of home and independence (U)	"The bank, the grocery, the pharmacy, [and] now we only have convenient stores. Before, 30 years ago, I could walk to the grocery, to the bank. But now that I'm aging and I would like to stay and to live in my apartment, I have to take my car to go to all these places: the grocery, the pharmacy, [and] the bank." pg.366(Bigonnesse et al., 2014)
Participants were reluctant to signal neediness and preferred to work	"We're both quite independent, we'd hate to ask, my husband had cancer and he had to have treatment, and out friends just railed round, and I

through challenges rather than involve family (U)	couldn't tell my family because they'd have flown to be with us and I didn't want that." [pg. 2550](Neville, Napier, Adams, et al., 2021)
The incentive to move was linked to maintaining independence if she was no longer driving (U)	"There's a new retirement place going up, just started right in the middle of [name of town], I thought that would be the place to be, I could walk to the bridge club, I could walk to the library. If you were town, it would be brilliant." [pg. 2551](Neville, Napier, Adams, et al., 2021)

(U) Unequivocal finding, (C) Credible finding

3.3.4.2 Category 1.2: The need for the 'right fit' between an older person's abilities and the environment

Participants acknowledged that, as they aged, their ability to manage different activities (such as home maintenance) declined, as depicted in Table 3.3. In some cases, changes in health status or abilities resulted in the need to relocate. Homes that were well designed (such as having a flat entry from the carport to the front door) made life easier as did homes that were specifically designed to be low maintenance. Participants were happy when there was a good fit between their abilities and the design of the home.

Table 3.3: Synthesised finding 1 illustrations for category 1.2

Findings	Illustrations
Relocation occurred if they couldn't access safe transit options (C)	"Participants indicated they would have to move, thereby bringing significant disruption to their usual occupations. A disruption in mobility was seen as a change that would be too big to adapt to."[pg. 153](Vrkljan et al., 2011)
There is a need for formal assistance to live independently and remain at home (U)	"As we age we lose some of our ability to do the necessary things, even little things (like changing a light bulb in a high ceiling). We worry . . .," and "I am afraid to climb a ladder to clean the gutters on my roof." [pg. 232](Black et al., 2015)
Health status, changes in function and need for assistance was a reason for relocation (C)	"I will need to move if I should develop any other kind of disability." [pg. 385](Martin et al., 2019)
Strong attachments to the home made it difficult to be objective about decisions to leave the home as their physical health deteriorated and/or the functionality of the home decreased (U)	"Occupants were satisfied with their homes because they considered them to be a good match for their homes because they considered them to be a good match for their needs, and whilst aware that they were 'slowing down', were satisfied to remain in their homes for as long as they could be sustained within the home and do their homes for as long as they could be sustained" [pg.1698](Mackenzie et al., 2015)
Deciding to wait on home modifications created loss of independence (U)	"At my mother's home, the bathroom doesn't have any major or special modifications. I advised her to replace the bath with a shower, or at least to do something to it that would make it easier for her to get in and out. But it's something she hasn't done for the moment and I don't think that she will. It is not a problem of money, and when I suggest anything that might make things easier she says 'I'll be long dead before I will be able to manage with those sort of things, and what is the use of doing any major work to the house if tomorrow I will no longer be there?'[pg. 1291](Renaut et al., 2015)

Feeling unable to meet these demands and being reminded daily of things needing repair or worrying that things such as appliances would break down was described as frustrating (U)	"As a single woman, it's a bit difficult because you need... you see that needs fixing and that needs repairing." pg. 260(Almevall et al., 2022)
Some of them wanted to keep a garden but wanted one small enough to manage (U)	"I like the thought of having a garden that I'm in control of, rather than it being in control of me." pg. 1187(Burgess & Quinio, 2021)
Others explained they were not satisfied with the practicalities of retirement housing (U)	"They were typically out of town, or in very small towns, and not well connected to London." pg. 1188(Burgess & Quinio, 2021)
Those who owned their home had maintenance obligations (U)	"Still in my house and that the maintenance has not become too much." pg. 6(Dendle et al., 2021)

(U) Unequivocal finding, (C) Credible finding

3.3.5 Synthesised finding 2: Finances and costs constrained decisions about future housing

This synthesised finding comprised one category, as presented in Table 3.4.

3.3.5.1 Category 2.1: Financial resources were a factor when making housing decisions

Financial constraints impacted on people in a variety of ways, as depicted in Table 3.4. Some participants were in rental properties where the owners refused to fund home modifications which would have improved safety and access. Some participants felt that if they had to relocate, they had very few options (if any) that would be affordable. One person commented that they had not expected to live as long as they were living. Factors such as leaving an inheritance for family members and deciding to invest in the housing market also influenced decision making.

Table 3.4: Synthesised finding 2 illustrations for category 2.1

Findings	Illustrations
Health and finances factors determined ability to remain at home (U)	"Wondering where I will be able to live when my money and health require another place . . .," and "The economy has affected all of us. It's harder and harder to survive financially. . . didn't expect us to live as long as we're living . . ." pg.232(Black et al., 2015)
Older people in Latvia and Hungary had to sign their home over to relatives due to financial and material burdens of home maintenance (U)	"I have never asked anyone for help, and I hope I never need to... I'm not in such a bad state yet that I'm in need of help. I can still manage alone, and my sister takes care of me. I don't have to depend on others... My daughter will inherit the house. I've already had it put in good order, but if she didn't bother ot visit me and didn't help at all, I would give the house to whoever cared for me, perhaps to one of my grandchildren. But, as I say, I am not worried, I have a good family. Female participant, Hungary." pg. 7(Sixsmith et al., 2014)
Their home was not one of choice (U)	"Could say I don't like to caravan but that's all we ended up with you know and haven't got any money to go any further." pg.1695(Mackenzie et al., 2015)

Housing is a determinant for health and a key component for quality of life (U)	"If I have to move from my home for some reasons, I don't know where I would go. Everything is too expensive for my income. I cannot afford going elsewhere." pg. 362(Bigonnesse et al., 2014)
Due to low levels of financial resources, not much can be done about the home environment to improve quality of life (U)	"'They say that I should move from here, but I'm not going to, I'm staying here. They don' realise that that I know my neighbours well here. Things could be made better here, but because they won't do them I shall have to live with it. I mean, they have put some small things in, like grab rails, but they don't want to install a shower." pg. 1294(Renaut et al., 2015)
A couple does not see the point of asking the housing associated to modify the home as they expect it will be refused (U)	"The bath-tub, we installed that. The housing associated gave us permission, we had to pay for it ourselves. And now we don't even use it. We get washed in the sink, like our grandparents did! I suppose we could ask them to install a shower, but they don't always agree. They want to sell off their housing stick and this building is already up for sale. They are giving preference to the existing tenants, but how can we buy at our age?" pg. 1295(Renaut et al., 2015)
Many interviewees decided to buy a more expensive home to invest in the housing market, sometimes through the renovation of a house in the existing stock (U)	"It was meant initially as an investment, but after we'd been in the house for a few years, we realised we really liked it and the intention was to keep it, which was fortunate because the house market kind of collapsed." pg. 1187(Burgess & Quinio, 2021)
Those who upsized for a cheaper price moved to a cheaper area (U)	"Property in Bristol at the time was half the price of property in London, so for half the price of our London flat we got a 3-bed penthouse overlooking the newly regenerated harbour area of Bristol." pg.1188(Burgess & Quinio, 2021)
Concerns expressed for older people who had low incomes and may not have the same resources (U)	"If I had to go through the public system I would have got limited support. I've only been able to make changes because I've got the money behind me." pg. 2549(Neville, Napier, Adams, et al., 2021)

(U) Unequivocal finding, (C) Credible finding

3.3.6 Synthesised finding 3: People experienced feelings of stigma regarding ageing and were concerned about being a burden

This synthesised finding comprised four categories, as presented in Tables 3.5, 3.6, 3.7, 3.8 and 3.9.

3.3.6.1 Category 3.1: Negative views associated with moving house

Several participants indicated that they wanted to die in their own home and that they would rather die than move to a nursing home, as depicted in Table 3.5. Nursing homes were considered to have extensive rules and regulations (like a 'prison') where residents had poor quality of life. For some, this was tempered with a fear of being isolated and living (and dying) alone. Some participants acknowledged that their home possessed safety hazards but moving out of their home would mean compromising on quality of life.

Table 3.5: Synthesised finding 3 illustrations for category 3.1

Findings	Illustrations
Participants living away from family and friends struggled with loneliness and felt less rooted 'in place' (C)	"What I am most afraid of is that I die inside my home, without anybody else living here or coming to the house, and that they won't find me until I've been decomposing for a few days." pg 775(Finlay et al., 2020)
No intention of moving homes or installing modifications despite architectural difficulties of accessing the home (U)	"It is difficult to know what is going to happen in life, at different stage in life, all these little things that happen and that are unexpected. We do talk about the steep steps as there has even been an accident by one of the neighbours who fell going down and didn't recover." pg. 1290(Renaut et al., 2015)
Home has an emotional attachment enabling older people wanting to stay with their familiar belongings (U)	"I've been here (in her apartment) for only 30 years! (laughs) Somebody told me if I moved to an old folk's home, I couldn't take anything with me, including my computer. To me, it would be like a prison. Even if I became totally blind, I hope someone could still come and help me here. I would like to die here, dammit. I don't want to go anywhere." pg. 4(Narushima & Kawabata, 2020)
Leaving home means leaving the place where the family gathers and having to get rid of personal belonging (U)	"To have access to the same level of services, we would have to spend between $1,500 and $2,000 each month. It [the apartment] will be smaller, we would not be able to entertain the kids anymore, and I would not have my workshop to work downstairs. It would be a disaster." pg. 370(Bigonnesse et al., 2014)
Older adults feeling forced to downsize due to their age (U)	"Personally, there's a question I find important. Because we are old, it looks like they want to put us in such small space! But, why? Because we are old people? We want to breathe like everyone else!" pg.364(Bigonnesse et al., 2014)
All wanted to stay in the community home of their choice as long as they could (U)	"Going into a home? That's be the end of me. And I mean it." pg. 1805(Grimmer et al., 2015)
Living in one's own home often drew contrasts with institutional facilities for older people (U)	"Well the first condition is to stay fit enough to be able to live on your own. And to live at home; I'd much rather live here at home than in some institution. (male, living alone, receiving daily home help)." pg. 54(Nosraty et al., 2015)
Concerns about poor support if relocation becomes necessary (U)	"Don't ever want nursing home. Quality of life would be miserable because I don't have big bucks. These places not really happy places if low income." pg. 386(Martin et al., 2019)
The sense of freedom and independence gained from living at home would be lost with moving out of home. (U)	"I'm too attached to my home... I'm used to being independent and I don't think I could confine down to regulations and rules.". pg. 5(Hatcher et al., 2019)
Older people had concerns about isolation and loneliness (U)	"It's difficult being alone so much. It's depressing at times, but I manage. Weekends are the worst. That's when I hate being alone." pg. 6(Dupuis-Blanchard et al., 2015)
They did not want the building to become a nursing home (U)	"We don't want our guest room to be used for living-in caregivers, we don't want this to become a locked facility in any way that means people with Alzheimer or dementia will begin to wander ... we expect

	that they will be placed in a better facility than here. We are not going to turn into a nursing home." [pg. 414(Puplampu et al., 2020)]
Reluctance to accept adaptations (U)	"You also get a lot of people who don't want adaptations, and they will struggle on and...[. . .] It's change. [. ..] [T]he change in the house and leaving the house to... To family."[pg.5(Bailey et al., 2019)]
Concerns with long-term facilities such as residential care facilities (U)	"You have to get up at a certain time, eat when they tell you, and go to bed early. I hope I die before going into a nursing home." [pg. 5(Dupuis-Blanchard et al., 2015)]
Entering a nursing home is a fate worse than death (U)	"Really, I can't say I'll never go, but I hope I die rather than go into a nursing home or if I do go, I'll be lost by then." [pg. 960(Gould et al., 2017)]
Loneliness was described as a problematic aspect of home (U)	"The loneliness is difficult... If I fall, I won't be able to get up." [pg. 258(Almevall et al., 2022)]
A majority had not considered any properties marketed for people aged over 55, mostly because they perceived them as an option for much older people (U)	"We honestly didn't think about it. I'm 75, my wife is 73. We didn't even think we were old enough." [pg. 1187(Burgess & Quinio, 2021)]
The decision to move was not taken lightly (U)	"'...you have to really start your life over again just when you have everything organised where you are." [pg. 4(Dendle et al., 2021)]
For many, it was difficult to move around urban spaces, creating a sense of fear and anxiety in leaving the home, and compromising access to health and well-being supports for older people (U)	"...her life is taken up by getting to medical appointments for different things. So she'll have to go down the road towards Manchester to the hospital. She'll have to go, until very recently anyway, every Tues to the anticoagulation clinic down in Withington. And then go a different way to her podiatry appointment. And then somewhere else to her GP. Weeks can go passed when she's got an appointment like four days out of five maybe. And that basically takes up the whole day for her getting somewhere and getting back." [pg. 213(Woolrych et al., 2020)]

(U) Unequivocal finding, (C) Credible finding

3.3.6.2 Category 3.2: Individuals did not want to be a burden

Concern about being a burden on others, particularly family members, was a theme present in multiple participants and studies, as depicted in Table 3.6. Participants preferred to remain in their own homes rather than become a 'burden' to their family and others. Some participants indicated that their family had their own responsibilities and commitments and therefore it would be onerous for them to also provide care.

Table 3.6: Synthesised finding 3 illustrations for category 3.2

Findings	Illustrations
Older people opted against being a burden or avoided conflicts within laws (U)	"When he (only son) was in his 50s, his business failed. He thought about too much and had a stroke. He has four young children, so I moved out and I am now alone... His wife is working now to support the whole family" pg. 529(Tan et al., 2015)
For elderly Koreans, living in one's home by themselves seemed to be related to thoughts they did not want to burden their children (U)	"My son says that he will not send me to a nursing home (and will take care of me by himself), but I know the current era is not such a time, so I need to take control of my own life, I am not going to my son's house. Whether it is inevitable or not, once I go to my son's house, it will be heavy in my mind... I am satisfied (living alone in my house). I've got to live by myself, errrr" pg. 102(Park & Ko, 2020)
Participants want to delay having to depend on others because of the fear of becoming a burden on their families (U)	"There is an emotional problem, when the older people don't feel attended . . . it is not about cooking the meals, doing the washing . . . As an example: "Daughter! take your mother to walk!" But, as she is always in a hurry, she cannot go. Here is where the emotional problems come. . . specially for the older people that live at home" (pg. 10)(Bosch-Farre et al., 2020)
Growing older with dignity and independence is important in ageing in place (U)	"Being self-sufficient and not becoming a burden on or dependent on others." pg.232(Black et al., 2015)
Family desire to reciprocate care (C)	"I don't want to be a burden on my children, and I am willing to go to a nursing care facility, but my children say I should live with one of them." pg. 386(Martin et al., 2019)
Several reflected on one day needing to move to specialized housing in order to avoid becoming too great a burden on their loved ones (U)	"It shouldn't be that I'm laying here and they [family members] have to come and... because they have their own life... I'm grateful as long as I can keep living in my own. but w11hen they realize it's time, I will have to come to terms with that [moving]." pg. 257(Almevall et al., 2022)
Several had already relocated, which had resulted in such problems described as adverse to well-being (U)	"I have only lived here for a year, I haven't been able to figure out these things in the apartment... It's been somewhat problematic getting to know things, the stove and...so it took some... it was difficult". pg. 258(Almevall et al., 2022)

(U) Unequivocal finding, (C) Credible finding

3.3.6.3 Category 3.3: Stigma

For some, there was stigma associated with the installation of home modifications and relocation to residential care homes, as depicted in Table 3.7. This stigma led to negative stereotypes about ageing and feelings of vulnerability among the participants. For instance, residential care homes and assisted living were considered to be an indication of loss of quality of life and dependency.

Table 3.7: Synthesised finding 3 illustrations for category 3.3

Findings	Illustrations
Frequent adaptations to the home prevented falls (U)	"Falls are terrible... I take my cane; some people don't because they are ashamed of it." pg.16(Bosch-Farre et al., 2020)
Residential homes or supportive living were seen as signals of being 'dependent' of losing quality of life (U)	"When you see these old people's homes, and their whole... Chairs around a television set. Oh, God spare me that. Really, I think that's... That must be the end, when you're reduced to that kind of thing." (pg.7(Bailey et al., 2019)
There were implications of designing for wheelchair accessibility (U)	"When the ramp was finished, this workman with a really loud voice called out "this is now a disability house!" really loudly—the whole street would have heard." pg.206(Tanner et al., 2008)
Adaptations cause negative stereotypes of ageing and vulnerability (U)	"You walk down the street, and the street says, "Vulnerable older person. Vulnerable older person." A key safe or grab rails or the ramps or whatever they happen to be." (pg.6)(Bailey et al., 2019)
Losing their home or relocating, is like losing control of their everyday lives (U)	"When you move in a senior home, you have rules to follow. You have more freedom when you live in your own home." pg.373(Bigonnesse et al., 2014)
Participants thought using ambient assisted living could be demoralizing (U)	"Most older people have a lot of pride and independence and having the comprehensive sensor monitoring would be insulting, and intrusive ... the constant monitoring would be really depressing; it would remind me that I have a really serious problem.". (pg. 108) (Mortenson et al., 2016)

(U) Unequivocal finding, (C) Credible finding

3.3.6.4 Category 3.4: Acceptance of ageing impacted housing decisions

In contrast, participants who were more accepting of ageing appeared to be more comfortable with the changes they experienced due to ageing, as depicted in Table 3.8. This acceptance enabled to better embrace home modifications and changed abilities. For some, acceptance enabled them to make proactive housing decisions.

Table 3.8: Synthesised finding 3 illustrations for category 3.4

Findings	Illustrations
Acceptance of life as it has become (U)	''I will accept being admitted to the nursing home when I need to go there – I hope." [pg 285](Bergland & Slettebø, 2018)
Past generations have been through many difficulties due to historical, thus would rather to adapt and endure future hardships (U)	"I try to be positive, tolerant and philosophical about things. I know the importance of keeping a good mentality... I have limited economic resources; the government doesn't provide much convenience and I don't think I can rely on my children. I don't know. I'd better exercise more to keep healthy. In that I don't have to count on anyone. But you can never predict, can you? I just take one steps and look around before taking another. I dare not think too much about the future."[pg. 197](Yu & Rosenberg, 2017)
Remaining in the same house to age in place is not necessarily a good thing (U)	'Well I think with (my husband), being in the one place it was a security for him. But he traded on it rather than looked beyond it as he deteriorated in his health... And I think that would have been a disadvantage, because he got comfortable and he got so comfortable he didn't want to move. "[pg. 361](Wiles et al., 2012)
Older people learnt to accept events of life during ageing (U)	"Very much to accept the limitations, the limits . . . Even if you don't have good health . . . Calmly." [pg. 6](Bosch-Farre et al., 2020)
Dependency is a life condition that participants need to accept sooner (U)	"We are getting old, and we will need our children's help, and I don't think they can help us . . . hence, we will have to afford a place in an institution, and even though, it is very difficult to find a place" [pg.10](Bosch-Farre et al., 2020)
Older adults accepted home adaptations as the reality of becoming old as it met their changing, mobility and health needs (U))	"That was one of the reasons that I didn't want it. Because... Because of the look of it. But then you've got to weigh up the benefits, and the benefits outweighed the... You know, you've got to forget about sort of the look of things and think what benefits it's given you; you know. And now, I never notice... You never notice it." [pg. 8](Bailey et al., 2019)
The decisions to move was sometimes made in conjunction with family as needs, real or imagined, changed (U)	"'Just over a year ago because I was turning 90, all the family and I thought that if I didn't get my driver's licence I'd be better in [name of town] closer to everything." [pg. 2551](Neville, Napier, Adams, et al., 2021)

(U) Unequivocal finding, (C) Credible finding

3.3.7   Synthesised finding 4: People experienced both positive and negative attitudes and feelings about future housing

This synthesised finding comprised two categories, as presented in Tables 3.9 and 3.10.

3.3.7.1   Category 4.1: Individuals with positive attitudes to future housing

Many participants had considered steps they would need to take to ensure their future housing was age-friendly, as depicted in Tables 3.9 and 3.10. They spoke of seeking out or modifying their homes to ensure accessibility. Modifications and equipment were considered acceptable steps in terms of improving the age-friendliness of their home. Some participants mentioned that they would be willing to consider use of smart technologies (such as ambient assisted living) if it helped them to stay in their own home safely for longer. Others mentioned that they planned to move closer to family. Seeing others make housing

decisions or speaking with others about their experiences was considered helpful. One participant described how a move to residential care would be the best solution as they had limited family and would not be independent forever.

Table 3.9: Synthesised finding 4 illustrations for category 4.1

Findings	Illustrations
Most participants indicated they were willing to trade personal privacy for the potential to remain at home (U)	"If (ambient assisted living) meant being able to stay... home longer, then privacy would go out the door." [pg. 109(Mortenson et al., 2016)]
All participants had a strong desire to continue living at home (U)	"The vast majority ... of people would prefer to stay at home and (if Ambient assisted living is) an alternative to going to a nursing home, I'm sure 99 per cent of people would opt for that" [pg. 107(Mortenson et al., 2016)]
Reducing their belongings from large houses was a common challenge (U)	"To live where you don't have a lot of space to put stuff, and it was just harder. It's not a big deal now, but getting rid of my stuff and downsizing was really, really ..." [pg. 413(Puplampu et al., 2020)]
Positive attitude towards retirement homes (U)	"I have already thought about it, if I can't manage to do things on my own anymore, then they should put me in a home. I don't have any children, and well, you have to be realistic, this would be the best solution." [pg. 1296(Renaut et al., 2015)]
Concern about isolation (U)	"I have no family within 600 miles. Although I hate to leave my friends and organisations here, I expect there will come a time when I will need to move south where I have family. " [pg. 386(Martin et al., 2019)]
Ageing in place is related to the capacity of older adults to gradually adapt their spaces to aging realities (U)	"My bedroom is on the second floor. Now, I am still in shape, but later [if I have health issues], I will have to install the bedroom on the main floor." [pg.363(Bigonnesse et al., 2014)]
Proactive steps were taken to adapt their actions and environments to achieve their goals (U)	"I mean I could do things and my strength's gone a lot, but I try to work my way around things and figure out how to do them differently." [pg. 1806(Grimmer et al., 2015)]
Ambient assisted living systems could transform these sense of home (U)	"It would be... like living in a nursing home in your own home." [pg. 109(Mortenson et al., 2016)]
Older adults who qualify for home modifications couldn't install the correct equipment installed (U)	"Often, one problem we have is that we are not able to modify an apartment. The person's needs have changed, we want to keep her in her home, but we are not able to adapt the apartment. For some reasons, the equipment does not fit in the bath, the wheelchair does not circulate, and there is no security system, no alarm system. It [incapacity to modify an apartment] comes often with poverty. (Service provider)." [pg. 363-364(Bigonnesse et al., 2014)]
Relocating during middle age took place due to their experience of how their ageing parents had faced difficulties (U)	"'Sure we, wanted a bungalow, that's what we were looking for... because we said to ourselves, in the coming years ... my wife, she said to me, 'I can't see myself climbing up the stairs and doing the housework, it's too tiring.' And we have seen what has happened to my mother-in-law, who can't go upstairs to her bedroom anymore so she sleep in one of the downstairs rooms." [pg. 1293(Renaut et al., 2015)]

Housing and urban environments adapted to older people was important (C)	"When we moved, the first thing I said: a shower." [pg. 16(Bosch-Farre et al., 2020)]
Some people had their name on a hostel or aged accommodation reservation list as a kind of insurance for the future, but intending to move (U)	"I have my name down in 3 places... (so I can) keep my options open."[pg. 1702(Mackenzie et al., 2015)]
Spouses who were carers relocated to smaller homes and did not rule out the possibility of further moves, even to retirements homes (U)	"There is my bedroom and a separate bedroom for home where he has a hospital bed. Yes I have adapted the home, of course and especially the bathroom... I won't move from here now unless I can get a housing associated flat on the ground floor and some more help for my husband. Otherwise we'll think about going to a retirement home where there will be more help and less problems."[pg. 1992(Renaut et al., 2015)]
Living in a nursing home, with children, getting a domestic helper as a caregiver were considered but not explored with their children (U)	"I was with a large group of friends when I told them that I would stay with my children. Some suggested a nursing home... I don't know, I do not understand what my children think... or maybe I should employ a domestic helper?"[pg. 530(Tan et al., 2015)]
Word of mouth raises awareness of home adaptations amongst older people (U)	"And often older people might have experience of a friend or a neighbour who has received a piece of equipment. They might have been struggling, but might not have realised that there might be a solution to that. And then they sort of realise there might be something out there that can help me as well, so." [pg. 5(Bailey et al., 2019)]
Participants felt they were able to exercise their freedom in the residence by having a choice on where to live, choosing when to move (U)	"Well, I am (in my 80s) now and we moved about 5 years ago. My wife and I were starting to experience our friends and relatives ending up being sick and having to move and we thought we should move. We like this idea of (seniors' cohousing) and we thought it was important that we choose where we moved." [pg. 412(Puplampu et al., 2020)]
Some participants described the move as difficult at first, and then gradually becoming rooted, practically and emotionally, and thus making the new place a home, even if this sometimes took years (U)	"Initially, it was awful.... I moved from my house where I had so much to do... and when I moved here I had a lot of energy that I felt I had no outlet for here... But that was five years ago and life changes... Now I don't have as much energy and I'm more content living here." [pg. 260(Almevall et al., 2022)]
Downsizing is considered in relation to the broader context of individuals' personal circumstances and changes associated with ageing (such as becoming grandparents) (U)	"My wife's mother was quite poorly which meant we were travelling almost daily to see her, and we decided that was silly so we decided to move so we could be nearer. Also our three kids were there with our grandchildren, all living in the same town. So we thought it would be useful if we were there so we could enjoy grandparent duties." [pg. 1186(Burgess & Quinio, 2021)]
For some, moving to a larger property was actually a way to anticipate future needs (U)	"We thought, 'well, we can manage', because of the size of the house, if necessary we could live downstairs". [pg. 1187(Burgess & Quinio, 2021)]
Participants described valuing the freedom to relocate in the later seasons of their lives, recognising the need for their home to fit with their lifestyle and anticipating their needs were likely to change (U)	"'I would like to move out of the small town I live in and be closer to the city of Adelaide but not in it. All my children live in Adelaide and I currently live four hour away". [pg. 4(Dendle et al., 2021)]

People living in single or couple households felt that maintenance demands could compel a relocation or downsize whether they wanted to or not (U)	"'Living in a very large house, just the two of us will be difficult in the future." pg. 4(Dendle et al., 2021)
There were renters who valued the freedom to relocate or travel without being tied to a permanent home base (U)	"Probably rent for a while in a neighbouring town which is a bit more cosmopolitan." pg. 5(Dendle et al., 2021)
Some participants had settled in early adulthood, perceiving it to be a good place to raise a family (U)	"We found that living on a wage in [name of city] with four boys was a quite a struggle... we came up here to get away from the city." pg. 2545(Neville, Napier, Adams, et al., 2021)
Maintaining an older home was identified as more difficult for ageing bodies and this meant by having to reassess how future upkeep would be managed (U)	"The house is very old, it was built in the 1940s. Whilst we took on the job of maintaining it, it's getting a bit onerous because you know the roof now needs some new sheets. I'm getting a little bit old for doing that sort of stuff." pg. 2551(Neville, Napier, Adams, et al., 2021)
The decision to move into a flat in sheltered accommodation was made with her late husband (U)	"'We'd more or less rules out that we wouldn't move away from the area because we felt that friends were an essential part of life for us." pg. 8(Webber et al., 2022)
A move from one house to another does not necessarily always disrupt a sense of home, rather living in sheltered accommodation offered the possibility of greater sociability (U)	"Having somebody to socially react with at home and to talk." pg. 8(Webber et al., 2022)

(U) Unequivocal finding, (C) Credible finding

3.3.7.2 Category 4.2: Some individuals avoid thinking about future housing

In contrast, there were older adults who chose to avoid or make no firm plans about future housing, including taking a 'wait and see' approach, as depicted in Table 3.10. Participants who felt this way were either unconcerned about the future, did not want to consider the future, or were unaware of steps that could be taken to safely age in place. One study described participants who were unsure of where, or how, to access home modification services.

Table 3.10: Synthesised finding 3 illustrations for category 4.2

Findings	Illustrations
Don't envisage making any modifications or adaptations despite health concerns (U)	"We'll wait and see what happens, is something happens to us, then we will have to make modifications, but for the moment, to get somebody to do something for something that might never happen, is it worth it? ...For my wife, at the moment she has some problems getting in and out of the bath, but for the moment there is no real problem, and if the time comes, there are always those rails that can be installed to help you get up."pg. 1290(Renaut et al., 2015)
Avoiding talking about future care needs to keep present circumstances (U)	"At my age, you know, as they say, I don't buy any green bananas anymore, but I try to live day by day, not to try to plan too much in advance." pg. 960(Gould et al., 2017)

No firm plans about changes in the future (U)	"Eventually we might have to get some assistance, I'm not fooling myself but at the moment I'm healthy enough to do most of the things I have do."[pg. 1701(Mackenzie et al., 2015)]
Participants were unsure of how to start the environmental adaptation process or concerned with the high cost (U)	"Participant who received a ramp and a scooter, 'I didn't even realize, you know, that I wasn't doing it... and now I can do it, you know, all this stuff and like just go to the store .. I had gone, all this stuff and like just go to the store... I had gone, I go nowhere unless I have to ... and no I can scoot right over there and... It makes a huge difference." [pg. 10(Shin et al., 2021)]
Accepting limitations for emotional stability (U)	"And to not think much about the future, because you don't know what will happen."[pg. 6(Bosch-Farre et al., 2020)]
The need to move in the future was considered when they could no longer take care of themselves (U)	"My mom is on the waiting list. Well, it's been 10 years already since she registered. It's one of the Chinese long-term care homes. Oh yes, it's common. They say it normally takes over 10 years!" [pg. 4(Narushima & Kawabata, 2020)]
Lack of awareness of how to access home adaptations (U)	"People actually don't know that these services are out there. And also how to access them. You don't get taught, at any point in your life, how to become an older person. It just sort of happens, [. . .] You know, if you have a child… you've got your health visitor and they explain what you're supposed to do. You become old and no-one is there telling you." [pg.5(Bailey et al., 2019)]
No matter the circumstance, relocation will not occur and will not contemplate small modifications (U)	"I don't know... the time that it would take to install them... and at the moment I can manage in the night on my own. All I really need is someone to give me a bit of help dressing, preparing meals and doing some cleaning, and I have already got someone to do that... so I think I'm ok." [pg. 1294(Renaut et al., 2015)]
Those unconcerned about future plans were inattentive to changes or modifying their homes (U)	"I have never thought about them (home modifications). What would I need them for? No, for the moment and I don't need anything like that. Like everybody, I don't know what the future holds, what will happen, nobody can foretell the future, I might even fall on the stairs tomorrow coming back form the bakers."[pg. 1290(Renaut et al., 2015)]
No intention to move despite reduced mobility and declining health (C)	"Participant no 15 described it was like 'interia' after living in a place long enough. He would not think about moving, especially after he had a stroke and at least he knew how to go to hospital from where he lived."[pg. 196(Yu & Rosenberg, 2017)]
The demand of everyday life was a priority rather than thinking about future changes for them to age in place (U	'Things don't bother me, I get washed in the sink, it takes me about an hour... there is a chair in the bathroom so I make do with that. In any case, my children have told me that it is not possible to install a shower, there is a window above the bath and it isn't possible to put a shower in front of a window." [pg. 1293-1294(Renaut et al., 2015)]
Unaware of their current needs (U)	"A lot of the referrals come through from the care agencies. That are going in to see that person to provide care and the older person themselves has not been aware that there's been something wrong or . . . They need."[pg. 5(Bailey et al., 2019)]
Thinking day to day (U)	"I don't think about the future, it's day to day. When I get up in the morning, I put my two feet on the ground, and I thank God I'm able to put my two feet on the ground. It isn't much, but that's what it takes."[pg. 960(Gould et al., 2017)]
People had settled, or hoped to settle, into a home where they could live out their lives (U)	"'Really don't want to move... I had so many moves when we were young." [pg. 4(Dendle et al., 2021)]

Observing the prospect of moving away could be scary for some (U)	"Very scary for some elderly people." [pg. 4(Dendle et al., 2021)]

(U) Unequivocal finding, (C) Credible finding

3.3.8 Synthesised finding 5: Emotions, meaningful activities, and attachments to the home played a part in housing decisions.

This synthesised finding comprised three categories, as presented in Tables 3.11, 3.12 and 3.13.

3.3.8.1 Category 5.1: Emotions related to home

Several participants discussed how they achieved great satisfaction which stemmed from caring for their own home, garden and pets, as depicted in Table 3.11. Others spoke about how keeping busy within the home provided them with a reason to get up in the morning. Beyond the home, participants spoke about the sense of community they experienced and being able to trust others within their community. Home was described as a place of comfort where restoration occurred. Many participants described the feeling of being safe and secure in their own home, in contrast the freedom and privacy they experienced in their own home to the lack of privacy in residential care homes. For some participants, home was described as place from which they longed to escape due to marital breakdown or noisy neighbours. This experience exacerbated their desire to move sooner than later in life.

Table 3.11: Synthesised finding 5 illustrations for category 5.1

Findings	Illustrations
Taking care of their own home is a source of pride and joy for older people (U)	"I'm still doing it, rack[ing] the leaves and all that. I still have the capacity and I want to keep doing that kind of work to stay in shape. Because physical conditioning, I'm doing it but I'm a little less assiduous. So, when you have an obligation you force yourself to go get the newspapers and to work on your property. I'm really satisfied with my home; it's the same since the past 40 years." [pg.372(Bigonnesse et al., 2014)]
Knowing each other leads to trust, security and respect for each other (U)	"So, you know, I like that sense of community. You know, I would really give anybody my keys and say I am going on vacation, can you water the plants or whatever. And, I would give to one person but I would give it to anybody or give it to five people. You know, I really feel that sense of comfort and sense of trust." [pg. 411(Puplampu et al., 2020)]
Comfort was one of the meanings of home (U)	"It's very comfortable... happy to be here and it is, with all my things around me, it's just like my own home." [pg. 6(Hatcher et al., 2019)]
Habits served to facilitate and maintain a strong relationship between occupations they enjoyed and their environment (U)	"I have to keep myself busy and I keep myself deliberately busy because it (volunteering) keeping me going... it gets me out of bed in the morning." [pg. 152(Vrkljan et al., 2011)]
Living at home gave individuals a degree of purpose in life and a reason to keep busy (U)	"I feed my cat and look after that, keep the house tidy in general and I see that raking up's done out in the garden." [pg. 5(Hatcher et al., 2019)]

Living at home and having access to their own garden provided comfortable place for relaxation (U)	"It's a sort of relaxation to go down there (garden)." pg. 6(Hatcher et al., 2019)
Home gave a sense of freedom and autonomy (U)	"I have freedom and I don't have to answer to anybody. . . (I do) what I want to do in my garden, in my house, when I want to do, what I want to do and all that."pg. 43(de Jonge et al., 2011)
The meaning of home encompassed being free of constraints (U)	"Because I am sure that living in my own home, definitely (means) more freedom."pg. 5(Hatcher et al., 2019)
Most participants valued their homes because of the sense of privacy they provided (U)	"I wouldn't want to be watched going in and out of the bathroom. That would be... encroaching on (my) privacy." pg. 109(Mortenson et al., 2016)
It was important for participants to in their homes as long as possible for familiarity. (U)	"No (aging in place doesn't have to mean being in the same place) but the likely advantage of staying in the same place, like me being in my own house for 29 years, that's a form of security. Because you're familiar with the background, you're familiar with the places. If anything goes wrong, and I have a private alarm. You feel that in your own home there's the contact that can come to you, and you know where things are." pg. 361(Wiles et al., 2012)
Home was a place for revival and restoration after engaging with others in the community (U)	"Being at home between activities and social outings as you stay at home to catch your breath." pg. 6(Hatcher et al., 2019)
A comfortable home provided peace of mind and a sense of competence in a familiar environment (U)	"I know where things are so that's a big plus... It's familiar". pg. 6 "I'm comfortable... I know where everything is that I need... even if I didn't have any fairly food eyesight I would still be able to get around." pg. 6(Hatcher et al., 2019)
By being able to manage at home gave older people a sense of existence (U)	"The most important with home is that I am independent, which means that I must force myself to manage. Even if it is hard I have to do it. And if I wouldn't manage it would be a mess, and I would not be able to live." pg. 4(Sixsmith et al., 2014)
Home is a place of comfort and the importance of the environment surrounding the house to their experience of home (U)	"The garden, front garden and looking up at the sky and the back garden with the lovely birds . . . just sitting at the kitchen table and looking out at the garden at the birds."(pg. 43)(de Jonge et al., 2011)
Objects in the home provided a feeling of connectedness to the outside world (U)	"The things that are in the house have a meaning … this old chair was 20 pounds, the hall table there about 30 dollars, I had very little money and had to find gems among junk. So everything has a little story, really it does, a journey I went on to find things and how I made things work. And you feel filled up with the memories and the meaning of things, and content. I feel very blessed here. I think that when you've been independent you're inclined to be thinking that you are alone. But somehow or other, in finding the meaning in things, I've come to the realisation that there's a difference between isolation and solitude. And so I think that once you realise that you're part of humankind."pg.44(Coleman & Wiles, 2020)
Home was referenced with a sense of identity through ownership (U)	"It is my home because I own it." pg. 4(Hatcher et al., 2019)

Comfort was one of the meanings of home (U)	"It's very comfortable...happy to be here and it is, with all my things around me, it's just like my own home." pg. 6(Hatcher et al., 2019)
Home was described as a place to feel free, comfort and enjoyment of your own privacy (U)	"Because at home I am free, comfortable, and I do prefer to be at home with my wife than in any institution." pg.10(Bosch-Farre et al., 2020)
Being around people you trust was the reason to relocate (U)	"We knew we wanted to live in a situation somewhat similar to rural; the best of rural living is when you know all your neighbours." pg. 411(Puplampu et al., 2020)
Home was a source of emotional and physical comfort, peace of mind, stability and having a space for relaxation and restoration (U)	"It's very comfortable. We're here together... Out home is very important to us... I think we've got everything we want in this house." pg. 6(Hatcher et al., 2019)
Home offered a place where there is freedom to come and go (U)	"Come and go when you wish... without someone wanting you to do this or that." pg. 5(Hatcher et al., 2019)
The background and familiarity of the home provides security and an emotional attachment to the home (U)	"So I suppose the advantages of staying in the same place would be that you got to know people, that you were familiar with your surroundings, that your house probably had everything done to it, you wouldn't need to be doing all these things, you'd have it exactly as you wanted it for your lifestyle, so that would be an advantage. Whereas I seem to be forever shifting and making new gardens and painting houses and extending decks and redecorating so that nothing is quite as it should be... " pg. 362(Wiles et al., 2012)
Home provided stability when the ownership of the house was secured (U	"It is good to have this house under my name. It feels good and comfortable to own a house." pg.101(Park & Ko, 2020)
Home was a place of security (U)	"A safe feeling. You sort of go back to the old cave- the guy went into the cave, and it protected him from the weather and it protected him from the wildlife, it protected him from invasion." pg. 107(Mortenson et al., 2016)
Their home had a strong sense of belonging (U)	"I feel more at home here than I would anywhere else I think. It take a long time to become acclimatised." pg.3(Lewis & Buffel, 2020)
Personalised objects were important characteristics of creating a home (U)	"That picture up there, (indicating a black and white photo of a man and woman), that was taken the day war was declared. See that one with the air force man? On the other side there's a photo of a soldier and a girl? Well that's G and I. I was 17, and he was 21. And that was the day war was declared. It was an open day at (E) camp Frasier's paddock. At 5-o'clock in the afternoon, Churchill, it came over the loud speaker that had been declared... All the paintings you see around, our families have done those." pg.202(Tanner et al., 2008)
The home and objects in it also represented what had been accomplished during one's life, and this gave participants a sense of pride (U)	"It means a lot....all the things around me.... that I created from nothing...means that I was successful." pg. 289(Almevall et al., 2022)
A minority spoke of their homes as places that made them feel constrained, or where they felt trapped, describing marital and co-resident relationships that had broken	"'It does not feel as welcoming as it did when we moved in 20 years ago." pg. 5(Dendle et al., 2021)

down, making their home into somewhere they longed to escape (U)	
Neighbours who were noisy, disrespectful, unhygienic, or violent could turn people's otherwise suitable home into a place they wished to leave as soon as possible (U)	"'Hoons (loud disrespectful drivers) doing burnouts in the street." [pg. 5(Dendle et al., 2021)]
Some compelled to relocate could exacerbate an already distressing experience (U)	"'Drug-crazed ex neighbour." [pg. 5(Dendle et al., 2021)]
Home was discussed as much more than physical building (U)	"Every day is busy and different and flexible and unexpected at times." [pg. 5(Dendle et al., 2021)]
Great importance was made to ensure her house felt like a home (U)	"Like a home; homely and welcoming." [pg. 7(Webber et al., 2022)]
Her life contributed to a deep sense of belonging to the local area (U)	"You do feel part of those communities." [pg. 8(Webber et al., 2022)]
Isolation reveals the unmaking of home through the damage to the material and emotional components of home (U)	"I used to have [have friends round her house] but I don't have any more." [pg. 10(Webber et al., 2022)]
Home was seen as a place of emotional connection and psychological attachment (U)	"I've been here 43 years [I don't want to move]. That's how my daughter sees it when she comes back. That makes me feel good. It's the positive and negative over the years. Negative things are a part of life, how you overcome them. Other memories that have enlightened your life. That is home." [pg. 211(Woolrych et al., 2020)]

Abbreviation: (U) Unequivocal finding, (C) Credible finding

3.3.8.2 Category 5.2: Meaningful activities within the home

Being able to have the 'space' for meaningful activities was important, as depicted in Table 3.12.

Participants mentioned activities such as gardening, indulging in hobbies in the backyard workshop, the

office or an area dedicated for arts and crafts.

Table 3.12: Synthesised finding 5 illustrations for category 5.2

Findings	Illustrations
People who lived in their family houses often found gardening a therapeutic and pleasurable activity (U)	"My kitchen garden is the most important thing for me in the summer, the only therapy I need. I work in the garden whenever I feel up to it and watch the plants grow." [pg. 251(Juvani et al., 2005)]
Alternations accommodate changes in the family or older relatives living with them (C)	"Some changes over time were related to activities that people valued, such as having a decent workshop or electrical work to accommodate a computer installation" [(pg. 1699)(Mackenzie et al., 2015)]
Having your own space in the home to accommodate a range of activities was important (U)	"See, we've got the front bedroom as our main bedroom, the second bedroom is Lara's artist room, the third bedroom is my office . . . We're using the whole house . . . It's a seven-room house and we're using them all." [pg.43(de Jonge et al., 2011)]

Living in a shared house did not provide a sense of self as you could not personalise the home (U)	"In an apartment, you're not at home. You can't paint and you can have a building manager that does not allow for any social activities."pg.5(Dupuis-Blanchard et al., 2015)
Freedom is negatively impacted when modifications weren't installed for outdoor/garden access (U)	"I miss even being able to take my washing and hang it out myself... I can go out to the little balcony but it's not the same as pottering outside and pulling a weed or cutting a flower or something, I miss that." pg.127(Aplin et al., 2015)
Having one's own space where it was possible to close the door was described as a fundamental aspect of home (U)	"No, I don't like it when they try to stop me... I guess they are concerned about me, but they don't need to be... so I do it anyway". pg. 256(Almevall et al., 2022)

(U) Unequivocal finding, (C) Credible finding

3.3.8.3 Category 5.3: Strong sense of attachment to the home

Many participants felt strongly attached to their home and could not imagine living elsewhere, as depicted in Table 3.13. They described wanting to remain in their own home until death in which case they would be leaving 'in a box'. Participants, in some cases, were still living in the family home and were reluctant to leave. Home was filled with important possessions accumulated over their lifetime. The home and the possessions within often triggered memories, bringing feelings of joy and gratitude.

Table 3.13: Synthesised finding 5 illustrations for category 5.3

Findings	Illustrations
The investment of personal and financial resources in obtaining one's home further strengthened the sense of attachment to their home (U)	"Never ever thought about living elsewhere." pg. 4(Hatcher et al., 2019)
Would leave their homes 'in a box', or will remain at home (U)	"Would rather leave in a box or we'll stay here till the last day I'm sure of it." pg. 1701(Mackenzie et al., 2015)
Older people voiced wanting to stay at home and others considered they were too old to consider moving (U)	"I just have a feeling that people will say that funny old lady that lives up there on the corner with those animal and that overgrown garden and they'll be all talking about me. Because I've made no arrangement to go anywhere or do anything." pg. 1702(Mackenzie et al., 2015)
Older people were still living in their family homes, where they were raised (U)	"We had our twelve children here. It started as a nothing house – and it became our house . . . A home . . . We've decided what rooms we'd have and we built them over time."pg. 43-44(de Jonge et al., 2011)
Cherished possessions foster connection to the past while aging in place (U)	"And you feel filled up with the memories and the meaning of things, and content. I feel very blessed here. I think that when you've been independent you're inclined to be thinking that you are alone. But somehow or other, in finding the meaning in things, I've come to the realisation that there's a difference between isolation and solitude. And so I think that once you realise that you're part of humankind." pg.44(Brim et al., 2021)
Cherished possessions act as a mechanism for coping with physical and daily ageing changes (U)	"These (cherished possessions) show something that I was involved with and looking back on these I am absolutely delighted, I feel very grateful and very proud of myself. These days, sometimes I can't do some things, there are a

	few things I can't do, I'm not as steady on my feet as I used to be. Well, this is something I've done that makes me feel fantastic." pg. 45(Coleman & Wiles, 2020)
Building the home and raising children in the home led to close attachment (U)	"Their attachment to the home related to having built the home themselves, for eg one couple 'just after the war, things were very hard to build and I think when it's your first home and you've really had to work for it and extend like we've done... you don't want to move because you've put so much of your life and you've brought your children up (in the home)." Pg. 1697(Mackenzie et al., 2015)
Objects of meaning help older people to connect to previous achievements (U)	"I've done a lot of amazing things in my boat and sometimes people don't believe you've had the adventures you have had when they see you as just an old man. You say you caught a big fish, and they say "oh yeah" in disbelief. So, I can get out these records, the photographs and other things and show them. I also keep clippings in albums and up on the wall to remember things and to show to people." pg.44(Coleman & Wiles, 2020)
Displayed cherished possessions in the home gave the sense of being surrounded by memories, people and the things they had done in their past list (U)	"For John, being surrounded by objects that speak about people and times I've had led to a strong feeling of being home, which can be interpreted as existential insideness."pg.43(Coleman & Wiles, 2020)
A part of them had gone into building and creating their home (U)	"We built our house." pg. 4(Grimmer et al., 2015)
Their home had a strong sense of belonging (U)	"I feel more at home here than I would anywhere else I think. It take a long time to become acclimatised." pg.3(Lewis & Buffel, 2020)
The longevity of domicile created strong and deep connections, resulting in a reluctance to leave (U)	"I couldn't imagine being anywhere else... I love my home and I lived there when I was married and I've never had another home on my own.. I don't want to leave it and I can't imagine going into a nursing home or a retirement village or anything like that because it's just, I suppose, just home to me." pg. 4(Hatcher et al., 2019)
The home is a symbol of life and existence (C)	"One informant thought of her house as a place where others could remember her life, and she wished for her children to visit the house after she dies to remember her." pg. 101(Park & Ko, 2020)
Home has a personal connection (U)	"The house she lives in now has been her home since she got married. This is important for her. She knows every little detail in her house and said: "And I am very fond of this place. I know every nook and cranny."pg.286-287(Bergland & Slettebø, 2018)
Home represented their past, present, future and gave the notion of anchoring self (U)	"But one's life gets locked into an area... your life gets locked up in the things you create."pg. 4(Hatcher et al., 2019)
Cherished objects allow older people to connect with self and others (U)	"Let's photograph that copper in the hallway with the old painting on it.. I found it in a bin outside an antique shop in Melbourne … I think it's of the artist's mother, but it reminds me of my own mother, she had copper hair. And not having had safe or loving family connections when I was growing up I found a happy connection to my mother through that plate, dear....Being drawn out from your own life is important, thinking about the past, difficult issues and bringing light to it, not being stuck in it, yes, finding some peace."pg. 45(Brim et al., 2021)

Dying at home was important (U)	"...when we are old and ready to return to our ancestors, it will be in this home. Not that we have old way of thinking. Young people can afford old people in there (nursing home) but it is miserable! You ask nine people, 10 want to return to their homes."pg. 530(Tan et al., 2015)
Cherished possessions brought back the past and what it presented to them 'now' to maintain continuity of self (C)	"For Rose, the very meaning of home entails nonhuman as well human others; she is "at home" because she is connected to things and people that reflect her life in both the past and present tense. Her connection to the past gives her a sense of continuity in the present."pg.44(Coleman & Wiles, 2020)
Personal skills and networks contributed practically to both sense of identity and ability to be autonomous (U)	"I've been in my house for 42 years. And had the same neighbours. . . . Yes. And so [the familiarity of the neighbourhood has] been marvellous for me. And the section is flat. And it's been great! And that's what I don't want to lose [general agreement]." pg. 364(Wiles et al., 2012)
Having control with relocation by gradually moving (U)	"I am so attached to that farm. It is bred in my bones! I once thought that we would be able to make a transition slowly. I would slowly become involved in things, in this urban place, and to some extent it has happened, but I am resisting now. It is very interesting to be going back and forth. Tomorrow night I will be sitting in this house that I built with my own hands, in front of the fire and playing my music."pg.412(Puplampu et al., 2020)
People spoke of 'loving' their homes (U)	"Wouldn't go anywhere... we live in paradise already." pg. 5(Dendle et al., 2021)
Felt a sense of belonging to the area (U)	"Very much so, especially this area, this road, it's very much a village feel... It's a long road and we all know one another." pg. 7(Webber et al., 2022)
Many older adults were bound to home and communities by shared memories, meanings and experience (positive and negative) within the context of place (U)	"In 1962, we were the first residents of this building, my father was the first one to enter that building, and then came the entrance where we are, the two of us came from the third floor and my neighbour is next door and we have almost like a fraternity, we were raised here so the neighbours all know us which we were little, that's a lot of family ... this neighbour of mine next door has been my neighbour for 54 years." pg. 209(Woolrych et al., 2020)

(U) Unequivocal finding, (C) Credible finding

3.3.9   Synthesised finding 6: Safety, accessibility and aesthetics in the home were important

This synthesised finding comprised two categories, as presented in Tables 3.14 and 3.15.

3.3.9.1   Category 6.1: Individuals valued safety and accessible homes

Many participants valued safety as an important feature of their home, as depicted in Table 3.14. Safety was linked to having flat, hazard-free spaces or having modifications which improved access and safety. For example, stairs were seen as unsafe. Some participants wanted to be connected, either through being able to summons assistance in an emergency or having other people check in on them. Some participants mentioned that it was important to know and trust their neighbours. One study described how night lights, safety guards and security systems contributed to a greater sense of safety.

Table 3.14: Synthesised finding 6 illustrations for category 6.1

Findings	Illustrations
Ambient assisted living (AAL) would make them feel more secure in their homes. (U)	"Feel a lot more secure... because when you are experiencing various physical symptoms and live by yourself, it's easy to get a little but frightened of incidents happening and not be able to summon assistance." pg. 107(Mortenson et al., 2016)
Being in a rental apartment did not make an informant feel safe after recovering from a fall (U)	"I feel more secured at home, I will not fall... Just now, that woman (from the VWO) said that another resident had a fall; now she is in the hospital. (Previously) she told me to tell her in Cantonese, 'Do not walk about when there is no need. If you fall, there is no-one to help you."pg. 529(Tan et al., 2015)
Living in a home without access to an elevator became a reason for relocation (U)	"I'm seriously looking for a new place... it would not have stairs to clean. I find that is a waste of space and it's a place where you can fall. We thought we would stay there for a long time but now my wife has problems with her hips. We were very satisfied with our home, but it has many levels and a lot of stairs. It's not possible to reorganize it to only live on one floor. So, we seriously think about relocation."pg.363(Bigonnesse et al., 2014)
Modifications makes access and everyday life easier (U)	"I can actually not only invite visitors in now, I can actually invite clients in too and that's another level again and that's what I've been going for, is to be able to invite clients and that's why I needed that separation, that's why I needed it not to look like a hospital." pg. 127(Aplin et al., 2015)
Modifications led to a safer environment (U)	It's great, just great. They put grab rails all around . . . [It's] safer. . . [and] it's more convenient too. It's much more comfortable. pg.204(Tanner et al., 2008)
The atmosphere and community around where the home was located was important (U)	"I have felt safe in this block of flats since I came here. There's three single older women and a couple. There are five older women including myself and a young Asian couple and I just don't feel threatened by the area." pg. 43(de Jonge et al., 2011)
Older people, including family members attributed apartment living to feelings of security (U)	"We'd feel better if he was in a place where there were people around. At least if people haven't seen him in a day or so, they'd check on him." pg.5(Dupuis-Blanchard et al., 2015)
Older adults want a safe environment that includes a safety guard, night lightening and security systems (U)	"I wanted an apartment where I could feel safe, [a place where] if people want to come to my place they must buzz downstairs. Then I can answer directly and know that my door is locked. But it's not everywhere you can find a building with this type of security. I will stay there for a long time!" pg.365(Bigonnesse et al., 2014)
Home means being close to someone in case one needs help, safety, and security (U)	"I'm 85 now and have trouble with my sight and my back, walking in general, you soon get tired. I feel secure in that I can go in [to my neighbors] at any time for a little chat. And they are wonderfully kind. So I feel it's secure round me too. I can go in and talk about how I feel*if anything has happened I can get it out of my system." pg. 27(Dahlin-Ivanoff et al., 2007)
Modifications provided independence and freedom of choice (U)	"So basically to give Andy access in and out, we put an oven in so he can use it if he ever gets to that stage." pg 105(Aplin et al., 2013)
Modifications for visitors, family and guests changed their engagement in social activities (U)	"I have a granddaughter who is in a wheelchair, and she came and stayed with me for a fortnight and she found she coped well, She said 'Your bathroom's terrific, Nana."pg 128(Aplin et al., 2015)

Modifications increased their independence to maintain habitual personal routines, and rely less on others (U)	"I've got more confidence and I don't have to depend on somebody to be here in case I fall. It's made me totally independent now." pg. 204(Tanner et al., 2008)
There was a need for a second grab bar because one was not enough (U)	"I have one shower bar on the right and to make the task easier, I need to get another bar on the left." pg. 51(Owens et al., 2021)
Grab bars were used in video diaries to enter and exit bathtub (U)	"As long as I have the grab bar, and I have a good grip on the grab bar, I have no problems getting in and out of the tub." pg. 51(Owens et al., 2021)
Home adaptations supported mobility and health needs of older people to promote independence (U)	"100% get it done. It does change your life. Which, I'll say, I'm a lot cleaner now to what I was. I'm a lot more independent in the house and everything else, so... Really, yes, 100%, get it done" pg. 8(Bailey et al., 2019)
All had some home adaptations by installing safety features (U)	"I've used it twice (emergency alert pendant or had installed an alert system with pull cord for their bathrooms) one time, they were able to get in through the kitchen window. The other time, I was doing Christmas decoration when my daughter phones, and when I turned, I fell. My daughter phoned a friend's husband to come, but before he arrived, I phoned the emergency alert and asked them if there was a particularly way he should pick me up. They immediately sent somebody and got me on the chair." pg. 4(Narushima & Kawabata, 2020)
Adequate housing with ramps or bathroom adaptations allowed Inuit elders to deal with health conditions (U)	"Yeah, and I think the kitchen and the living room like this is ok, but having stairs for someone [with low mobility], like for old person, might be hard for stairs, [they should] be on a flat house." pg.139(Baron et al., 2020)
Accessibility barriers such as stairs and lack of lifts were inhibited home access (U)	"I broke my leg, and I had no choice but to go up the stairs. You don't know what I have been through with the stairs. I would raise a foot, and then the other I couldn't raise it anymore, dragging, dragging, and raise the foot another bit again." pg. 16(Bosch-Farre et al., 2020)
The need to downsize/home modifications (C)	"My home offers barriers: steps, narrow doors, remoteness to services." pg. 385(Martin et al., 2019)
Completing instrumental activities of daily living were deemed important to remain independent at home (U)	"Simple modifications to remain independent [made one] feel much more self-reliant." pg. 232(Black et al., 2015)
Well planned housing is recognised (U)	"Well, for one thing I think this apartment is beautiful and well-planned. Then there's an elevator and that's good. I can't go up and down stairs at the moment. There's an elevator here and they've carried out alterations inside. Taken away the thresholds, and then there's the world's largest balcony I usually say, it stretches along the whole of the apartment and faces south/south-west."pg. 27(Dahlin-Ivanoff et al., 2007)
Home adaptations were crucial in enabling older people to live independently (U)	"We did an awful lot (on the home), we've been doing it since and ...now we got just lovely! I absolutely love it! I think it's just heaven! And erm I'd never want to go anywhere else, I just absolutely love it, I think it's ideal." pg. 7(Sixsmith et al., 2014)
Older people value the convenience of the home and the	"I mean having the carport on the same level I can just bring shopping straight in there. The upstairs laundry – it's part of the house and I haven't

layout of the home supported various occupations. (U)	got to go downstairs to wash because with the washing machine that means you're going up and down, up and down whereas here I can go on with something else and go back to the laundry again without any trouble."pg.42(de Jonge et al., 2011)
Preventative measured made to avoid social stigma with old age (U)	"Yes I arranged to have the second toilet put in upstairs, because we were not getting any younger and to have to go downstairs to the toilet at night ... so then we have to put the banisters in as well, because of going downstairs at the night ..."pg. 1292(Renaut et al., 2015)
They were able to control their home environment as best they could (U)	"The very last thing I wanted to do was move into this building... Do I want to live here? No! But should I live here? Absolutely! ... If you think your health is going to be the same tomorrow as it is today, you are wrong. We all progress to some extent from day to day... I did not know the presence of a garbage disposal in the hallway was so convenient. So in the big picture, it was a very wise thing." pg. 4(Narushima & Kawabata, 2020)
Quality of life is good in the building because they did not have to worry about maintenance (U)	'The quality of the building is good enough where you don't have to worry about doing maintenance; you don't have to worry about (the roof) falling down on you" pg. 414(Puplampu et al., 2020)"
Choosing not to think about the future while still healthy (U)	"If I was in a wheelchair, I'd have trouble with the stairs."pg. 1702(Mackenzie et al., 2015)
Home modification decisions are important for future planning during ageing, deteriorating, or improving health (U)	"It's good now that I've got the shower and its wide enough that if ever, I needed to put a wheelchair in there, its big enough for that."pg. 127(Aplin et al., 2015)
Older people explained they lived in a home which met their needs e.g. wheelchair accessible home (U)	"We lived in our own home. It was two levels with six steps to the lower level and 13 steps to the second floor. We just decided we can't do this anymore. We sold the house and came to an apartment. pg. 4 One of the things I looked for in this home was the wide concept, to make it accessible if I ever had to be in a wheelchair."pg. 4(Dupuis-Blanchard et al., 2015)
There is interest in ageing in place despite age related changes (U)	"But each unit is contained on, you know, all the rooms; there is no stairs within a unit. So, that's the convenient factor if you are having mobility issues you can move around to every part of your own unit. And the elevator takes you from main floor to your floor and so, that element is important. And actually, the doorways are a little wider than normal. So, they could accommodate wheelchairs if necessary. The light switches are low, very low, lower than normal, so you could reach them from a wheelchair." pg. 414(Puplampu et al., 2020)
Having a home they would not be compelled to leave enabled plans for modifications (U)	"'Modifications to bathrooms to make them more 'senior' friendly'." pg. 4(Dendle et al., 2021)
A home which was a safe harbour was critically important for residents, also enabling them to welcome and nurture others (U)	"'A huge task... she has suffered a lot of trauma." pg. 5(Dendle et al., 2021)
This feeling of security was a valued feature of the rural lifestyle they had chosen (U)	"'I feel really safe, I'd go out at night, think nothing of it." pg. 2546(Neville, Napier, Adams, et al., 2021)

Feeling safe was part of her lifestyle and was cherished (U)	"'I go to bed with the windows wide open, sometimes I get up and the front door is wide open, I love that feeling." pg. 2546(Neville, Napier, Adams, et al., 2021)
His flat was a space of safety that provided him with everything he needed (U)	"[do] what I want, when I want." pg. 10(Webber et al., 2022)
The threat of physical barriers and impediments to getting around undermined older adults' sense of competence in terms of moving around the community (U)	"When one walks they stumble on the roads continuously since there are many rugged areas, gaps and holes in the roads. That is a great challenge indeed." pg. 213(Woolrych et al., 2020)

(U) Unequivocal finding, (C) Credible finding

3.3.9.2 Category 6.2: Individuals valued the aesthetics of their home

Natural, bright lighting and open spaces appealed to middle-aged and older adults, as depicted in Table 3.15. They spoke of how a house feels like a home depending on the decorations and possessions within. Personal possessions and mementos added to the appeal of the home. While home modifications were sometimes viewed as improving the appearance of the house, more commonly they were seen as visually unappealing and contributed to the house feeling like a clinical environment instead of a home.

Table 3.15: Synthesised finding 6 illustrations for category 6.2

Findings	Illustrations
Home is linked to identity (U)	"We actually think it (ramp) improves the look of the house." pg. 126(Aplin et al., 2015)
Home modifications can improve the look of the home (U)	"It looks really nice. Everybody remarks on it when they come in. They'll say, Oh, it's really nice. Uh-huh. The blue floor - it's nice" pg.8(Bailey et al., 2019)
Changes to protect the home from the weather (C)	"Those stairs are pretty solid and the landing's very good. But I had the awning put over it later. Because it sort of meant that the rain doesn't come in any more." pg. 127(Aplin et al., 2015))
Home adaptations do not have a functional look (U)	"I really would have struggled to get in. Because there wasn't a handle. And I don't want a handle at the front door. Because I don't like the look of it [a grab rail]. It's like a pipe... A bit like a sewage pipe, you know what I mean?" pg.8(Bailey et al., 2019)
Home is a place where one can leave one's mark and allow the place to look the way one wants it to look (U)	"A home is your own personal mark, so to speak... I think carefully about where to put things and about colors. I have a feeling for both form and color. So to speak. It comes quite naturally to me. I always think of the balance in the living room. I think I've been quite successful with that. The main thing is knowing that it's mine." pg. 29(Dahlin-Ivanoff et al., 2007)

Home is a reflection and expressions of self through decorating each new house with personal mementos (U)	"I can make a home anywhere... everybody has a few personal things that they dearly love... I put up two paintings. That was home." pg. 5(Hatcher et al., 2019)
Appearance of the modifications (U)	"I guess to a degree we didn't want it looking like a disabled bathroom, but it looks like a disabled bathroom I don't know. So we paid extra for the tiles, a lot more extra tiles." pg 105(Aplin et al., 2013)
Lighting for elderly people was important as they felt that the lack of light influenced their psychic well-being (U)	"Then you just sleep (in bad weather). I feel that, in the dark period, I'm much slower and not willing to go anywhere, especially alone" pg. 250-251(Juvani et al., 2005)
Older people dislike the clinical appearance of grab rails as it remind them of hospital environments (U)	"With the best will in the world, adaptations can, you know, provide a very clinical... a more clinical environment, as assessed by need. And it's trying to have that... That, sort of, conversation with them about what is in their best interest, really. To keep them in the home, safe. And I think you have to be very sensitive to that. (pg.7)(Bailey et al., 2019)
Insulation, soundproofing, light and size of living was important (U)	"I have a nice apartment, I feel very comfortable... and there's space. There's light; it faces south. When I wake up in the morning, it's sunny everywhere." pg. 364(Bigonnesse et al., 2014)
Available space impact home modification decision making (U)	"It's not only the expense, it's just where you can put it (water lift) and how bulky it is and we don't have a very wide block of ground so it's hard to find a spot that would be suitable for it."pg 106(Aplin et al., 2013)
Home created into a personal meaning (U)	"We put extra cupboards up, varnished the floors, put curtains and blinds up... just made it home." pg 202(Tanner et al., 2008)
Lack of control on the changes made to their home (U)	"They wanted to build something that looked like it was straight out of a hospital. It was shocking. It was horrible. It's like they didn't listen to a thing I said." pg 105-106(Aplin et al., 2013)

(U) Unequivocal finding, (C) Credible finding

3.3.10 Synthesised finding 7: Family, community support and connection were essential to support remaining at home

This synthesised finding comprised three categories, as presented in Tables 3.16, 3.17 and 3.18.

3.3.10.1 Category 7.1: The importance of access to essential community services

Health care services, alternative housing options, meals and home cleaning were all essential services deemed to be important to support older adults remaining in their own home, as depicted in Table 3.16. It was further highlighted that these needed to be culturally appropriate services. One participant mentioned the lack of housing options that could meet older people's housing needs. Some older adults identified the importance of having good access to public transport nearby their homes as this helped the to maintain connections beyond their own home and was especially needed after cessation of driving.

Table 3.16: Synthesised finding 7 illustrations for category 7.1

Findings	Illustrations
Rural people found long distances an obstacle to their ability to live at home, because help was not easily available and they were tired of travelling long distances (U)	"Sometimes it is very difficult and I don't go (to the municipal centre) if I have a small health problem. I listen to my body quite long before I go to the doctor. Other people say that many would have gone much earlier. But one should not worry too much ." pg. 251(Juvani et al., 2005)
Accessing transportation was the link to the world beyond their home (C)	"Participants who did not drive relied on public transportation, including taxis and bus service, but felt these services required improvement to accommodate future needs." pg. 153(Wiles et al., 2012)
Older adults found the home modification an uneasy process to understand due to multiple steps, causing them to hire their own contractor (U)	"If I need to install a grab bar in my bathroom, where should I go for that? You can ask your local health and social services clinic but it takes 3 months before [they contact you]... You have the time to fall!" pg. 363(Bigonnesse et al., 2014)
Accessible transportation supported ageing in place (U)	"Everybody worries about it (transportation). My neighbor across the street is 77 and she might not be able to drive in a couple of years, and she says 'as soon as I can't drive, I've got to move." pg. 153(Vrkljan et al., 2011)
There is an imbalance between formal and informal home care and support (U))	"The agency working in this building has no personal support workers who speaks Chinese. For showering, communication is very important. That's why I need to translate. Otherwise I could be preparing breakfast during that time." pg. 5(Narushima & Kawabata, 2020)
Participant felt at home because she had good neighbours who often got in touch (U)	"I've been in the area so long, I'm quite well known. Even the kids say, 'Hello Mrs Smith, are you all right Mrs Smith, do you want me to carry your back?" pg. 3-4(Lewis & Buffel, 2020)
When the help is not available, relocation was considered (U)	"I think about moving because my home is too big. It's a lot of maintenance. Then you ask yourself, because one time one of us has been sick you know? But you must mow the lawn! You have to maintain the house! What are you going to do? Then, you start to look for a new place. You're forced to leave." pg. 372(Bigonnesse et al., 2014)
Accessing transportation was the link to the world beyond their home (C)	"Participants who did not drive relied on public transportation, including taxis and bus service, but felt these services required improvement to accommodate future needs." pg. 153(Wiles et al., 2012)
Living in a home that has access to public transportation was important (U)	"Well, the bus didn't come within a mile to where she lived so she couldn't get the groceries. There is a bus system, but it only goes here and there." pg. 7(Dupuis-Blanchard et al., 2015)
Living in a home that had access to other services such as health care services, meals and house cleaning was important (U)	"It's nice here, but it's far away from the doctors, the dentist, and other specialists." pg. 5(Dupuis-Blanchard et al., 2015)
Being close to essential services was deemed important (U)	"They've got a small main street area with little grocery stores and the health food store, pharmacy, library... so if you're not carrying a lot of things, it's possible to get around town." pg. 153(Vrkljan et al., 2011)
Most of our respondents were living alone, but it was important to have people around (U)	"Good age means you have people you know, that you do not have to be alone." pg. 55(Nosraty et al., 2015)

Hard to make plans for old age (U)	"Everyday life consisted of little planning and little social life with others even though she has good friends. She continued to say that she did not make many plans but took decisions based on what she felt she needed at the time. Social life seems important, but it is limited to good friends living nearby, so it is possible to meet regularly."pg.285(Bergland & Slettebø, 2018)
There was great support in the building, including emotional, physical and financial support (U)	"We have actually been sort of taking care of each other. Just the first month we moved in, a woman on my floor who is still working was sick. She lives alone and she disappeared into her condo. And, 2 or 3 days after she disappeared in her condo, my husband and one of our retired nurses went to her door and banged on the door and got entry into her place and immediately took her to the hospital because she had really bad pneumonia. And, she was unaware of how sick she was. But again like it was the people in the community that said okay like we haven't seen her in 2 days, we got to check on her." pg. 412(Puplampu et al., 2020)
Living with people of similar age group and political values brought happiness (U)	"I didn't expect our group to be so homogeneous, in terms of our political outlook. We are a non conservative group... it can feel quite isolating in out areas where we lived on a farm. Our farm (area) is very conservative." pg. 411(Puplampu et al., 2020)
Opportunity for socialisation was a factor that contributed to improved mental health and quality of life. (U)	"There (are) so many opportunities to do things with other people here... go for lunch, go to a movie... I need the company of mostly other women and my husband really needs to be able to be around men. So today for instance he is just headed off to (another town) with our elderly friend Fred to help him move furniture into his cabin up there. He couldn't do without James' help, and James is just happy to do it. So just the impact on our life, we have friends here. We are not isolated in a big 5 bedroom house." pg.412(Puplampu et al., 2020)
Accessible transportation supported ageing in place (U)	"Everybody worries about it (transportation). My neighbor across the street is 77 and she might not be able to drive in a couple of years, and she says 'as soon as I can't drive, I've got to move.'" pg. 153(Vrkljan et al., 2011)
A home located in an area with access to good internet, mobile phone, or equivalent technologies for staying connected was vital for engaging in valued activities (U)	"'[free access to city-wide wifi enabled her to be] connected to information as I move." pg. 6(Dendle et al., 2021)
Online access was particularly valued by people found it difficult or impossible to leave the dwelling due to health or logistic issues (U)	"'[I don't] get out very often and [I] love to catch up with what is happening around the world." pg. 6(Dendle et al., 2021)
Home in location with inadequate public transport and walkability constrained what meaningful activities people were able to do (U)	"When I can no longer drive a problem arises it's too far to walk." pg. 7(Dendle et al., 2021)
Even where public transport is available a mismatch between availability and desired activities is very limiting (U)	"The buses mostly run hourly, and stop at 9pm or earlier, because everyone has a car in this suburb." pg. 7(Dendle et al., 2021)
Participants indicated that loneliness could be prevented by	"You can find your own level quite happily, it's all about choices I've made, so that's the thing you do what you can.". pg. 2549(Neville, Napier, Adams, et al., 2021)

keeping busy and being socially engaged in the community (U	
Relying on hired help for housework, gardening and odd jobs were ways some participants coped with more challenging tasks (U)	"I have a lady that comes in a does the housework, I have a gentleman who does the lawns and a farm manager who keeps an eye on the stock." pg. 2550(Neville, Napier, Adams, et al., 2021)
Some relied on their ability to walk to the local shops and services as they were no longer driving (U)	"It's not easy for me to walk down the street these days, it used to be but it isn't these days but I do it. I often have to give a leg a bit of rest in the afternoon for a little bit but that's okay, I do that. And I go in the morning when I've got a little but more energy." pg. 2550(Neville, Napier, Adams, et al., 2021)
A lack of seamless transportation options for older adults resulted in older adults having to take longer and more arduous journeys to get to their destinations (U)	"We do not have a metro station in Behala. if we need to travel by metro then we have to go to Tollygune or Kalighat metro station which takes more than half an hour, this is quite challenging for us... the journey becomes quite hectic at least for older people like us." pg. 214(Woolrych et al., 2020)

(U) Unequivocal finding, (C) Credible finding

3.3.10.2 Category 7.2: The importance of being close or connected to family

Participants felt it was important for their homes to be near family, as depicted in Table 3.17. Being close to people within their social networks strengthened connection to family, prevented isolation and provided them with regular 'check-in visits'. Families helped with practical tasks such as transport and home maintenance in order to help them remain in their own homes. In some cases, children of ageing adults were involved in housing decisions (e.g. inviting older relatives to live with them or move closer). Participants valued having family visits or stays and enjoyed entertaining in their homes. Conversely, one participant felt that dwindling visits from family and friends made them feel isolated.

Table 3.17: Synthesised finding 7 illustrations for category 7.1

Findings	Illustrations
Family members were the primary source for a wide range of household chores (U)	"It helps me a lot that my son and daughter-in law live here (in the same city). I've been calling them to do things. He installed the railing on the basement stairs, because I've had 3 falls since last December. It just makes me feel more secure. And my daughter-in-law takes me to a rheumatologist in another city, because I don't drive highways anymore." pg. 5(Narushima & Kawabata, 2020)
Living nearby formal and informal help by family members and neighbours was important (U)	"I have a friend who lives next door, she's 39 and she does a lot of nice things for me. She's a hairstylist, but she's also a bank manager. She cuts my hair and she won't let me pay her. She treats me like a parent." pg. 5(Dupuis-Blanchard et al., 2015)
Family decided to live in her mother's home and put into place a strategy to ensure she ages in place (U)	"No, I live only for the present. you know, it is really difficult to think about what life would be like at my mother's age... but I see myself staying in this house. You know, I have converted a couple of the rooms

	downstairs into a studio flat, with a bathroom. When my mother is no longer here I can rent it out and then after." pg. 1296(Renaut et al., 2015)
Older people valued their spare rooms as necessary for allowing children and grandchildren to visit (U)	"It's a home for my family... we've got 12 grandchildren, they know they they're always welcome to come and stay." pg.1695(Mackenzie et al., 2015)
Being around family and neighbours were important (U)	"I've got all my network of friends in the area and I wouldn't like to have to move right away at this stage and sort of make new friends again. I've got all my support group around this area. So that's why I stay really." pg.43(de Jonge et al., 2011)
Home provided a support network and prevented isolation allowing them to keep in contact with others (U)	"We have got our family around there. We got our interests all round this area... It's just in a good position." pg.6(Hatcher et al., 2019)
Home was a place where the children came to see them (U)	"My youngest kid likes the side dishes that I've made for him. So, when he (my youngest son) comes to my house, I prepare some greens and side dishes for him to take home." pg. 102(Park & Ko, 2020)
Decisions were made to move their family members into a retirement home (U)	"When she started to lose her sight, I talked things over with my brother and the only solution was that I should go and live with her. There was no question of her going into a home on that we were clear." pg. 1296(Renaut et al., 2015)
Outdoor areas allow older people to retain meaningful occupations such as gardening (U)	"We have a proper house here with three bedrooms, which mean we can have our grandchildren back here to stay. So the house itself is ideal." pg. 43(de Jonge et al., 2011)
Widows relied on their families and neighbours to provide regular check ins (U)	"When she (neighbour) look up (from her apartment) she can see me. When she notices I do not open my window she will telephone me. I advised my son (adopted son in law), 'you call me on the phone in the morning and in the evening. If something happens to me at night, you will know in the morning. This way it is fine. If something happens to me in the day, when you call at night, you will also know' ... I fell very at ease." pg. 530(Tan et al., 2015)
Seniors expressed concerns about not being able to provide food and lodging for family members. (U)	"I like to have food when the children come because they often have a meal here and on weekend's there's always visitors." pg. 961(Gould et al., 2017)
Remaining in their homes was contingent on having strong social connections (U)	"I just look forward to Masha and Helen visiting me, there's something really nice about having my family... they are all sort of close, they keep me company and in touch with what's going on." pg. 263(Neville et al., 2016)
Home is the place where social roles are continued and a place for family to gather (U)	"The home where I live is very comfortable; I really take care of it. It's very functional; I feel content. I have space to entertain my kids and grandkids." pg.370(Bigonnesse et al., 2014)
Family members lived far away, friends and neighbors were crucial sources of social support (U)	"When I had the cancer, I had radiation 28 times in December. Every morning I told my friends, I cannot do it one more day, but I did thanks to them." pg. 5(Narushima & Kawabata, 2020)
Home was a place to allow family to take over the ancestral rites (U	"Even after I die, I hope my children will not sell this house and just come and go like their hometown... This house has let me live my life. That's the meaning of this house." pg. 101(Park & Ko, 2020)

Older people wish to remain at home as long as possible provided they were given access to home care services (U)	"If my health should require help with that, I would like the public health care system to give me such services. That I can get out and maintain contact with others." pg. 4(Fjell et al., 2021)
Home provided a place, a time and a reason for positive contact with others as well as being where friends and family were close, which was described as central to well-being (U)	"It's simply that I have a home that provides me a my dog and my friends with a space that we share." pg. 258(Almevall et al., 2022)
People described weekly dinners held at their home over many year brought together their children and grandchildren, a routine that they consciously continued to keep family ties strong (U)	"'I have four different lunch groups. We go to different places each time." pg. 6(Dendle et al., 2021)
Having supportive friends and family nearby meant that they felt free to travel and visit relatives and friends without worrying about their home while they were away (U)	"Our neighbours keep an eye on it, put out the garbage, water the pot plants and check the mail if we are going on an extended holiday. We do the same for them." pg. 6(Dendle et al., 2021)
Having family nearby was integral to their social and support network (U)	"It's nice to have a little bit of family close by because, although you have a lot of friends, inevitable I believe it's your family that are there for you at the end." pg. 2547(Neville, Napier, Adams, et al., 2021)
With reduced mobility, there was great comfort from having his family nearby (U)	"We have a daughter just down the road and another in [name of city] so it makes life very pleasant and of course family nearby is quite massive. We know people around here and all the families are all overseas, they're all on their own. I can see that getting progressively worse which means there will be more need for help." pg. 2548(Neville, Napier, Adams, et al., 2021)
Dwindling visits from his children and friends, contributed to his home becoming less porous and more isolating (U)	"It's why I'm going to be depressed when you go, I don't really do anything." pg. 11(Webber et al., 2022)

(U) Unequivocal finding, (C) Credible finding

3.3.10.3 Category 7.3: Individuals felt a sense of connection towards their community

Older adults felt strongly connected to their communities, as depicted in Table 3.18. Family and friends often lived nearby, and in some cases participants considered their neighbours to be like family or friends. In that way, the community contributed towards the person's social network. Furthermore, they appreciated knowing the people who worked in local shops. The person's community contributed towards their sense of identity. Participants mentioned the value of having community services, local amenities and public transport nearby as well as public green spaces. One participant voiced concerns about segregating middle-aged and older adults from younger communities (such as in retirement villages or communities).

Table 3.18: Synthesised finding 7 illustrations for category 7.3

Findings	Illustrations
Occupants described the importance they placed on their home's close location to community activities, family members, friends and neighbours (U)	"There's a good community spirit here' and support mechanisms within their neighbourhood 'we've got (name) over the fence, the neighbour, he looks after the place if we should go away and likewise we look after his place." pg.1697(Mackenzie et al., 2015)
Older people were happy with their current home as it provided connection with community services (U)	"Well the house is central in position; it's very close to the shops and transportation which is very good. We have got the railway of course; there is a good bus service along here." pg. 43(de Jonge et al., 2011)
Location of housing was important in being able to access neighbourhood facilities with easy access (U)	"I would hold (the house) and would put it here, in the centre of the village, because I have to go uphill and it is getting more difficult every day." pg. 17(Bosch-Farre et al., 2020)
Being with familiar people and the neighbourhood, supported their living arrangements (U)	"He (the son) asked me over. I said no. When my son goes to school, there is no-one at home ... The neighbours lock their doors. It is boring to be alone. Sometimes I went to the void desk (the vacant space on the ground floor of an apartment block that is often reserved for communal activities) and there is no one to talk to. It is also a long walk just to take a bus ... Here, there are many people and also food is readily available. Convenient! At Sengkang (a new surburban), one needs to travel a long distance just to get food. Sometimes, when I stay here, I have to cook for myself." pg. 529(Tan et al., 2015)
Living in apartments or condominiums expressed contentment with their new home (U)	"I want to stay in my condo as long as possible because I'm comfortable, I'm close to everything and I have good neighbours. pg. 961(Gould et al., 2017)
Having access to health services was important for people who suffered chronic illness (U)	"About the community events, feasts, and so on, are there enough activities like that in the community? [Through an interpreter]: Yeah. Why is it important, why is it good? [Through an interpreter]: He says it's important going, because it's so boring here and sometimes [there is] hardly any food. So, it's his only chance to go eat around people and socialize with others." pg.140(Hatcher et al., 2019)
Location of housing was important in being able to access neighbourhood facilities with easy access (U)	"I would hold (the house) and would put it here, in the centre of the village, because I have to go uphill and it is getting more difficult every day." pg. 17(Bosch-Farre et al., 2020)
Participants found reasons 'to get up in the morning' through routines around their neighbourhoods and broader communities. (U)	"'It helps me keep going. I think now if I didn't do this, I would probably be crippled. Just sitting around doing nothing. I have to get out." pg. 777(Finlay et al., 2020)
Neighbours were referred as family (U)	"Researchers (people in my neighbourhood) are like a family. They call 119 (911) if I become sick. When I am sick, they come and see if I am OK, and if I'm not home, they look for me and ask around."pg. 101(Park & Ko, 2020)
Local social networks enabled participants to feel rooted in the community (U)	"I have very good friends. I've been widowed since 1978, and had I not had those friends, it would have been very difficult for me. And then they're like family … very close good friends that care about you." pg. 774(Fjell et al., 2021)

Older adults felt the need to consider a neighbourhood adapted to their needs as a preventative strategy (U)	"[My wife and I] have already established relocation criteria. We want to have access to community-based services close to home; [this alone is proving to be an] "endangered species." We want public transportation to be accessible and efficient. It [the new apartment] must be a one-floor unit and it has to be close to green spaces. We want to go out for walks." pg.365(Bigonnesse et al., 2014)
Older people stayed in their neighborhoods to avoid dealing with life struggles or interacting with their social surroundings. (U)	"I barely get out of my room now. For one thing my health condition makes it a bit difficult for me to move around. But I just avoid interacting with anyone beside my partner, unless I have to. I simply don't want to talk to anyone in the neighbourhood. I stay at home every day, do some reading and writing. I lose my temper sometimes with my partner. I know it's no good."pg. 197(Yu & Rosenberg, 2017)
Living in public housing remade neighborhood space into a more welcoming place that gave them a sense of continuity. (U)	"Since Danwei is now part of society, we belong to the community. No one is responsible for us anymore... Some of us old neighbours still care about each other and the Community. Look at these chairs, tables and games! We bought them. We made those cushions as well... We volunteer in the neighbourhood and keep each other informed about recent developments. If we don't see the old folks showing up within a day or two we will knock on the door. We pay special attention to the frail ones who live alone."pg. 196(Yu & Rosenberg, 2017)
Quality of life had either improved or been sustained because of the motivations and activity in the community (U)	"I have improved physically because I am doing a whole bunch of new stuff with a bunch of new people here. I think for me a lot of it is what I mentioned before about the inspiration from other people here that have got me thinking about how do I want to go into old age. And I look at them and I think okay, most of them are in good shape, both physically and mentally. Some people aren't in great shape physically, but they still do stuff as much as they can. I think, that for me, that's the most important thing that has helped me."pg.412(Puplampu et al., 2020)
Having a community near the home was a source of support for older people that promote independence (U)	"She loves to go to the bank because three or four of the staff members, as soon as she walks in, they say hello. She has this personal connection with them; that's a really big thing for her." Older participants commented on the importance of having services available in their community: "We're in a very fortunate area. The bank, the liquor store, the grocery store; they're all right there. The pharmacy is across the street."pg. 6(Dupuis-Blanchard et al., 2015)
Home is a place for connection with their neighbours (U)	"Everybody helps each other; when one is staking wood, another one comes to give a hand. When I shovel my driveway, somebody will come to help me. When my neighbour sits on her porch—she's old, she's 90 years old—I go [to] her place and talk with her, she's happy. My street is really like a big family."pg. 368(Bigonnesse et al., 2014)
Habitual occupations provided opportunities to connect with others (U)	"I go to town because I like the walk, and I meet people, and I like to talk to people, so I socialize often." pg. 153(Vrkljan et al., 2011)
Elderly people in the community spending much time with people they were close to (U)	"I like it when my friends come to my house. When they come to my house, researchers drink tea and eat something, and researchers visit with one another. (When they come) I give them tea and fruit or something like that. I also go their homes, and they do the same for me." pg. 102(Park & Ko, 2020)

Being close to essential services was deemed important (U)	"They've got a small main street area with little grocery stores and the health food store, pharmacy, library... so if you're not carrying a lot of things, it's possible to get around town." pg. 153(Vrkljan et al., 2011)
Living at home enabled the older persons to maintain this sense of identity within their community (U)	"Those people (neighbours) had known him (her husband) and that is very important to me, that I am not just me but that I was part of a double, part of something else." pg. 4(Hatcher et al., 2019)
Easy access to grocery stores, medical sites, etc, were important to live near (U)	"If I get really depressed or down, I leave the building. Get in my car and go. I go to a lot of thrift shops, [food shelves], Goodwill, or just browse around [the local department store]. Brenda felt 'at home' in these shops where she was greeted by familiar employees and storefronts." pg.772(Finlay et al., 2020)
Social networks contributed to the essence of what home meant and provided participants a sense of identity (U)	"I enjoy it here. The fact . . . [that] I have about 8 or 10 kids come of a morning now that school's started. They wait here; if it's raining, they wait on the veranda and otherwise they'll wait in the yard and go out when the bus comes for the children ...and I like to be able to make sure they're on the bus safe. Some of them get off here in the afternoon and the rest will get off in front of their place or another stop further down. But they all like to get on here. . . . By them being here the bus comes along up the road here, they walk across to catch it and I know they're safe. ...It makes you feel you're doing something even though I'm not really doing anything ...to most of the neighborhood children I'm "Nanna." It doesn't matter whether they are related or not. I'm Nanna. Even the 18- and 19-year-olds... still refer to me as Nanna. I've got a very large family!"pg.203(Tanner et al., 2008)
Social interaction for those who lived alone near younger people was valued (U)	"I think it's essential when you're designing something for us old people that are in close proximity to the young... don't isolate us." pg. 156(Vrkljan et al., 2011)
Proximity and depth of social connections were major factors in any sense of rootedness (C)	"I'm comfortable. I feel safe here. I was born here – I'm probably only three or four miles away from where I grew up. I know lots of people. My church is here; my whole life is here." pg. 776(Finlay et al., 2020)
Older people coped with relocation and isolation by using public transit to go to the old city or their neighbourhood every day for familiarity (U)	"Participant no. 24 described how in her new neighborhood, no one talks to each other. She took three hour bus rides everyday just to visit the park in the old neighborhood." Pg.197 (Yu & Rosenberg, 2017)
Individuals stated that they would prefer to continue living in an area with younger people rather than only with seniors (U)	"I didn't want to go into that sort of environment. I wanted to have younger people around me, I find that more lively. I don't want to go into care home type of atmosphere." pg 1188(Burgess & Quinio, 2021)
The value of familiar neighbours and surroundings by expressing a wish that a quality nursing home could be built in her area (U)	"[I] could live out my days in the neighbourhood I've lived in for over 40 years." pg. 4(Dendle et al., 2021)
Value was placed on the town's 'village' atmosphere and the friendliness of people (U)	"Small places are easier to get to know people." pg. 2546(Neville, Napier, Adams, et al., 2021)
The care and friendship associated with being part of a small-town community was	"'After my husband died there were people sort of turning up doing things, it was absolutely amazing." pg. 2546(Neville, Napier, Adams, et al., 2021)

especially evident during critical and difficult times (U)	
Friendships were valued as they formed shared experiences of living on a remote peninsula (U)	"'It's a peninsula, there's only one road in and one road out, and because of that you're isolated in many ways, like our telephone, we can't have mobile reception because of the geology of the last, so you have to check on your neighbours, you can't ring them up, and if there's a civil defence emergency, which we're involved in, everyone actually has to go and make sure that people are okay, so you immediately have a warmer, closer relationship with people, but I think that's unique because we've worked on that really hard, that we've developed things that we do, which the whole community is involved in." pg.2547(Neville, Napier, Adams, et al., 2021)
Fostering good relationships with neighbours was considered instrumental in maintaining a supportive community (U)	"'I have got good neighbours, very nice, we all look out for each other but we are not in each other's pockets all the time." pg.2547(Neville, Napier, Adams, et al., 2021)
Fitting in to the community was a two-way process (U)	"'We let our neighbour graze and in return he helps my husband with hedges. He put in the electric fences." pg. 2547(Neville, Napier, Adams, et al., 2021)
It took time and effort to feel accepting as a new comer in the community (U)	"This is a cliquey community, hard to break into anything. I did yoga for a year and honestly I was an outsider for the whole year." pg.2547(Neville, Napier, Adams, et al., 2021)
Participants typically chose to engage in their communities in ways that matched their cultural preferences and enhanced their sense of belonging (U)	"We go down to the bowling club quite often to have a meal at night time and that's where all the people in my generation are." pg.2548(Neville, Napier, Adams, et al., 2021)
Continuing to feel part of the wider community balanced what was perceived to be a limitation of an age-segregated community (U)	"Plenty here to do if you want to but I'm still trying to do things out of the community as well because I think that keeps you going and well that's good for your health." pg. 2551(Neville, Napier, Adams, et al., 2021)
Having lived in the same neighbourhood for most of her life cultivated long-standing connections with other residents (U)	"Being out, seeing people, talking to them." pg. 7(Webber et al., 2022)
Her sense of belonging to her home was reinforced not only by her sense of belonging to the wider neighbourhood, but also strongly connected to her sense of community within the sheltered accommodation (U)	"There's a certain of social activity within the building which you wouldn't get in a long house, which is good." pg. 8(Webber et al., 2022)
Just being present in the neighbourhood over a number of years and 'coping' with the changes was enough to form a sense of emotional attachment (U)	"I am emotionally attached to this community. Though I lived here for many years, I have not personally contributed anything here... We have coped with the changes in the community." pg. 210(Woolrych et al., 2020)
A strong-aspect of those experiences in the lower-income communities of India and Brazil was a sense of connection to home and community despite the everyday issues people experienced (U)	"I was born and brought up here. Where people are born they have strong connections and feel attached to their place. Even if neighbours are not pleasant we still feel belongingness as they are part of our neighbourhood." pg. 210(Woolrych et al., 2020)

A number of older adults, even when they had spent a considerable amount of time outside of the area, reported a strong desire to return to their community in old age (U)	"I was always in love with Pelotas, I lived in Porto Alegre, I did not like it. I lived in Parana, I do not like it. I came back here. My place is Pelotas." pg. 210(Woolrych et al., 2020)
Older adults reflected on the norms, values and attitudes which had traditionally orientated people to the community (U)	"Well everybody knew everybody else. Not anymore. Not the same. No sense of community. Definitely not. It starts to change the way you see the place, yet know, it's not the same sense of connection that we all have. You used to know where you were. You felt centred if you know that I mean. I'm not sure communities know where they are from anymore. pg. 211(Woolrych et al., 2020)
Home was a place that people 'wanted to return to', an environment where social connections were sustained and where personal freedoms could be enjoyed (U)	"I was born and brought up here and feel attached with the people and this place. I can go out for some time but at the end of the day I want to come back here only. At this stage it is difficult to go to some new place and making new friends would not be easy." pg. 212(Woolrych et al., 2020)
The feeling of 'being known' and recognised at a street level created a sense of belongingness (U)	"I know each and everyone here. They're very close to me. So, I definitely bear a different kind of emotional attachment with the locality and people of the locality. Everybody is known. Every face is known." pg. 217(Woolrych et al., 2020)

(U) Unequivocal finding, (C) Credible finding

3.4 Discussion

This review examined the findings of qualitative research studies on the perspectives of middle-aged and older adults of their home environments and identified several key themes. Factors deemed important when making decisions about future housing were: a) independence, abilities and autonomy; b) finances and costs; c) feelings of stigma about ageing and concerns about being a burden; d) positive and negative attitudes to ageing; e) emotions, meaningful activities and attachment to the home; (f) safety, accessibility and aesthetics in the home; and (g) family, community support and connection whilst remaining at home. Having an understanding of these perspectives allows professionals working in house and community design, healthcare and social care to support ageing in place (Fausset et al., 2011). These factors should be considered when planning and designing communities in a manner that supports ageing adults. This study synthesised the views of middle-aged and older adults from an international context (from Australia to Finland) to understand future housing decision-making internationally.

This systematic review of qualitative studies and meta-aggregation builds on the findings of individual studies and provides up-to-date evidence regarding middle-aged and older adults' experiences of ageing at home. Systematic reviews advance knowledge through identifying and analysing multiple studies,

identifying gaps in the literature, identifying deficiencies in current studies and helping to guide and inform delivery of care and policy development (Munn et al., 2018). We identified a total of 46 studies published over the last 15 years demonstrating the strong interest and importance of this topic area. We were interested in the views of middle-aged adults as they are a cohort who may be considering their future ageing needs when planning renovations, relocation and/or downsizing. However, only 12 of the studies included people considered to be middle-aged (as part of a larger participant group, including older people), hence their views were not examined separately. More research should be conducted specifically with this population group as decisions made during this time may lead to long term benefits. For example, someone who is 50 years old and renovating their bathroom could ensure that there is flat entry to the shower cubicle and could avoid installing a low toilet seat.

Older adults tended to have negative views related to relocation and residential care; this finding was not unexpected. Consistent with the findings from, Gillsjö et al. (2011) and Corcoran et al. (2023), most middle-aged and older adults want to remain in their homes for as long as possible. It is possible that perceptions of living in residential care are currently poor due to media reports portraying residential care as being an environment of neglect (Royal Commission into Aged Care Quality and Safety, 2020b). Effort is needed in the residential care sector to demonstrate that high quality care can be offered, and that autonomy can be preserved. A recent integrative review regarding autonomy in residential care showed that autonomy was a critical contributor to health and quality of life. Moilanen et al. (2021) also found that autonomy could be preserved in residential care, but this depended on staff skills and family support. Simple things such as being listened to and the ability to decorate one's own room as they wished contributed to autonomy (Nord, 2016).

It is also evident that people become more reluctant to consider moving as they age and moving appears to be more difficult as time passes. Despite peoples' intentions to remain at home for as long as possible, there are currently a number of barriers in place that need to be addressed at a policy level. In terms of care, more investment in home care services is required. For example, data from 2021 showed that older Australians spent an average of 28 months on a wait list for home care (Atkin, 2021). Other research suggests that home care packages for people in small communities in Portugal are in limited supply (Genet et al., 2012). Similarly, whilst people living in Europe such as England, Austria and France have access to a large variety of home care services, long-term funding continues to be a problem (Genet et al., 2012). Therefore, by the time middle-aged and older adults gain access to funding for care, they will receive less care than they need and face the risk of further decline, preventable hospitalisation and premature entry to residential aged care (Royal Commission into Aged Care Quality and Safety, 2020b). Furthermore, dedicated funding for home modifications is not currently available. Our review showed that financial constraints play a part in decision making around future housing; new solutions are required so that older

adults can access funds for home modification without needing to use their home care services budget.

Similar to the findings from Tanner et al. (2008), this review showed that many participants described their home as a place of security, autonomy and comfort, aspects that transcend the physical features of the home. These emotions were not necessarily prevalent in the early stages of them residing in their homes, but rather they developed over time. As adults age, homes gradually trigger these emotions which are associated with everyday routines (Gillsjö & Schwartz-Barcott, 2011). Similar to studies by Sherman and Dacher (2005) and Oswald et al. (2007), this review revealed that those who wanted to stay in their homes became emotionally attached to their properties. Moving therefore is not simply a transition into another space, and planners and designers need to look beyond the physical attributes of what is considered a home, that is, how individuals define the meaning of 'home'. This confirms findings by Coleman and Wiles (2020) regarding the relationship between ageing, the physical environment and personal views about ageing.

The ageing population's changing demographics will continue to create demand for affordable age-friendly housing. The affordability of age-friendly housing is an important consideration for planners and policy makers. In the United States, a study by Li et al. (2022) highlighted the need to increase rental assistance funding for ageing adults to promote affordable housing. Possible solutions included either densifying housing units to build smaller units or transforming single-family houses, such as garages and basements, into smaller housing units (Li et al., 2022). Similarly, Riedy et al. (2019) suggested that co-housing may have the potential to address the challenges older adults face with affordability, accessibility and isolation. However, their research also showed there were negative perceptions of cohousing amongst the ageing population, due to the lack of familiarity with shared living arrangements (Riedy et al., 2019). Jolanki (2021) recommended the need for more 'in-between' housing options for all stages of ageing and housing policies to meet the rapid growth of older adults.

Results of this review are also consistent with studies by Hatcher et al. (2019), Kramer and Pfaffenbach (2015), Stones and Gullifer (2014) where living near family, friends and acquaintances was considered important. Feelings of loneliness and social isolation are common in older people and are expected to increase as the ageing population increases (Alpert, 2017). Depending on the country, estimates of social isolation and loneliness can vary. Literature indicates between 12% to 30% of older people experience loneliness and between 5% to 17% are socially isolated (Ong et al., 2016; Shankar et al., 2013; Tomstad et al., 2017). Older adults experience a decline in economic and social resources, continued functional limitations and changes in family structure (Courtin & Knapp, 2017). Social isolation and loneliness can place older people at greater risk of mortality and comorbidities (World Health Organization, 2021c). To address this, the World Health Organization (2021c) recommends connecting older adults to services and

maintaining/building relationships. Remaining socially connected to others who live nearby enables ageing adults to feel safer and less anxious (Glass & Vander Plaats, 2013). Luciano et al. (2020) developed a framework for age-friendly housing which comprised nine domains, which includes 'community connection'. Hence, living near family, friends and neighbours are an important aspect of ensuring older adults are not socially isolated and are part of a locally integrated network.

3.5 Strengths and limitations

This review showed the importance of consulting with middle-aged and older adults and understanding their perspectives when planning communities and designing housing for older adults. While the included studies contained rich information from a diverse range of journals, the review had some limitations. It is possible that as the topic was so broad that some relevant studies may have been missed using the selected search strategies. This review also did not source non-English studies, thereby not incorporating the perspectives of middle-aged and older adults from countries where English is not the primary language. Although qualitative methods assisted in the understanding of perceptions of home among middle-aged and older adults, we were not able to understand which aspects were the most important. For example, participants may have spoken about the importance of living near family, however in real life this may be less important than other features, such as housing affordability. Another limitation was that the experiences of participants may have been influenced by other factors, such as cognitive impairment or other chronic conditions.

3.6 Conclusions

In summary, this review provides a guide and highlights that the planning and design of future housing should incorporate middle-aged and older adult's values around their home, rather than focusing only on the physical characteristics of the home. Working with middle-aged and older adults to develop age-friendly communities and buildings may promote autonomy and independence, reduce isolation and loneliness, and result in people staying at home for longer which in turn contributes to reductions in government spending. Changes to funding are required so that older adults can access funding specifically for appropriate home modifications. Given that it may not always be possible to stay at home, alternatives to residential care (such as co-housing) should be trialled. Older adults and their families who are contemplating relocating should consider how the move can be a positive experience by ensuring that the new house feels safe and aesthetically pleasing. They should also consider how the person can maintain connections to their previous community while forming connections with their new community.

CHAPTER 4   CONSIDERING THE HOME ENVIRONMENT AND PLANNING FOR THE FUTURE: A QUALITATIVE EXPLORATION OF THE VIEWS OF OLDER ADULTS AND INDIVIDUALS WITH OLDER RELATIVES

This chapter addresses Objectives 2 and 3 of the thesis: to describe the views of older individuals regarding their home environment, home safety and ageing in place; and to explore the perspectives of individuals with older family members who are ageing in place, and the challenges that these older family members face as they continue to age in their own homes. This chapter describes a qualitative study conducted and is presented with minor changes for thesis formatting from the article, 'Considering the home environment and planning for the future: a qualitative exploration of the views of older adults and individuals with older relatives', published in the *Scandinavian Journal of Occupational Therapy* within Appendix P (Aclan, George, et al., 2023b).

The qualitative study was conducted to better understand the views and perspectives of both middle-aged and older adults on home safety, ageing in place and particularly the experiences of individuals with older family members who are ageing in place. After conducting a comprehensive qualitative meta-analysis in Chapter 1, this qualitative research examines the perspectives of individuals who are autonomous and self-sufficient, with the intention of remaining in their current living situation as they age.

As the lead author of this publication, the candidate's contribution was 75% of this chapter. Due to funding timelines, the data collection occurred prior to my enrolment in my PhD candidature. Therefore, the data was collected by my supervisor. I refined the research question, led the data analysis and was the major contributor to the write-up and editing of this publication. Co-author approval was obtained for permission to include this publication in the thesis.

4.1 Introduction

As already described in Chapter 3, globally, the proportion of older adults aged 65 and over is projected to increase steadily over the coming decades, resulting in a population of 2.1 billion older adults across the world by 2050 (World Health Organization, 2022). Ageing leads to biological, physical and cognitive changes, and increased risk of disease (World Health Organization, 2022). As age increases, the person's ability to move and function independently within their own home environment can become increasingly difficult (Productivity Commission, 2015). Most people want to age at home and remain in their own home for as long as possible (Hatcher et al., 2019; Kramer & Pfaffenbach, 2015; Stones & Gullifer, 2014; Tanner et al., 2008) which is often referred to as 'ageing in place' (Pani-Harreman et al., 2021). Pani-Harreman et al. (2021) define 'ageing in place' as an older person remaining at home whereby the house is more than just a place but a home connected to social networks, identity and supportive technology. Research conducted with older people reveals that they prefer to stay at home for several reasons, including a sense of

attachment to the home, the high cost of moving, and a desire to maintain existing social and community networks (Hatcher et al., 2019; Kramer & Pfaffenbach, 2015; Stones & Gullifer, 2014; Tanner et al., 2008). 'Home' is considered by older adults to be a place of comfort and safety, and where independence can be preserved (Aplin et al., 2020; Coleman & Wiles, 2020; Hatcher et al., 2019; Tanner et al., 2008). Strong community networks enable older adults to cope with age-related changes and prevent isolation (Courtin & Knapp, 2017; Glass & Vander Plaats, 2013; Victor et al., 2005). Similarly, being surrounded by important possessions or memories is reported to be linked to quality of life (Coleman & Wiles, 2020).

The ability to 'age in place' is dependent not only on age-related changes but the design and environment of the home and the availability of other housing options (Ninnis et al., 2018). Few homes are designed or built with consideration of the needs of older people, and the development of age-friendly housing has remained a relatively low priority worldwide (Novek & Menec, 2014; Podgórniak-Krzykacz et al., 2020). According to Severinsen et al. (2016), many older people are living in houses which are unsuitable. As a marker of housing suitability, Australian data shows that approximately 75% of older people lived in a house with two or more *spare* bedrooms (Australian Institute of Health and Welfare, 2021a).

As a person ages, home modifications or relocation may be required (Godfrey et al., 2019). Relocation may be avoided if the home can be modified to meet the needs of the older person. Occupational therapists often conduct home assessments to identify environmental hazards and suggest possible modifications to improve the safety of the home (e.g. installation of ramps and, grabrails, or decluttering) (Stark et al., 2017). Evidence from randomised controlled trials suggests that occupational therapy home assessments can lead to improved functional performance, reduced risk of falls and less demands on caregivers (Stark et al., 2017). However, access to occupational therapy home assessments may be limited in both urban and rural areas, and is usually available only after injury or illness (Ninnis et al., 2018; Read et al., 2020; van Gaans & Dent, 2018). Home assessments can be time intensive, with one study suggesting an average duration of 80 minutes per home assessment (Lannin et al., 2011).

Solutions which lead to accessible, age-friendly homes for the increasing number of older adults are required. It is possible that, in future, digital health tools may play a role in enhancing the home assessment process (Ninnis et al., 2018). A scoping review by Ninnis et. al. (2018) identified 14 studies which used technology to enhance the occupational therapy home assessment process. These studies involved either the development of specialised tools or the application of off-the-shelf technologies. Findings from studies conducted to date suggest that remote assessments were less likely to identify potential hazards than assessments when the therapist was in the home (Ninnis et al., 2018; Sim et al., 2015). Despite rapid advances in technology, clinical practice has not changed substantially and traditional in-home assessments remain preferable (Ninnis et al., 2018).

Much of the research in this field to date has focused on older adults with existing diseases and disabilities who require home modifications. Less research has been conducted on older adults who remain relatively fit and independent but who may be considering future changes that may be required to increase their chances of successfully ageing in place. Educating members of the public on age-friendly home design and modifications may assist with future planning, thereby potentially preventing injuries, reducing the fiscal pressures on the health care system, and compensating for workforce shortages in health and aged care.

This qualitative study seeks to develop a tool which enables older people (or their families) to self-assess their own home. This tool will be available both in hard copy and in digital form, and will be used to promote and support future planning in terms of the home environment. The first step in tool development is to conduct a needs assessment to understand the gaps between the 'current state' of older adults living at home and the 'desired state' of supporting ageing in place (Stefaniak, 2020). This involves gathering data from older adults to gain a deeper understanding around ageing in place and home safety. As relatives often become involved in housing decisions of older people and are potential users of the tool, understand their perspectives is also critical. Therefore, the aim of this qualitative study was to investigate the following research questions: 1) what are the perspectives of middle-aged and older people in relation to their own home environment, home safety and ageing in the home; and 2) what are the experiences of individuals with older relatives and the difficulties their older relatives face as they age in place.

4.2 Methods

4.2.1 Ethics

This study was approved by the Flinders University of South Australia Human Research Ethics Committee (ID: 1949). Eligible participants were provided with information about the study and provided informed consent. Interviews were conducted individually with the person over the phone (while they were in their own home) at a time convenient to the participant (see Appendix F for the information sheet for older people, and Appendix G for that for individuals with older relatives). Audio-recordings were transcribed and de-identified, and data presented in a way that ensured participants remained anonymous. Participants were assured that they could choose not to answer questions if they felt uncomfortable and could end the interview at any time.

4.2.2 Research design

A qualitative descriptive method was used (Doyle et al., 2020). The qualitative descriptive methodology was applied in order to understand descriptions of experiences and perceptions (Doyle et al., 2020; Sandelowski, 2010). This methodology aims to collate the 'who, what and where of events or experiences' from a subjective perspective (Kim et al., 2017). Semi-structured interviews were the preferred approach as it allowed the researcher to address topics in their own terms pertinent to them and clarify views based on

the development of answers (Flick, 2022). To ensure rigorous reporting of the methodology, this paper was written in accordance with the Consolidated Criteria for Reporting Qualitative Research (COREQ) (see Appendix H) (Tong et al., 2007).

4.2.3 Participants

We recruited participants to represent one of two categories. The first category was people considered as 'middle- or older-aged people' who were invited to talk about their own personal experiences and plans for housing as they age. The second category was people who had older relatives from whom we sought to understand the experience of being a family member providing support during the ageing process. Relatives (especially children) often become involved in housing decisions of older people as they provide increasing support to ageing family members. The two groups were recruited separately so that there was no duplication of participants the two categories. The inclusion criteria for first group were as follows: a) aged 55-75 years, b) live in their own home, (c) speak fluent English, and (d) cognitively intact. This age criterion was chosen to explore the views of adults who were likely to be relatively healthy and independent, and thinking about planning for the future, as these are the target end users of the tool in development.

The criteria for the second group were: a) aged 50 years and over; b) have parents who are still alive, c) live in their own homes, d) speak fluent English, and (e) cognitively intact. All participants were from metropolitan Adelaide, Australia, and were identified and invited to participate through their membership of an online research panel hosted by a market and social research company, McGregor Tan, Adelaide, Australia which assisted only with the recruitment phase. The company manages a panel of over 20,000 respondents and identified panel members who met the eligibility criteria and agreed to participate in an interview.

4.2.4 Data collection

Semi-structured interviews were conducted by one of the authors (KL), over a one-month period. A semi-structured interview guide with open-ended questions was used to explore participants' perceptions and opinions, or complex or emotionally sensitive issues (Kallio et al., 2016). The question guide for the second group of participants (children) was slightly altered to seek their experiences and perspectives of having an older relative, and family views and discussions about long term housing decisions. The interviews started with the interviewers giving participants (middle- and older-aged people) opportunities to explain their overall thoughts around staying at home as they aged. People with older relatives however were asked about their experiences with ageing parents. For this study, individual semi-structured interviews were conducted until the data reached a point of saturation, (i.e. when further information no longer generated new ideas or understandings) (DeJonckheere & Vaughn, 2019). Probes were used to follow up on responses

and promote discussion with each participant. No field notes were taken, nor observations written regarding individual behaviours. Questions covered for both categories are detailed in Appendix I (wording modification was made for the second category). All interviews were conducted one-to-one via phone due to restrictions associated with the Covid-19 pandemic. The interviews took approximately 30 minutes each until their natural conclusion, were audiotaped and transcribed verbatim.

4.2.5   Data analysis

Recorded audio interviews were transcribed by an independent company. Data analysis was conducted by two investigators: (RA and KL) All data was entered into NVivo 12 (software), Interviews were analysed inductively using thematic analysis. This study used reflexive thematic analysis to fully embrace the skills of the researcher and the qualitative research values (Braun & Clarke, 2019, 2020b). Reflexive thematic analysis is used for research questions needing to describe the 'lived experience of particular social groups' or 'to examine the factors' that influence a particular phenomenon (Braun & Clarke, 2020a). The principal investigator familiarised themselves with the data and then coded the interview text independently (in NVivo). For example, "*they don't want to let go of their independence, and I get it*" was assigned the code, "want to remain independent". Codes were then reviewed to check for duplication and similar codes were grouped together as initial themes (Braun & Clarke, 2019, 2020b). The investigators discussed, reviewed and refined the themes until consensus about their nature and relationship with other themes was reached. Socio-economic status was categorised according to the Australian Bureau of Statistics index of relative socio-economics advantage and disadvantage (IRSAD) (Australian Bureau of Statistics, 2018a). Each socio-economic area is given a score for a statistical area level, based on postcode (for e.g. SA1) through the addition of weighted characteristics. The scores ranged from a low index score (more disadvantaged: SA1) to a high index score (most advantaged: SA5). (Australian Bureau of Statistics, 2018a).

4.3   Results

A total of 16 participants were interviewed, as presented in Table 4.1.

Table 4.1: Characteristics of participants in qualitative study

Participant number	Group	Age	Gender	Socioeconomic status	Occupation
1	Individual with older relatives	59	Female	SA4	Tutor
2	Middle/older aged person	71	Female	SA4	Retired
3	Individual with older relatives	52	Female	SA2	Home duties
4	Individuals with older relatives	51	Male	SA2	Office manager
5	Middle/older aged person	75	Male	SA5	Retired manager
6	Middle/older aged person	69	Female	SA2	Retired
7	Middle/older aged person	66	Male	SA5	Building designer
8	Individual with older relatives	62	Female	SA5	Accountant
9	Middle/older aged person	75	Female	SA4	None
10	Individual with older relatives	64	Female	SA5	Retired
11	Middle/older aged person	71	Male	SA3	Retired maths teacher
12	Individual with older relatives	55	Male	SA3	Delivery driver
13	Middle/older aged person	66	Male	SA4	Retired public servant
14	Middle/older aged person	66	Female	SA3	Retired
15	Individual with older relatives	62	Male	SA4	Stone mason
16	Individual with older relatives	62	Male	SA1	Teacher

Eight middle- and older-aged people discussed their own home environments and future housing plans, and eight individuals with older relatives provided perspectives on the home environment and future planning for a relative. Four out of the eight middle- and older-aged people were males, while the remaining four were females. The middle- and older-aged people were aged 67-76 years. Four of the individuals with older relatives were also males and the remaining four were females. Individuals with older relatives were aged 52-65 years.

In total, seven themes represented participants' perceptions of home safety, ageing in the home and the information older people need to assess their own home for safety emerged (Figure 4.1). These were: i) experiencing and accepting the ageing process, ii) no place like home, iii) push for independence, (iv) recognising future housing needs, v) recognition of home environment risks, vi) resistance to change, and; (vii) access to services and education.
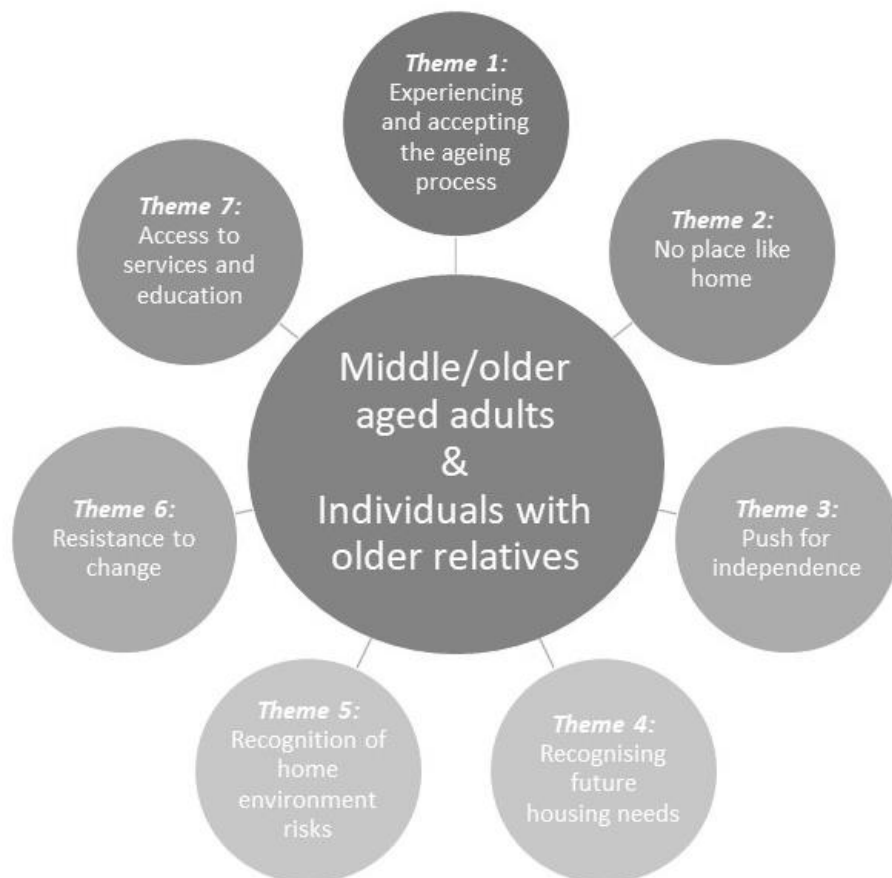
Figure 4.1: Themes representing participants' perceptions of home safety and ageing in the home

4.3.1 Theme 1: Experiencing and accepting the ageing process

Individuals with older relatives and middle/older-aged adults identified how a positive attitude towards ageing and being receptive to change and new information supported successful ageing in place and changes in behavior. This is reflected by an individual with an older relative and a middle/older-aged person:

> Certainly at this point they've always been very positive and accepting that it's okay. Individual with an older relative, Interview 16

> You have to be in the mindset to accept the information that's presented to you. Middle/older aged adult, Interview 13.

The acceptance of ageing and the changes associated created further opportunities for middle- and older-aged adults to accept help at home and the home safety features required to support ageing in place.

> I suppose in the future, you might have to have the usual bars to help you, assist, and all the rest of it, which we don't have at the moment. Middle/older aged adult, Interview 6

You're responsible, so it's up to you to take the initiative and the responsibility. Put it this way. I would have no problem, if things did get a bit difficult, in asking for help. Middle/older aged adult, Interview 2

Middle/older aged adults who accepted change and saw benefits to change were more open to home safety interventions such as home modifications, and visits by an occupational therapist to install safety features or to conduct home assessments:

I'm well controlled and everything's not too bad, but, yes, I certainly would consider some modifications, not at the moment, but in the future. Middle/older aged adult, Interview 14.

My wife's going to have hip replacement in a couple of weeks. So we're putting in some suction handles and things like that, just to facilitate ease for her for that. And obviously those sorts of things can be made permanent down the track. Middle/older aged adult, Interview 13.

I would certainly say that this experience now that she's used the handrails and everything, she's agreed that they're actually good [occupational therapists]. So she's probably a bit more open, but she's still very distrustful and we still have to work very hard at her. Individual with an older relative, Interview 4.

Others were also open to the idea of visits by an occupational therapist, however this depended on costs.

If I was living alone, depends on the price of course, but I'd be amenable to having some professional look at it. Middle/older aged adult, Interview 11.

I think a lot of people don't want to get professional help to come in because they're concerned that it's going to cost them too much or that they're not going to get the answer they want. Middle/older aged adult, Interview 7.

4.3.2 Theme 2: No place like home

For all middle- and older-aged adults, their houses were their home. Three out of eight middle- and older-aged adults planned to remain in their homes for as long as possible. When discussing her husband, one participant said:

He's going to go out of this house is in his coffin. Middle/older aged adult, Interview 2.

Personally, I'd like to stay in my home. I mean, we've been in here 40 odd years. I'd like to stay here as long as possible, really. Middle/older aged adult, Interview 6.

My preference is to stay where I am as long as I can. Middle/older aged adult, Interview 7.

Some participants reported that there was fear of losing the home and about relocating to residential aged care facilities.

She's [mother] just got this notion, she's scared of losing the house. She thinks the nursing home's going to take the house. We're telling her, "No, they don't," but yeah. Individual with an older relative, Interview 3.

Matter of moving into an aged care unit or something like that. I don't think that would work. Middle/older aged adult, Interview 9.

There's no way that she would accept going into a nursing home. So, yes, it's difficult now. Yes. Individual with an older relative, Interview 1.

One individual with an older relatives talked about their mother wanting to remain at home due to the worries of becoming a burden. This participant discussed how her mother had become a burden because she was not allowing her to help make ageing in place easier:

She's worried about contributing to the burden… And although, so we're getting a little less tactful these days saying, "Mom, you are the burden because you're not allowing us to just make it easy." Individual with an older relative, Interview 4.

4.3.3   Theme 3: Push for independence

Participants strongly wanted to remain independent. Middle- and older-aged people reported that they currently felt active enough to continue living at home and not require assistance or home modifications. Five out of eight individuals with older relatives described the desire of their relative to remain independent; this was linked to pride and dignity.

They are fiercely independent. They have been serious travelers all of their lives. Individual with older relatives, Interview 8.

It's like a self-preservation thing you just don't want to admit, I suppose, to anyone let alone yourself. Middle/older aged adult, Interview 14.

We're both mid to late 60s, so we're quite fit. Middle/older aged adult, Interview 13.

At the moment, I think I can manage pretty much everything. Middle/older aged adult, Interview 9.

Some individuals attempted to encourage their older relatives to be more proactive in seeking help, assistance and home modifications, however they had difficulty persuading their older family members.

I've tried to be proactive in helping mum, but she hasn't been interested. Individual with older relatives, Interview 10.

Other individuals tried to encourage their older relatives to live with them without the need to relocate.

I said to her, "Would you like to come and live with me when you're older?" And she's not open to that either, which is probably a good thing, but it was out. I put it out there just in case. "No, no," she said. "No, no, I wouldn't, I wouldn't like to do that." Individual with older relatives, Interview 1.

When I was young, you looked after your olds. They came and lived with you. You don't anymore. It's sad. Middle/older aged adult, Interview 2.

More than once we've had the conversation, "Well yeah mom, when we were kids and we needed you, you were there. And that was fantastic. But the reality is you're in your 90s now, and now the tables have turned. We're here to help you." Individual with older relatives, Interview 4.

Participants spoke about the importance of being able to choose what they did, how they spent their time in their homes, having control of their own routines and how this desire for autonomy played a role in their housing decisions.

Like I've even suggested to mum, at least, like I've said before, just if she does the bathroom and the vacuuming, and then you can do the other things. But she's still not happy about that." Individual with older relatives, Interview 1

I think we're okay here. We're reasonably close to shops. Middle/older aged adult, Interview 2,

4.3.4   Theme 4: Recognising future housing needs

Participants who were planning for future housing discussed either what modifications may be required over time or the possible need for relocation. Five out of eight middle/older aged adults identified the need to consider future housing plans. Some participants expressed the need to be proactive about future housing plans and discussed safety at home for both now and the future.

We've been thinking about it, my wife and I. Five years, we've been sort of working out what we're going to do about it. And on top of everything, she's a physiotherapist. Middle/older aged adult, Interview 7.

Middle- and older-aged participants discussed awareness of relocation options, communication with families around what may be needed in the future and how they had already implemented minor home modifications.

I actually worked in an aged care facility, but I am aware of a lot of the modifications and frames and chairs and all sorts of things that's around, yeah. Middle/older aged adult, Interview 14.

I know several years ago we had to get some cementing done at the back. And I do remember my husband saying we should make this a slope just in case we have to have a wheelchair or anything like that in the future, which we have done. Middle/older aged adult, Interview 6.

Individuals encouraged their older relatives to make early changes, either to move to lower maintenance homes or to a retirement village, rather than waiting for a crisis.

We can't just walk in and say, "Oh, I think we should do this. It'll make your life easier." She wouldn't just go, "Oh yeah, make it happen." We'd have to spend another hour on it to explain it all. Individual with older relatives, Interview 4

Other individuals with older relatives discussed the disinterest their older family members had towards home modifications.

> Yes. I did talk to them about seeing an occupational therapist or a physio or someone and getting the right measurements, but they weren't interested in that. Individual with older relatives, Interview 10.

Six participants had been thinking about changing their home to improve home safety and avoid relocation

> I have over the years been involved in putting handicap rails and that sort of thing in houses where someone's had a stroke or something as an older person, and then they just need bits and pieces fixed into the bathroom. Middle aged person (building designer), Interview 7.

Another participant suggested that grab rails and assistive equipment would probably be installed in the foreseeable future.

> Look, I would say probably showers and things like... because I live with my husband and he's a little bit older than me and he has rheumatoid arthritis which is controlled at the moment. But I would say in the future, we'll probably look at grab rails in the bathrooms, maybe shower chairs and we've also got a sunken lounge and both of us are quite capable of getting into and out of it at the moment, but in the future that could pose a problem. Middle/older aged person, Interview 14.

Most participants identified grab rails as being one of the key changes that could be made to the house to improve accessibility and safety. Some considered the use of temporary grab rails (e.g. suction rails) to compensate for short term changes in function (e.g. after surgery). Six out of 16 middle- or older-aged adults said they were aware of the different types of home modifications that were available, either due to their experience in their jobs or their experiences with family and peers.

> In fact, my first husband became very ill with a brain tumor, and we had a friend who was a carpenter and he actually put some rails in the shower and the toilet for him while he was ill. That was a bit of a preview of that sort of thing. Middle/older aged adult, Interview 9.

Overall, data showed that early recognition of home safety was important for ageing adults and their relatives.

4.3.5   Theme 5: Recognition of home environment risks

Six out of eight middle- and older-aged adults and one individual with an older relative were able to distinguish current home hazards and age-related changes that could potentially affect their ability to age in place.

> We might have to make some minor alterations to maybe where we've got steps, I suppose. But apart from that, everything's fairly safe. Middle/older aged adult, Interview 6.

> I've got little steps and things to use, long tongs to help me grab things. That's really not a modification. Sometimes in the shower, if I think the floor could be a wee bit slippery, and I'm sometimes a bit worried that I might need a grab rail or something in there at some point in time. Middle/older aged adult, Interview 9.

> The only thing I did think that maybe would be a help if PowerPoints were more a hip level. Not down. But that's the way the house was built. Middle/older aged adult, Interview 5.

Four out of eight individuals identified no current home modifications in the houses of their older relatives.

> I think nothing else has been done, as in modifications, stuff like that. Handrails and stuff like that, she hasn't got any. Individual with older relatives, Interview 3.

> So, as far as home modifications, regardless of boarder or not, I'm quite independent and can be at home with no real worries. Individual with older relatives, Interview 11.

Three individuals with older relatives described their experiences with home modifications which were already in place or which were organised after they noticed their older parent struggling to mobilise.

> They've got a rail there now. But dad put it in. My dad put it in, which is fine… I think it was because I fell… They were afraid that other people might hurt themselves rather than them. Individual with older relatives, Interview 10.

The identification of home hazards may have been influenced by a middle/older aged person's cultural background. One middle/older aged person described no issues that could be foreseen as issues.

> I don't think houses in this country… I mean, obviously I'm from the UK, where you've got steps that are Everest-like. Middle/older aged person, Interview 2.

Factors such as health crises and age-related changes were identified as triggers for individuals with older relatives or middle and older aged adults to make home environment and housing decisions.

4.3.6   Theme 6: Resistance to change

Individuals with older relatives spoke of resistance amongst their relatives to make changes or modifications. There was resistance to home modifications, assistance at home or the idea of relocation in the future.

> Very resistant to the idea. The OT [occupational therapist] that came out, I mean, he was pretty understanding of the challenges quite often, but there's usually a lot of pushback on, "It's my house. I've never had these for the last 60 years. Why do I need now?" Individual with an older relative, Interview 4.

The fear of strangers entering their home, home alterations not being suited to visitors, stigma of ageing/disability and modifications being visually unappealing were all reasons to this resistance to change. Individuals preferred to be given the choice regarding home modifications to suit their aesthetics and function.

> Because a lot of the equipment is very obviously clunky looking, awkward looking and it's not streamlined looking. Middle/older aged adult, Interview 14.

This middle/older aged adult also wanted modifications to be visually appealing.

Aesthetically nicer looking but still functional. Middle/older aged adult, Interview 14.

Middle/older aged adults sometimes felt changes to their house were not a priority either because they were not 'open' to the idea, or other individuals with older relatives were trying to make their homes safer, but they were not interested.

> [They're] not open to that yet...I think they're taking it like a, it's more like a day-by-day approach. Individual with an older relative, Interview 1

Waiting until a crisis occurred was common. A total of five middle/older aged adults and four individuals with older relatives described housing decision-making approaches being altered only after a crisis or an age-related change occurred.

> They would wait for a trigger. So both of them, really. Mom... Especially my dad. Individual of an older relative, Interview 15.

> I guess they may make some further changes that they might need. Individual of an older relatives, Interview 16.

> I think people tend to leave it till they really need it or, till they need it. Yeah. Middle/older aged adult, Interview 6.

> I'm not really worried about my safety in the home. If I trip over, I am probably getting clumsier. But I'll figure I can sort of crawl out, yell out stuff. Middle/older aged adult, Interview 11.

> But the point would be that you started to feel that it was a bit risky or you felt a little bit like you needed it at that point. Middle/older aged adult, Interview 14.

4.3.7   Theme 7: Access to services and education

Individuals with an older relative reported that there was not enough information being shared or promoted about ageing in place, especially about home modifications and where you could obtain these. These individuals described many issues with the system, especially in relation to the lack of information being shared:

> No, I don't think there is a lot. I knew nothing until My Aged Care [government funded aged care support service] came on board. But even then, to me, I didn't think there was enough information, but then I thought it might've been because I was new to all this because of mom. Middle/older aged person, Interview 16.

Three individuals with an older relative were uncertain of the current services available for their older relatives. One individual expressed there was still a lot to learn about 'the system'.

> Mom actually had an ACAT assessment [assessment of aged care support needs] done, and I rather gather her and my sister and I are still sort of learning the ropes a little bit on this one. We find understanding that system to be a little bit of a minefield. Individual with an older relative, Interview 4

Despite this, seven out of eight individuals with older relatives and all eight middle- and older-aged adults were open towards receiving more education about ageing in place. All participants felt that education that showed older people 'how to age safely within their home' would be useful for future planning.

> I think it would be a good idea because especially you think of things, but there may be something that someone else knows about that you hadn't even thought of. So I suppose some assistance might help in some areas. Yeah. Middle/older aged person, Interview 6.

> I think many of those sorts of things are probably common sense, but yeah, there may be some things that we haven't considered and there is an actual document of sorts. So yeah, we... certainly I wouldn't be... against that. I don't think, they wouldn't mind being... assessing the house and just making some comments, see the certain things or... for example, the shower is probably one that is of concern given the nature of showers and wet areas. Individual with an older relative, Interview 16.

> But I think mum would be interested. And I think she'd be surprised at the things that could be done, and that might give her a kickstart into actually talking to someone about getting it done. Individual with an older relative, Interview 10.

Educational guides that were in a 'paper-based form' were the most preferred. Five middle/older aged people and four individuals with older relatives described feeling less comfortable with technology (mobile phones, tablets, computers or computer software programs).

> So for her, she'd never used any form of computer or mobile phone. She probably would look at something in the form of a printed document, she'd be open to that, for sure. She would look at it, might not admit to us that she has, but she would. Kat and I would use anything, printed form, anything, app really, just don't care as long as it gets the result. Individual with an older relative, Interview 4.

> I think at the moment, for the older age group, I'm 71, I'd say probably the majority of people over 75 or 80 would go for the paper. Middle/older aged person, Interview 2.

Four individuals with older relatives and three middle/older aged people preferred electronic or online educational guides, depending on their ease of use and experience with technology.

> Apps work really well for me, obviously, because I'm computer literate, but obviously I've got a stepmother who's just not computer literate at all so she'd need a written one. But for purpose it would be an app. Middle/older aged person, Interview 14.

Six individuals with older relatives and middle/older aged adults reported that they would go to their general practitioner (GP) or a known health professional such as their physiotherapist as their first point of contact if they required further education or access to home modifications.

> GPs the most trusted sort of source of information. Middle/older aged person, Interview 2.

Other individuals with older relatives and middle/older aged adults reported that they had attempted to seek information on house modifications through online health service portals, their social networks, private organisations, their council or retail shops such as hardware stores.

> Well, now that I'm being assessed, I'd probably go to My Aged Care. Middle/older aged person, Interview 5.

> Maybe supermarket or Bunnings. Middle/older aged person, Interview 5.

> An independent living organisation. And I'm not necessarily thinking straight away of a particular shop or retail outlet in that respect, because they've got their own barrows to push. Middle/older aged person, Interview 13.

> With my Mum's condition, she does go to a local council service that they provide. Individual with an older relative, Interview 16.

4.4 Discussion

Older adults reported a strong desire to remain independent and in their own homes. Relatives supported their family members but were sometimes concerned about the safety of the older person in their home environment and had difficulty convincing them to make changes to improve the safety or accessibility of the home. Both older people and family members reported some knowledge of home modifications that could be made although participants agreed that more information and tools to help with future planning would be beneficial. Participants had mixed opinions as to the preferred format, with some preferring paper-based tools and others preferring digital health tools. The challenge remains regarding how to implement home assessments and modifications at the right time as while some participants reported being proactive and wanting to plan ahead, others were reluctant to take action until it was absolutely necessary, such as due to a health crisis.

The World Health Organization's vision is a society comprising age-friendly environments (World Health Organization, 2020b). To achieve this, middle- and older-aged people need to be engaged and involved in the process of designing, building, adapting and building their own home. However, involvement relies on the older person having the knowledge, tools and resources to do so. The views and preferences of older people and their families should be included when planning and designing tools for older people to self-assess their own home. This sentiment was echoed by Ollevier et al. (2020) who identified the importance of older adults being engaged in the development and evaluation of technology to support ageing, especially in home environments.

Age-related changes to one's physical function influenced participants' views on ageing in place. Feeling physically and emotionally strong led to improved acceptance of the ageing process (Bosch-Farre et al., 2020). Consistent with the findings from Shaw and Langman (2017), most older people who accepted their

ageing trajectory took the necessary steps to maintain and enhance their physical and mental health to remain at home, whereas those who refused to accept the decline in their abilities caused frustration to their family members (Macdonald et al., 2000). Participants in this study were also frustrated when older relatives were reluctant to accept changes or modifications.

Decisions on modifications or relocation are complex and can be overwhelming and expensive. We found that older people in this study were aware changes were needed to remain at home, had reasonable understanding of what modifications were possible and wanted more ways to make their home age friendly. However, participants expressed a desire for more access to education. Similarly, Wang et al. (2019) described the need for more information and education about the home environment to inform older adults' decisions as access to home modifications was one of the most critical determinants for why older people stayed or moved from their homes rather than move into a residential care home (Davey et al., 2004; Hwang et al., 2011). Overall, individuals had the desire and willingness to participate in education and were interested in education and tools that could support this (Wang et al., 2019).

Participants often reported waiting for a crisis to occur before making major housing decisions. Our findings were similar to Safran-Norton (2010) reported that older adults were still reluctant to make changes, even when there were factors that justify making housing adjustments, such as living in two-storey home with no bathroom on the first level. Changes to the home or moving seemed to be overwhelming or for some, it may have been considered as too late due to the sudden change in health (Molinsky & Forsyth, 2018). Davey (2006) reported that older people were aware of the safety issues as they aged and thought about adaptations but were still hoping that they would be able to cope. Receiving education and tools from people with influence, such as family members, health professionals or the person's GP may promote earlier decision making. Although there has been a shift towards digital health tools, our participants had mixed views, with some preferring digital tools but most preferring paper-based guides due to their inexperience with technology. Other studies have found that older people were generally more accepting of digital health tools if they were provided with training (Klimova & Poulova, 2018; Tsertsidis et al., 2019). Technology has the potential to facilitate conversations about the home environment between patients and their family members (Read et al., 2020).

Understanding the perspective of individuals with ageing relatives is important as families are often involved in managing health crises and decisions about housing. In 2018, 34% of older people reported relying on their spouse for support, 21% relied on a daughter and 17% relied on a son (Australian Bureau of Statistics, 2018b). As the population ages, the number of older people hoping to remain in their own homes will continue to grow and a decline in family support is expected due to families living further away and having limited capacity to assist due to their own work and family commitments (Gaugler & Schulz, 2021).

Involving both older people and family members in designing solutions on how to successfully age in place is critical and family members may play a key role in bringing forward decision making regarding housing.

4.5   Future recommendations

Older adults and families are open to receiving education around home safety and potential adaptations and modifications. Educational workshops and tools may increase awareness about options available and assist people to assess their own homes thereby prompting changes earlier rather than later. Results of this study suggest that family involvement, linking with the community (e.g. GPs, local councils) and having both digital and paper-based tools will increase uptake.

4.6   Limitations

This study showed the importance of consulting with middle- and older-aged people and family members. Whilst semi-structured interviews can provide rich data and provide multiple perspectives there are limitations. Although data collection reached a natural conclusion, the length of the interviews or depth may have been influenced by external factors, impacting data saturation and understanding. It is possible that some data may have been overlooked during analysis and the small sample size may not encapsulate the perspectives of the broader population. In particular, recruitment via an online research panel may have resulted in a sample who were more technology literate with higher levels of education. Furthermore, there may be potential bias due to interviews and analyses being conducted by an occupational therapist.

4.7   Conclusions

This study provides insight into the knowledge and support middle- and older-aged adults may need to assess their home and approaches that may successfully promote ageing in place. Some participants accepted the ageing process, which promoted a positive outlook towards future housing decisions, whereas those that waited for crises did not recognise the need to alter their homes. Despite this, middle- and older-aged people are open to education and would like access to information on home safety including home modifications. A tool (in both paper and digital form) which provides education and facilitates decision making is acceptable and likely to be beneficial.

CHAPTER 5   COMMON HOME HAZARDS AMONG HEALTHY OLDER AGED ADULTS AND POTENTIAL MODIFICATIONS REQUIRED FOR AGE-FRIENDLY HOUSING

This chapter addresses Objective 4 of the thesis: To identify the common home hazards among healthy older-aged adults and what modifications may be required for age-friendly housing. This chapter describes a prospective cohort study and is present with minor changes for thesis formatting from the article, 'Common home hazards among healthy older aged adults and potential modifications required for age-friendly housing', published in the *Australian Occupational Therapy Journal,* within Appendix Q (Aclan, George, et al., 2023a).

On completion of the qualitative meta-synthesis and qualitative study described in Chapters 3 and 4, the importance of assessing prevailing home hazards among self-sufficient and healthy older adults was acknowledged, in order to understand the areas that may require modifications in the future, as evaluated by an occupational therapist.

As the lead author of this publication, the candidate's contribution was 80% of this chapter, was the major contributor to the write up and editing of this publication. The candidate co-designed the study and undertook recruitment of participants, ethics application, data collection and data analysis.. Co-author approval was obtained for permission to include this publication in the thesis.

5.1   Introduction

The earlier chapters of this thesis have highlighted the current research on the significance of home and home safety for ageing adults and individuals with elderly family members. Nevertheless, there are still gaps in the understanding of the potential home hazards that people may face as they age in their homes, particularly before the onset of age-related changes.

As discussed in previous chapters, the world is facing an unprecedented increase in the ageing population, with one in six people expected to be 60 years and over by 2030 (World Health Organization, 2022). Ageing can lead to changes in physical and cognitive capabilities and consequently reduced functional ability (World Health Organization, 2022). However, functional ability is dependent not only on the intrinsic capacity of a person (such as their physical and cognitive capabilities) but also the environment they live in and how they interact with that environment (Luciano et al., 2020). The World Health Organization supports healthy ageing and older adults being able to remain at home for as long as possible, encouraging the establishment of age-friendly environments in homes and communities (Das et al., 2022; World Health Organization, 2020b). Transitioning into an age-friendly society requires the establishment of 'age-ready cities' and the promotion of housing solutions to enable older adults to age in place (Das et al., 2022). Most

people have the desire to remain in in their own home for as long as possible, however housing needs change over time (Hatcher et al., 2019; Kramer & Pfaffenbach, 2015; Productivity Commission, 2013; Stones & Gullifer, 2014; Tanner et al., 2008). Middle-aged adults, those aged 55 and over, may consider downsizing as children leave home or may be considering lower-maintenance accommodation for the years ahead (Australian Bureau of Statistics, 2020a), whilst older people, those over the age of 65, may be experiencing new or greater challenges associated with ageing (Government of South Australia, 2021). Existing research shows that the significance and meaning of the home increases over time with the relationship between people and their homes becoming more important (Löfqvist et al., 2017; Sixsmith et al., 2014). Hence, ageing in place has become a strategy for governments to allow people to remain in their own homes for longer, reducing the need to relocate to residential care, whilst reducing public and private health spending (Lux & Sunega, 2014).

Home environment assessments and interventions have been used by occupational therapists to assess and improve safety and independence at home, allowing older adults to live in their own homes longer (Barras, 2005). Home environment assessment and interventions have been used by occupational therapists to assess, improve and facilitate a person's safety and independence within their own home (Clemson et al., 2019; Gitlin et al., 2009; Keglovits & Stark, 2020). Modifications such as the installation of ramps/grab rails, improved lighting, removal of rugs or decluttering are commonly recommended by an occupational therapist following a home environment assessment. Home assessment and interventions conducted by an occupational therapist have benefited many ageing adults and have shown to increase independence at home (Tanner et al., 2008). Older people have also reported modifications reducing the need to rely on others (community services or family members) to assist with everyday tasks (Tanner et al., 2008). However, home modifications are often completed following a health crisis or later in the ageing trajectory when older people may already be experiencing frailty. Existing home environment assessments or checklists designed and used by occupational therapists have primarily focused on compensating for reduced mobility, safety and access. For example, the Westmead Home Safety tool was designed to be used by occupational therapists to identify a list of potential environmental hazards in the homes of people who were at risk of falling (Clemson et al., 2014; Clemson et al., 1999). Other tools are designed to be self-administered such as the Home Falls and Accidents Screening (HOME FAST) Tool (Mackenzie, 2017) and the Home Safety Self-Assessment Tool (Horowitz et al., 2016), although these tools were also designed primarily for falls prevention. In contrast, the Housing Enabler tool is a therapist-led tool used with this population to assess a person's functional limitation and potential home hazards (Iwarsson et al., 2012). In summary, most existing instruments have been designed by occupational therapists and used with people who already have a physical limitation and with a focus on falls. There is a need for tools which are broader to identify potential future home hazards and address the needs of ageing adults who wish to age in place.

Our research shows that older people consider both the home environment and the surrounding community as being important for successful ageing in place (Laver et al., 2022). In our workshops with older people, participants reported the importance of many other features of the home that contributed to comfort, such as ensuring the home was comfortable with access to fresh air, views, warmth, good community amenities and friendly neighbours (Laver et al., 2022). These characteristics of the home are not commonly assessed in existing home assessment tools. Participants also identified the need for existing self-assessment tools in easy-to-understand language and which can be accessed via a website or mobile phone (Laver et al., 2022). These features are lacking in current assessment tools. Working with people earlier in the ageing trajectory and providing personalised information and education on age-friendly environments could be key in fostering healthy ageing and supporting people to stay home for as long as possible (Davey et al., 2004; Hwang et al., 2011).

Existing studies have used home environment assessment tools to detail the common home environment issues faced by older people. For example, Fausset et al. (2011) described home maintenance tasks such as cleaning the gutters and household chores as being the most demanding during ageing. In a separate study, Horowitz et al. (2013) identified a list of potential home hazards using a home safety self-assessment checklist among 28 participants aged 69-87 years. They found a total of 30 environmental problems in 17 apartments. Common concerns were loose railings at the front of the house, torn carpet and a lack of grab rails, especially in the bathroom (Horowitz et al., 2013). More recently, a scoping review of fall hazards by Keglovits et al. (2020) identified 17 home environmental hazards among community-dwelling older adults. Hazards comprised loose throw rugs, clutter, items placed too low or too high, low toilets and inadequate lighting, heating and cooling. Hence, most of the research to date has examined home hazards and falls prevention among older people who already have impaired functional ability and disability (Horowitz et al., 2016; Ramulu et al., 2021). Less is currently known about the home hazards that may potentially hinder healthy older people in their ability to remain at home in future, particularly prior to the onset of age-related changes.

This study uses a novel home environment assessment tool which was co-designed with older people and addresses aspects of the home which are considered important for ageing in place. The tool was administered with a novel population comprising older people who were not yet experiencing disability due to ageing. Understanding the potential home hazards of healthy older people can help build understanding about the environmental modification needs and support required for people to successfully age in place in the future. The aim of this study was to understand existing potential home hazards in healthy older aged adults. The research question was: 'What are the common home hazards among healthy older aged adults and what modifications may be required for age-friendly housing?'.

5.2 Methods

5.2.1 Study design

A prospective cohort study involved use of a novel home assessment tool designed via a co-design process with older people (Laver et al., 2022) and intended for use by healthy older people wishing to plan ahead in regards to ageing in place. The assessments were conducted between June 2022 and November 2022 and investigated the age friendliness of the person's home and potential changes that may be needed over time. An experienced (more than three years post-graduation and trained in the use of the tool) occupational therapist assessed each commonly used area within the home, garden and community. The assessment was conducted by the same occupational therapist in person and involved observation of the environment and discussion. The assessment tool and questions were specifically designed for this research and based on a review of existing tools and co-design workshops with older people (Laver et al., 2022). According to the co-design workshop, older people reported the need to consider features of the home such as whether the home has access to outdoors and fresh air rather than being primarily focused on safety and access (Laver et al., 2022). The assessment contained 89 questions and included questions about an individual's general safety, cleaning and maintenance, front entry and garden, hallways, kitchen, toilets, bedrooms, living rooms, bathrooms, laundry, backyard, internal steps and neighbourhood. Each question was scored either a 'yes' (satisfactory and no changes required to the home), 'no' (needs improvement to meet criteria) or 'non-applicable' (not present or the participant does not use the home feature). For example, for questions related to the garden, these were marked 'not applicable' if there was no garden. Each participant also answered demographic questions relating to their socio-economic status, marital status, level of education, living status, housing type, ownership of housing, community services being received', and whether they considered relocating in the future, recorded as a categorical variable as 'yes/no'. Most homes differed and not all participant homes contained the same number of bedrooms, living areas, toilets, and bathrooms. For this study, a maximum of two of each area were assessed and data presented for ease of reporting (example, a maximum of two bedrooms were assessed). The home environment assessment is presented in Appendix J.

5.2.2 Participants

The study was conducted across metropolitan Adelaide, South Australia, Australia. Participants were eligible for inclusion if they were aged 60 years or older, living within their own home in a private dwelling or in a retirement village, did not have a significant level of disability, measured using the Modified Rankin Score (Broderick et al., 2017) where people must score <2: 'able to carry out all usual duties and activities' or 'unable to carry out all previous activities but able to look after own affairs without assistance'.

5.2.3   Recruitment

Participants were recruited through local council newsletters, the research department's registry of interested participants and existing networks. Participants who expressed interest in participating contacted the lead researcher (RA) via phone or email. They were provided a copy of the study participant information sheet and written consent form as in Appendix K. Participants involved were offered a small honorarium in recognition of their time (AU$20) and a copy of the completed home environment assessment at the end of the study.

5.2.4   Data collection

Potentially eligible participants were screened against the eligibility criteria by the lead researcher, as above. Upon obtaining informed consent, (via phone or email) a time and date for the home assessments was scheduled to. Prior to each home assessment, a pre-offsite risk assessment was completed ensuring there were no safety risks posed to the therapist (such as COVID-19 infection). Each home assessment was completed by the same registered occupational therapist and lead researcher (RA) and was completed in approximately one hour. For each of the items within the assessment, the possible responses that the occupational therapist could answer were either: 'yes' (satisfactory), 'no' (needs improvement) or 'non-applicable' (not present). At the completion of each home assessment, the occupational therapist provided a home assessment summary comprising tips or solutions that may be considered for each section of the home. For example, if the occupational therapist considered their front paths not relatively flat and approximately 1000mm wide, the tip provided in the summary was 'to consider landscaping to improve path gradient and width'. All tips or solutions for each item were pre-determined and generated automatically if the occupational therapist answered the question as 'no' (needs improvement).

5.2.5   Data analysis

Data were entered into an Excel file and exported into IBM SPSS (IBM Corp, 2021). Descriptive analyses were performed by grouping each of the questions and responses in accordance with their specific rooms. The possible responses ('yes', 'no', 'not applicable') were categorised into their individual group. The total number and percentage for each of the responses to the questions were calculated using IBM SPSS. Hazards were then determined based on the perception of the occupational therapist who completed each home environment assessment. The total number of 'no' responses was also calculated for each 'area' of the home to determine the most common areas needing improvement. Socio-economic status was categorised according to the Australian Bureau of Statistics index of relative socio-economics advantage and disadvantage (IRSAD) (Australian Bureau of Statistics, 2018a). Each socio-economic area is given a score for a statistical area level (for e.g. SA1) through the addition of weighted characteristics. The scores ranged from a low index score (more disadvantaged, SA1) to a high index score (most advantaged, SA5). (Australian Bureau of Statistics, 2018a). Statistical analyses determined the association between the

measures. The Pearson correlation coefficient, *r,* was used to investigate the relationship between the categorical variables of socio-economic status, level of education, intention to relocate, and the total amount of changes suggested for each home which is a continuous variable. Spearman's rank-order correlation coefficient, *p*, was used to analyse the relationship between the two continuous variables of age and the total amount of suggested changes per home. P was set at less than 0.05.

5.3   Ethical considerations

This research was approved by the Flinders University Human Research Ethics Committee (Project number 5303). The ethics approval letter is shown in Appendix L.

5.4   Results

Occupational therapy home environment assessments were completed for a total of 60 participants. An overview of participant characteristics is presented in Table 5.1. Some of the participants in the sample cohabited with a spouse or family member, while others lived alone. It is important to note that if a participant shared a living space with another person, they were included in the analysed sample.

Table 5.1: Characteristics of participants

Demographics	Respondents (N, %)
Age, mean (SD), range	71 (7.041), 60-88
Living status	
Alone	15 (25%)
Living with spouse	38 (63%)
Living with family member	6 (10%)
Other	1 (1.7%)
Sex	
Male	27 (45%)
Female	33 (55%)
Marital status	
Married	39 (65%)
Not married	21 (35%)
Level of education	
High school	11 (18%)
Higher education	43 (72%)
Other	6 (10%)
Type of housing	
House	49 (82%)
Townhouse	1 (1.7%)
Unit	4 (6.7%)
Other	6 (10%)
Ownership	
Private owner	56 (93.3%)
Private rental	1 (1.7%)
Other	3 (5%)

Services	
Cleaning and gardening	2 (3.3%)
Cleaning	3 (5.0%)
Gardening	5 (8.3%)
None	50 (83.3)
Socioeconomic status	
SA1 (most disadvantaged)	5 (8.3%)
SA2	6 (10%)
SA3	16 (27%)
SA4	21 (35%)
SA5 (least disadvantaged)	12 (20%)
Considering relocation	
Yes	2 (3.3%)
No	48 (80%)
Considering	10 (17%)

Abbreviations: n=total number of participants; SA= statistical area level; SD= standard deviation

All home assessments were conducted within metropolitan Adelaide. Types of houses considered under 'other' were homes built within retirement villages or they were homes defined as an apartment by the participant. Results from the assessments are presented in Table 5.2 and summarised below.

Table 5.2: Results of assessments

Frequency	Satisfactory (yes) N (%)	Needs improvement (no) N (%)	Not applicable N (%)
General			
Safely check to see who is at the door	51 (85%)	9 (15%)	0 (0%)
Has a phone or mobile phone	58 (97%)	9 (3.0%)	0 (0%)
Smoke alarms working	57 (95%)	3 (5.0%)	0 (0%)
Sensor light in place to assist walking indoors & outdoors	46 (77%)	14 (23%)	0 (0%)
Electric safety switch installed	57 (95%)	3 (5.0%)	0 (0%)
Small fire blanket or fire extinguisher	42 (70%)	18 (30%)	0 (0%)
Access to spare keys	60 (100%)	0 (0%)	0 (0%)
Torches accessible	60 (100%)	0 (0%)	0 (0%)
Stocked first aid kit	50 (83%)	10 (17%)	0 (0%)
Cleaning and Maintenance			
Accessible clothesline	49 (82%)	11 (18%)	0 (0%)
Irrigation system installed	28 (47%)	24 (40%)	8 (13%)
Strategies to change lightbulbs & gutters	45 (75%)	14 (23%)	1 (1.7%)
Long lasting lightbulbs installed	56 (93%)	2 (3.3%)	2 (3.3%)
Home clutter free	41 (68%)	19 (32%)	0 (0%)
Step stool in place	55 (92%)	4 (6.7%)	1 (1.7%)
Front garden and entry			
Paths flat and wide	40 (67%)	20 (33%)	0 (0%)
Non-slip paths & driveway	45 (75%)	15 (25%)	0 (0%)
Easy to open gate	39 (65%)	3 (5.0%)	18 (30%)
Suitable step heights	42 (70%)	13 (22%)	5 (8.3%)
Easy to unlock front door & use door handle	51 (85%)	9 (15%)	0 (0%)
Lockable screen door in place & has access to fresh air	52 (87%)	5 (8.0%)	3 (5.0%)
Accessible letter box	45 (75%)	15 (25%)	0 (0%)
At least one way to access home without a step	24 (40%)	36 (60%)	0 (0%)
Hallways			
Hallways clutter free	47 (78%)	13 (22%)	0 (0%)
Floor coverings secure	42 (70%)	17 (28%)	1 (2.0%)
Free of internal steps	45 (75%)	15 (25%)	0 (0%)
Kitchen			
Easy to manoeuvre	60 (100%)	0 (0%)	0 (0%)
Benches clear	53 (88%)	7 (12%)	0 (0%)
Rugs and floor secure	42 (70%)	12 (20%)	6 (10%)
Easy to reach commonly used items	56 (93%)	4 (7%)	0 (0%)
Taps easy to turn on, off & adjust	59 (98%)	1 (2.0%)	0 (0%)
Appliance controls easily accessed	59 (98%)	1 (2.0%)	0 (0%)
Adequate space next to microwave & oven to place hot food			
Carbon monoxide detector installed	0 (0%)	58 (96.7%)	2 (3.3%)
Space to sit & prepare food	58 (97%)	2 (3.0%)	0 (0%)
Stool height & stable OK	29 (48%)	5 (8.0%)	26 (43%)
Microwave & oven height OK	43 (72%)	17 (28%)	0 (0%)
Bench height OK	60 (100%)	0 (0%)	0 (0%)
Bathroom 1			
Easy to manoeuvre	42 (70%)	18 (30%)	0 (0%)
Rugs and floor secure	16 (27%)	19 (32%)	25 (42%)
Adequate ventilation	60 (100%)	0 (0%)	0 (0%)
Flat between shower & floor	18 (30%)	42 (70%)	0 (0%)

Taps easy to turn on, off & adjust	39 (65%)	21 (35%)	0 (0%)
Shower hose in place	33 (55%)	27 (45%)	0 (0%)
Thermostatically controlled water	27 (45%)	29 (48%)	4 (7.0%)
Non-slip tiles	30 (50%)	30 (50%)	0 (0%)
Shower cubicle 900mmx900mm	49 (82%)	11 (18%)	0 (0%)
Bathroom 2[†]			
Easy to manoeuvre	23 (48%)	25 (52%)	0 (0%)
Rugs and floor secure	8 (17%)	24 (50%)	16 (33%)
Adequate ventilation	47 (98%)	1 (2.0%)	0 (0%)
Flat between shower & floor	10 (21%)	38 (79%)	0 (0%)
Taps easy to turn on, off & adjust	28 (58%)	20 (42%)	0 (0%)
Shower hose in place	26 (54%)	22 (46%)	0 (0%)
Thermostatically controlled water	26 (54%)	20 (42%)	2 (4.0%)
Non-slip tiles	29 (60%)	19 (40%)	0 (0%)
Shower cubicle 900mmx900mm	34 (72%)	14 (28%)	0 (0%)
Toilet 1			
Suitable height	31 (51%)	29 (49%)	0 (0%)
Rugs or mats secure	13 (22%)	17 (27%)	30 (51%)
Door swings outwards	4 (6.7%)	42 (70%)	14 (24%)
Toilet 2[‡]			
Suitable height	27 (53%)	23 (47%)	0 (0%)
Rugs or mats secure	7 (14%)	16 (31%)	27 (55%)
Door swings outwards	5 (10%)	34 (68%)	11 (22%)
Bedroom 1			
Accessible height	55 (92%)	5 (8.3%)	0 (0%)
Easy to manoeuvre	43 (72%)	17 (28%)	0 (0%)
Access to a light & phone	58 (97%)	2 (3.3%)	0 (0%)
Flooring secure	51 (85%)	7 (12%)	2 (3.3%)
Place to sit while dressing & putting on shoes	56 (93%)	3 (5.0%)	1 (2.0%)
Easy to access clothing & shoes	58 (97%)	2 (3.0%)	0 (0%)
Easy to close windows & blinds	50 (83%)	10 (17%)	0 (0%)
Temperature easily adjusted in bedroom	50 (83%)	9 (15%)	1 (2.0%)
Bedroom 2[§]			
Accessible height	40 (78%)	9 (18%)	2 (3.9%)
Easy to manoeuvre	35 (69%)	14 (28%)	2 (3.9%)
Access to a light & phone	47 (92%)	2 (4.0%)	2 (4.0%)
Flooring secure	47 (92%)	4 (7.8%)	0 (0%)
Place to sit while dressing & putting on shoes	48 (94%)	1 (2.0%)	2 (4.0%)
Easy to access clothing & shoes	48 (94%)	0 (0.0%)	3 (6.0%)
Easy to close windows & blinds	36 (71%)	15 (29%)	0 (0%)
Temperature easily adjusted in bedroom	43 (84%)	8 (16%)	0 (0%)
Living 1			
Easy to manoeuvre	50 (83%)	10 (17%)	0 (0%)
Flooring secure	51 (85%)	9 (15%)	0 (0%)
Good storage so all items have a spot	58 (97%)	1 (2.0%)	1 (2.0%)
Free of cords	58 (97%)	2 (3.3%)	0 (0%)
Easy to access heating & cooling controls	56 (93%)	4 (7.0%)	0 (0%)
Easy to open & close windows and blinds	55 (92%)	5 (8.3%)	0 (0%)
Easily get in/out chairs	26 (43%)	34 (57%)	0 (0%)
Living 2[**]			
Easy to manoeuvre	20 (69%)	9 (31%)	0 (0%)
Flooring secure	21 (72%)	8 (28%)	0 (0%)

Good storage so items have a spot	24 (83%)	5 (17%)	0 (0%)
Free of cords	25 (86%)	4 (14%)	0 (0%)
Easy to access heating & cooling controls	25 (86%)	4 (14%)	0 (0%)
Easy to open & close windows and blinds	23 (80%)	6 (21%)	0 (0%)
Easily get in/out chairs	15 (52%)	13 (45%)	1 (3.0%)
Laundry			
Adequate bench space	36 (60%)	22 (37%)	2 (3.0%)
Appliances easily accessed and plugged in when needed	49 (82%)	10 (17%)	1 (2.0%)
Room to hang small items	54 (90%)	6 (10%)	0 (0%)
Front loading washing machine	46 (77%)	14 (23%)	0 (0%)
Backyard[††]			
Relatively flat footpaths	46 (78%)	11 (19%)	2 (3.0%)
Doorways 850mm minimum wide	58 (98%)	1 (2.0%)	0 (0%)
Accessible clothesline without excessive reaching	31 (53%)	20 (34%)	8 (14%)
Garden low maintenance	20 (34%)	39 (66%)	0 (0%)
Shady areas outside to sit	53 (90%)	6 (10%)	0 (0%)
Outdoor furniture sturdy, comfortable & easily to get on/off	45 (76%)	11 (19%)	3 (5.0%)
Internal steps[§§]			
Sturdy rail in place	10 (91%)	1 (9.1%)	0 (0%)
Doorways minimum 850mm	9 (82%)	2 (18%)	0 (0%)
Neighbourhood			
Nearby public transport	54 (90%)	5 (8.0%)	1 (2.0%)
Nearby shops	56 (93%)	4 (7.0%)	0 (0%)
Neary local parks or pleasant walking areas	57 (95%)	2 (3.0%)	1 (2.0)
Nearby medical clinic & pharmacy	59 (98%)	1 (2.0%)	0 (0%)
Nearby local council facilities	54 (90%)	5 (8.0%)	1 (2.0%)
Nearby cafés and restaurants	58 (97%)	2 (3.0%)	0 (0%)
Footpaths present and in good condition	44 (73%)	16 (27%)	0 (0%)
Possible to safely cross main roads nearby	56 (93%)	4 (7.0%)	0 (0%)

*Total results & percentages may not add to 100% due to rounding
†Total of 48 homes assessed with 2 bathrooms.
‡Total of 50 homes with 2 toilets
§Total of 51 homes assessed with 2 bedrooms
**Total of 29 homes assessed with 2 living rooms.
††Total of 59 homes assessed with a backyard or a shared outdoor space.
§§Total of 11 homes assessed with internal steps

At least 90% (n=54/61) of participants reported living nearby shops, public transport and cafes. All participants had a front yard (n=60/60; 100%) and 98% (n=59/60) had a backyard or shared outdoor space attached to a townhouse or apartment. Most homes assessed contained at least one living room (n=60/60, 100%) and two bedrooms (n=51/60, 85%). A total of 35% (n=21/60) of participants had three bedrooms, 15% (n=9/60) had a four-bedroom house and only 3% (n=2/60) had a five-bedroom house. The spare bedrooms in houses with more than two bedrooms were mainly used either for guests and grandchildren, or as a study room or for storage. A total of 80% (n=48/60) of homes had two bathrooms, comprising a main/guest bathroom and an ensuite attached to their main bedroom. There were 48% (n=29/60) of homes with two living areas, either defined a rumpus room, formal lounge or main sitting area to watch

television, while 18% (n=11/60) of homes had an internal step, either in a house, townhouse, retirement village or unit. Internal staircases within retirement villages were assessed under 'internal steps'.

5.4.1   Common areas with hazards

A mean of 23 actions or improvements to reduce potential hazards (SD=10.8, range=4-44) were recommended among 60 participants. Most participants (>80%) were able to safely check who is at their door (n=51/60; 85% satisfactory), ensure they had access to a torch (n=60/60;100% satisfactory) or phone (n=58/60; 97% satisfactory), and confirm a location or person who had access to spare keys to their home (n=60/60; 100%). Amongst cleaning and maintenance items, most participants had strategies to change light bulbs and clean gutters ((n=45/60; 75% satisfactory) and had a step stool in place (n=55/60; 92% satisfactory). Few participants did not have front loading machines (n=22/60; 37% may need improvement). For 32% (n=19/60) of homes, it was recommended that they decluttered to improve access and safety (as assessed by the occupational therapist).

Among the 60 participants, the most common areas that may require improvement in the future were: bathroom, with a mean of 3.3 (range=0-8) actions recommended; toilet, with a mean of 1.4 (range=0-3) actions recommended, and backyard, with a mean of 1.5 (range=0-5) actions recommended. An item which may require modifications in the future within the bathroom was the transition from the shower to the floor (n= 42/60; 70% may need improvement). All first bathrooms (main bathrooms) assessed contained adequate ventilation (n=60/60; 100%), and most contained a shower cubicle at least 900mm by 900mm (n=49/60; 82% satisfactory) and had appropriate circulation space (n=42/60; 70% satisfactory). However, in bathroom 2 (ensuite bathroom) 60% of the homes had non-slip tiles (n=29/60), 54% of homes had thermostatically controlled water (n=26/60) and 50% had unsecured rugs acting as a potential future trip hazard (n=24/60). Similarly, toilet 1 (main toilet) also contained unsecured rugs (n= 17/60; 27% may need improvement) and low toilet seats (n=29/60; 49% may need improvement). Likewise, toilet 2 (ensuite toilet) contained also contained unsecure rugs (n=16/60, 31% may need improvement) and low toilet seats (n=23/60, 47% may need improvement). These toilets may benefit with a grab rail nearby or the consideration of equipment to assist with future toilet transfers from low toilet seats. Additionally, most toilet doors swung inwards (toilet 1, n=42/60; 70% may need improvement and toilet 2, n=34, 68% may need improvement), which may also act as a hazard in case of emergency.

Approximately two thirds of the homes contained high-maintenance gardens (n=39/60; 66% may need improvement), suggesting it may be necessary to consider landscaping options in the future. Approximately 40% of homes had not yet installed an irrigation system (n=24/60). Pathways leading to the front entry may require further attention in the future (n=20/60; 33% may need improvement), either by widening paths or landscaping to improve the surface. These actions to reduce hazards are applicable to both the front or back entry, especially if equipment (wheelchairs or mobility aids) is required to access the home. Letter

boxes also required fixing, replacement or relocating (n=15/60; 25% may need improvement). While 73% of participants (n=46/60) were living in communities with flat and accessible footpaths, further community action may be required in other areas to improve access to parks and amenities.

Items in living areas which may require future attention or modification were low chair heights within living rooms (n= 34/60; 57% needed improvement), inadequate microwave and oven heights (n=; 28% may need improvement), loose rugs and unsecured flooring in the kitchen (n=12/60; 20% may need improvement), and steps to access the home (n=36/60; 60% needed improvement). Most participants had not yet considered the use of carbon monoxide detectors (n=58/60; 97% needed improvement). While most participants (n=50/60; 83% satisfactory) had a first aid kit, many also indicated that they did not always regularly check if they had out-of-date medications. At least three participants (n=3/60; 5% may need improvement) did not have a working smoke alarm and eight participants (n=8/60; 30% may need improvement) did not have a fire blanket or fire extinguisher.

Lower socio-economic status was not associated with more potential home hazards. (n=60; Pearson's r=0.044; p=0.740). Similarly, level of education (n=60; Pearson's r=0.181; p=0.166) and age (n=60, Spearman's p=0.118, p=0.370) were also not correlated with the number of potential home hazards. However, there was a medium, positive correlation between the number of potential home hazards and whether or not participants were planning to move, Pearson's r=0.408, n=60; p=0.001); those with more hazards were more likely to be planning a move in the future.

5.5 Discussion

In this study, we assessed 60 homes to determine common potential hazards among healthy older adults and the potential modifications required to support ageing in place. Among the 60 homes, the most common areas requiring future improvement or modifications were bathroom, toilet and backyard. Other specific hazards needing future attention and possible modifications included chair height, loose rugs, elimination or improvement of steps to access the home and installation of carbon monoxide detectors. Our analysis showed that retirement villages and apartments were less likely to require modifications or improvements in the future due to the lower number of potential hazards identified. Furthermore, our results showed that those who stated they were considering relocating in the future were more likely to have potential hazards that required modifications.

The results of our study indicated that home environment assessments earlier in the course of ageing can help people to proactively plan for ageing in the home, address potential hazards and enable them to live longer in their own homes. Home environment assessments earlier in the course of ageing (e.g. at the age of 70) may result in a more proactive approach than is currently taken. As reported by Das et al. (2022) and Luciano et al. (2020), this may promote early planning to create age-friendly environments. In fact, older

people have expressed the desire to access information on home safety that will support their desire to remain in their homes (Aclan, George, et al., 2023b). Occupational therapists can work with individuals, communities and policy makers to create age-friendly communities and advocate for funds for assistive devices and modifications where necessary (Laver, 2023). Occupational therapists can also work with designers to create more aesthetically pleasing home modifications to promote independence.

Results suggested that people with less home hazards were less likely to consider moving in future. Retirement villages and apartments required fewer future improvements and were the most adequate in terms of safety and accessibility. These homes typically had home modifications already in place, smaller gardens and no steps to access the home. Other homes had low toilets, loose rugs in the bathroom and backyards that may require more maintenance in the future. To support the development of age-friendly homes and communities as suggested by World Health Organization (2020a), more purpose built homes for older people may be required. These future homes may benefit the consideration of non-slip flooring, grab rails within the bathroom and toilet, and smaller backyards with irrigation systems or those that are easier to maintain. The creation of age-friendly homes such as these may also lead to economic and social benefits to society (Sinclair et al., 2020).

While home modifications can be beneficial, modifications have been reported as being unaesthetically pleasing, such as being 'too clinical' and 'hospital-like' (Bailey et al., 2019). Some older people have been reported to disfavour the idea of their homes looking like a 'disabled bathroom' (Aplin et al., 2013). Houses are considered to be not just buildings, but 'homes', where individuals can express themselves and create personal meaning (Tanner et al., 2008). Early education about a variety of options including those which suit their home décor may be beneficial in promoting changes earlier in the ageing trajectory.

Participants in this study were commonly found to have high maintenance gardens. This may suggest that gardens are places of leisure and physical activity among many older adults. In Canada, older adults aged 65-86 described their gardens as being important in promoting their physical, mental and social health, especially during the COVID-19 pandemic (Corley et al., 2021; Finlay et al., 2015). However, as individuals age, their ability to perform more physically demanding gardening activities can be diminished (Horowitz et al., 2013). Gardening activities may require modification over time so that the person's ability is aligned with the complexity of the task. With increasing disability, some elements of gardening may become too difficult or unsafe. Gardens which require high maintenance may also become a factor for relocating. Findings from Davey (2006) indicated garden work as one of the main reasons to move in the event of illness and frailty. Planning for the future can included purchase of suitable outdoor seating, shade and irrigation systems, evergreen plants to reduce the need for raking leaves, weed management and plants which do not require frequent pruning. The high prevalence of high maintenance gardens in this study may

be unique to Australians who tend to have large gardens. Occupational therapists should consider the characteristics of the garden when advising clients on future planning.

Many participants described their inability to safely walk in the community via neighbourhood pathways and outdoor places, such as parks. With the rise of older adults living alone, the ability to age in place should consider both the nature of the home and community environment (Australian Institute of Health and Welfare, 2021a). Data shows most (94%) older people report having participated in social activities (such as exercise, visiting relatives or friends) outside of their home in the last three months (Australian Institute of Health and Welfare, 2021b). Similarly, access to green spaces and community gardens can promote healthy habits, such as walking (Hong et al., 2018). Di Stefano et al. (2012) discuss the need for occupational therapists to consider all possible community mobility and access issues when working with clients, regardless their age or functional limitations. Home visit assessments may need to look beyond the home environment and consider community accessibility (i.e. accessible footpaths and parks).

Several limitations in this study should be acknowledged. We recruited through a variety of methods, however, participants were relatively homogenous in terms of level of social disadvantage. Convenience sampling may have resulted in the recruitment of more participants living within the metropolitan areas with a higher socioeconomic status. The inclusion of rural and remote homes may therefore have add further value to future study. We did not include participants with significant physical impairment as these people are more suited to an occupational therapy home assessment that addresses their specific capabilities and needs, and may potentially require complex home modifications. The inclusion and uptake of smart home technologies was also not considered in this study. Smart devices (e.g. Google Homes, Amazon Alexa, smart lightbulbs, etc) have been able to support functional independence (Demiris et al., 2004; Wang et al., 2019). Some research suggests that older adults may not necessarily see the benefits of having a smart home and feel technology is more intended for those who are younger or less healthy (Peek et al., 2014). However, smart home automation is likely to become more prevalent in future and should be considered in future research. Future research is also required to adapt the assessment to be applicable to varied populations, and which considers cultural diversity, geographical locations and social disadvantage.

5.6 Conclusions

Common areas where potential hazards were identified were bathroom, toilet, and backyard. Specific hazards, such as the transition from the shower cubicle to the bathroom floor, steps to access the home, low chair heights in the lounge room and loose rugs in the kitchen, may require future attention or modification in the future. Retirement villages or apartments were considered the most 'adequate' in terms of age-friendliness. Older people were more likely to consider moving when there were more modifications needed to their homes. Gardens tended to be considered high maintenance and identified as possible areas to modify in future. The need for age-friendly housing is apparent and older people could be

provided with information and education earlier to proactively plan for ageing in place, rather than waiting for a health crisis.

CHAPTER 6 THE VALIDITY OF A DIGITAL TOOL FOR SELF-ASSESSMENT OF THE HOME TO IMPROVE AGE-FRIENDLINESS

This chapter addresses Objectives 5 and 6 of the thesis: To investigate whether it is feasible for older people to self-assess their own home environment using a digital health tool, and to evaluate whether a self-assessment tool can be used to accurately assess the home environment of older individuals and produce results that are comparable to the current widely accepted gold standard, which is an occupational therapy assessment, in terms of validity. This chapter describes an agreement (validity) study and is present with minor changes for thesis formatting from the publication, 'A Digital Tool for the Self-Assessment of Homes to Increase Age-Friendliness: Validity Study,' published in *JMIR Aging,* within Appendix R (Aclan, George, et al., 2023c).

Chapter 3 of this thesis described the current evidence regarding the concept of 'home' and the factors that may be hindering future housing decisions. Chapter 4 explored the views of relatively healthy middle aged and older adults and individuals with older relatives. Chapter 5 however considered current home hazards that may be required to be modified in the future. There is a need to further investigate whether older people can recognise their own potential home hazards in their own homes and whether they can reach conclusions similar to those generated through an occupational therapy home assessment. This chapter will describe the use of a digital self-assessment tool among older people and whether they can use this to accurately self-assess their own homes to prepare for ageing in place.

As the lead author of this publication, the candidate's contribution was 80% of this chapter, was the major contributor to the write up and editing of this publication. The candidate co-designed the study and undertook recruitment of participants, ethics application, data collection and data analysis. Co-author approval was obtained for permission to include this publication in the thesis.

6.1 Introduction

As described in previous chapters, worldwide, people are living longer due to increased life expectancy and declining fertility rates (World Health Organization, 2010). Recent data shows that the number of older people over the age of 60 will increase from 1 billion in 2020 to 1.4 billion in 2030 (World Health Organization, 2022). By 2050, the number of older people aged 60 year and older will double to 2.1 billion (World Health Organization, 2022). Ageing leads to changes in intrinsic capacity (e.g. physical and cognitive abilities) and functional ability. In turn, the environment in which the person lives may require adaptation. Over time, the home environment needs to be able to support both a decline in intrinsic capacity and function ability (Das et al., 2022).

The establishment of age-friendly environments in homes and communities will play an important role in optimising the health and well-being of society (World Health Organization, 2020a). Most people want to remain in their own homes as they grow older (Hatcher et al., 2019; Kramer & Pfaffenbach, 2015). A survey of more than 10,000 Australians found that 80% of older people wanted to remain in their current home (Royal Commission into Aged Care Quality and Safety, 2020b). Around 20% of older people preferred to live in a long-term facility (Royal Commission into Aged Care Quality and Safety, 2020b). In Canada, a population-wide survey of people aged 65 years found that over 70% had not moved in the past five years (Northcott & Petruik, 2011). In Hong Kong, research has also found a strong preference among older people for residing at home or with family members, or residing in a place that is familiar to them (Chui, 2008). Ageing in place refers to the ability to remain at home for as long as possible, despite a decline in functional ability (Pani-Harreman et al., 2021). Supporting adults to age in place requires consideration of the house as being more than a building, but a home (Pani-Harreman et al., 2021). Older people feel strongly connected to their homes and communities as it provides security, comfort and a space for self-reflection (Hatcher et al., 2019). Homes are also considered a place to cherish memories and maintain a sense of belonging which prevents loneliness (Coleman & Wiles, 2020; Glass & Vander Plaats, 2013). The ability to age in place depends on the appropriateness of the home, the potential to make alterations to the home, costs and availability of suitable housing alternatives and formal supports (Australian Institute of Health and Welfare, 2021b).

Occupational therapists often conduct home environment assessments and recommend modifications to improve access and function in older people, and to reduce the risk of falls (Stark et al., 2017). Examples of home modifications are the installation of grab rails in the shower, de-cluttering of overcrowded bedrooms or installation of threshold ramps to eliminate trip hazards within the home (Stark et al., 2009). Despite the proven benefits of home environment assessments, access is limited, particularly in rural areas, and assessments are usually available only after injury or illness (Ninnis et al., 2018; Read et al., 2020; van Gaans & Dent, 2018). Home environment assessments can take considerable time, averaging 80 minutes per home assessment (Lannin et al., 2011). Older adults have identified the potential benefits of adaptations and modifications earlier in the course of ageing (Renaut et al., 2015) and are receptive to more education about actions that can be taken to support ageing in place (Aclan, George, et al., 2023b).

To date, most home environment assessment tools have been developed for administering by an occupational therapist (Barras, 2005). Furthermore, most tools have been developed for use with older people with impaired functional ability, rather than those who are considering future needs to support ageing in place (Barras, 2005). A recent review of home accessibility assessment tools identified seven home accessibility assessment measures which were considered promising, however none of the tools had strong evidence supporting reliability and validity (Patry et al., 2019). In recent years, home self-assessment tools have emerged. Ziebart et al. (2021) described the development of a self-assessment checklist which

could be used by older adults to assess falls risks in the house (Ziebart et al., 2021). The Home Safety Self-Assessment is another tool which includes a self-assessment checklist and has been shown to have good reliability and validity (Tomita et al., 2014). Further research to develop and validate tools which can be used by older people to assess their homes to prepare for ageing in place is required.

This current project is part of a research program which seeks to develop a digital health tool to enable middle- aged and older people to self-assess their own home to understand how to improve the accessibility and age-friendliness of the home environment. The tool was co-designed with older people and developed into a prototype. The aim of this study is to determine the validity of a home environment self-assessment tool and to investigate the levels of agreement between completion by an occupational therapist and an older adult. The research questions were as follows: Is it feasible for older people to self-assess their own home environment using a digital health tool? What are the levels of agreement between an occupational therapist and an older person when using a home environment assessment tool?

6.2   Methods

6.2.1   Study design

This study involved recruiting a cohort of older adults who had completed the home environment self-assessment tool at the same time as an occupational therapist. The study design was used to establish agreement (validity) of the self-assessment tool by assessing it against the current gold standard: an occupational therapy home assessment. Studies that assess validity seek to compare a new approach with a gold standard or traditional approach and look at the level of agreement (Kimberlin & Winterstein, 2008). Validity will be understood as the capacity of a self-administered assessment program to detect the same kind of home hazards and an equal number of hazards as an assessment conducted by an occupational therapist. In this instance, the self-assessment of the home by an occupational therapist serves as the gold standard. This study was conducted across metropolitan Adelaide, South Australia, Australia.

6.2.2   Ethical considerations

This research was approved by the Flinders University Human Research Ethics Committee (Project number 5303). Ethics approval is shown in Appendix L.

6.2.3   Participants

Participants were recruited if they met the following criteria: i) aged 60 years or older, ii) living in their own home either in a private dwelling or in a retirement village, and iii) did not have a significant level of disability [measured using the Modified Rankin Score where people must a score of 2: 'able to carry out all usual duties and activities' or 'unable to carry out all previously activities but able to look after own affairs without assistance' (Broderick et al., 2017). Participants were included if they were aged 60 years or older.

While people aged 60-65 are not classified as older adults, they fall under an age group where many are planning retirement and considering longer-term living options (Gibler & Tyvimaa, 2015).

6.2.4 Recruitment

Participants were recruited from June to November 2022. In Chapter 5, Section 5.2.3, all participants were recruited using the same method, and these same participants were also included in this chapter. Furthermore, all of the participants in this study were residing in the same homes that were presented in Chapter 5.Participants were recruited through local council newsletters, the Flinders University research department's registry of interested participants and existing research networks. Participants who expressed interested were contacted by the lead researcher (RA) via phone or email. They were provided a copy of the participation information sheet and written consent form, as shown in Appendix K. Participants involved were offered an honorarium in recognition of their time (AU $20) and a copy of their completed self-assessment results and the occupational therapy home assessment results at the of the study.

6.2.5 Instrument

The self-assessment tool was specifically developed for this research program based on a review of existing tools and co-design workshops with older people (Laver et al., 2022). In this study, the tool was made available via a website and displayed on a tablet computer (iPad). The self-assessment tool was developed using a co-design process which was led by an occupational therapist (KL) and built by a website designer (Figure 6.1). The tool comprised 89 questions within the domains of: general safety, cleaning and maintenance, front entry and garden, hallway, kitchen, toilet, bedroom, living room, bathroom, laundry, backyard, internal steps and neighbourhood. Each question comprised the following possible responses: 'yes' (satisfactory), 'no' (needs improvement), or 'not applicable' (not present). The home environment assessment is presented in Appendix J. Participants also answered demographic questions related to their socio-economic status, marital status, level of education, living status, housing type, ownership of housing, community services being received, and whether they considered relocating in the future recorded as a categorical variable as 'yes/no' or 'not applicable', as shown in Appendix M. For this study, a maximum of two of each area were assessed and data presented for ease of reporting (e.g. two bathrooms, two bedrooms).

Figure 6.1: Digital self-assessment tool

6.2.6   Data collection

Potentially eligible participants were screened against the eligibility criteria by the lead researcher and occupational therapist, as above. Upon obtaining consent via phone or email, a time and date was scheduled for each participant to complete the self-assessment and receive the standardised occupational therapy home assessment. Prior to each visit, a pre-offsite visit risk assessment was completed to ensure there were no specific safety risks to the therapist and research assistant (e.g. COVID-19 infection).

6.2.6.1 Self-assessment procedure

At each visit, the occupational therapist demonstrated the use of the self-assessment tool using a study iPad with an inbuilt wi-fi card for internet access. The occupational therapist utilised an adapted version of the self-assessment program using a second iPad (which reflects that the therapist is the administrator), rather than the participant. A copy of the self-assessment assessment tool is presented in Appendix J. The participant and occupational therapist simultaneously completed the self-assessment using the study iPads. The participant and the occupational therapist walked through the home together, did not discuss the content of the assessment and scored each question independently. If two people were living in the same house, the occupational therapist and research assistant ensured the two people were not sharing answers so as to limit bias.

6.2.7 Data analysis

Data was entered into Microsoft Excel and exported into IBM SPSS and Stata software (IBM Corp, 2021; StataCorp, 2021). Descriptive statistics were used to report categorical and continuous variables, including the participant's demographic characteristics, responses to questions on type of housing they lived in, ownership of their home, formal services being received, postcode, whether they considered relocating and level of confidence using digital technology. Socio-economic status was categorised according to the Australian Bureau of Statistics index of relative socio-economics advantage and disadvantage (IRSAD) (Australian Bureau of Statistics, 2018a). Each socio-economic area is given a score for a statistical area level (e.g. SA1) through the addition of weighted characteristics. The scores ranged from a low index score (more disadvantaged, SA1) to a high index score (most advantaged, SA5) (Australian Bureau of Statistics, 2018a).

The rooms of each home were assessed with a series of questions related to home safety which was determined using a 'yes/no' response. A total of seven possible responses were developed: 'yes-yes', 'no-no', 'no-yes', 'yes-no', 'not applicable-not applicable', 'yes-not applicable', 'no-not applicable'. The kappa statistic measure of agreement was used to examine the inter-rater reliability and level of agreement between the participant and the occupational therapist using the same self-assessment tool. The level of agreement was determined through individual items. Kappa scores were presented to provide the agreement between the raters. Kappa scores ranged from 0 for the amount of agreement that can be expected from random change, to 1 which represents perfect agreement between the raters (McHugh, 2012). For this analysis, Cohen's kappa ($\underline{k}$) guidelines of interpretation were applied as suggested by McHugh (2012), with values 0- 0.20 indicating no agreement, 0.21-0.39 as minimal, 0.40-0.59 as weak, 0.60-0.79 as moderate, 0.80-0.90 as strong and above 90 as almost perfect. This analysis interpreted the analysis with any kappa below 0.60 suggesting an inadequate agreement among the two raters (McHugh, 2012).

Variations of kappa were used to assess validity. Where results created a high agreement and, the value of kappa was low, Gwet's AC_1 was applied. Dettori and Norvell (2020) suggest that there are limitations to kappa where high agreement can result in low kappa (Dettori & Norvell, 2020; Feinstein & Cicchetti, 1990), and that kappa values depend on sample sizes, the number of categories and distribution of responses. Gwet AC_1 was applied to overcome these problems (Dettori & Norvell, 2020). Wongpakaran et al. (2013) recommend that Gwet's AC_1 be considered for any inter-rater reliability analyses alongside Cohen's kappa.

6.3   Results

6.3.1   Participants

A total of 61 participants completed the self-assessment tool. Table 6.1 outlines the demographic characteristics of these 61 participants. The mean age of the participants was 71.2 years (SD=7.03). The sample consisted of slightly more females (56%, n= 34) than males (44%, n=27). Among the sample, 39% (n=24) of participants lived with a spouse or family member and conducted the self-assessment independently but within the same home at the same time. A total of 97% of participants (n=59) were assessed as having no disability. One participant had no significant disability despite symptoms and one participant had a slight disability but was able to look after their own affairs without assistance (Broderick et al., 2017). All self-assessments were conducted within metropolitan Adelaide. Houses considered as 'other' were homes built within retirement villages or they were defined as an apartment by the participant. Almost all participants (n=60, 98%) did not use a mobility aid at home.

Table 6.1: Demographic data on the 61 characteristics

Person	Demographics	Frequency (N, %)
	Age, mean (SD), range	71.2 (7.03), 60-88
Sex		
	Male	27 (44%)
	Female	34 (56%)
Level of education		
	High school	9 (15%)
	Higher education	44 (72%)
	Other	6 (10%)
Marital status		
	Married	40 (66%)
	Not married	21 (34%)
Living status		
	Alone	15 (25%)
	Living with spouse	38 (63%)
	Living with family member	6 (10%)
	Other	1 (1.7)
Type of housing		
	House	50 (82%)
	Townhouse	1 (2%)
	Unit	4 (7%)
	Other	6 (10%)
Ownership		

	Private owner	57 (93%)
	Private rental	1 (2%)
	Other	3 (5%)
Services		
	Cleaning and gardening	2 (3%)
	Cleaning	3 (5%)
	Gardening	2 (3%)
	None	51 (84%)
Socioeconomic status		
	SA1 (most disadvantaged)	5 (8%)
	SA2	6 (10%)
	SA3	16 (26%)
	SA4	21 (34%)
	SA5 (least disadvantaged)	13 (21%)
Considering relocation		
	Yes	2 (3%)
	No	49 (80%)
	Considering	10 (16%)
Mobility aid use at home		
	Yes	1 (2%)
	No	60 (98%)

Abbreviations: M= mean; n=total number of participants; SA= statistical area level; SD= standard deviation

The average time it took to complete the self-assessment tool was 23 minutes (SD=8.12). Table 6.2 shows the responses on the use and confidence on usage of the self-assessment tool. A total of 16 out of 61 participants (26%) had minor technical difficulties with the use of the self-assessment tool on the iPad. These technical difficulties were due to accidentally exiting out of the self-assessment application and not knowing how to return to the original screen or being unable to scroll up/down the iPad. Despite technical difficulties, more than half of the participants (n=44, 72%) found the self-assessment easy to use.

Table 6.2: Responses to questions about the self-assessment tool

Responses to questions	Frequency (N, %)
Time taken to complete self-assessment tool (min), mean (SD; range)	23 (8.12;11-60)
Was the self-assessment tool easy to use? (1-hard, 10-easy)	
10	44 (72%)
9	14 (23%)
8	1 (1.6%)
7.5	1 (1.6%)
7	1 (1.6%)
Were there any technical difficulties?	
Yes	16 (26%)
No	45 (74%)

Abbreviations: min= minutes; n=total number of participants; SA= statistical area level; SD= standard deviation

6.3.2 Levels of agreement

Most participants were living in homes with two or more bedrooms, two bathrooms and one living room. In homes with more than two bedrooms. The spare bedrooms were used as a study room or for guests, storage or grandchildren. Only 18% of homes had internal steps, 18% participants had a three-bedroom house, 12% had a four-bedroom house and only two out of 60 participants had a five-bedroom house. Most (98% of participants) had a backyard or common shared outdoor space within a retirement village or apartment.

An overview of the levels of agreement between each participant and occupational therapist is outlined in Table 6.3. In total, all the 'general' and 'neighbourhood' related questions demonstrated an almost perfect agreement as all these questions became a point of discussion related to the opinion of the participant.

Table 6.3: Agreement levels between occupational therapist and participant

Area of the home	Questions answers between raters	Percentage agreement (%)	Cohen's kappa (k)	Gwet AC$_1$	95% confidence internal
Cleaning					
	1. Are clotheslines easy to access (height? Location?)	85%	0.34*	0.81	0.76-0.94
	2. Is there an irrigation system in place with ease of watering?	93%	0.89	0.91	0.87-1.00
	3. Are there strategies to change lightbulbs, access high cupboards and clean gutters which don't require use of a ladder?	89%	0.69*	0.86	0.80-0.97
	4. Are long lasting lightbulbs (LED) installed to reduce the need for frequent changing?	97%	0.66*	0.97	0.92-1.00
	5. Is the home largely clutter free?	90%	0.75	0.84	0.82-0.98
	6. Is there a supportive step stool available to access items which are just out of reach	95%	0.70	0.95	0.90-1.00
Front access					
	1. Are paths relatively flat and approximately 1000mm wide?	72%	0.19*	0.60	0.61-0.84
	2. Do paths and driveways have a non-slip texture and are they free of moss?	79%	0.24*	0.71	0.68-0.89
	3. Is the gate easy to open?	85%	0.68*	0.81	0.76-0.94
	4. Are steps a suitable height (115-190mm) and depth (240mm-355mm) and stable?	79%	0.51	0.73	0.68-0.89
	5. Is it easy to unlock the front door and use the door handle?	89%	0.33*	0.86	0.80-0.97
	6. Is a lockable screen door in place to enable access to fresh air and maintain security?	87%	0.57*	0.85	0.78-0.96
	7. Is there space within the garage or carport to easily open the car door and get out?	93%	0.57*	0.93	0.87-1.00
	8. Is the letterbox easy to access and open?	75%	0.00*	0.69	0.64-0.87
	9. Is there at least one way to access the home without a step?	77%	0.56	0.54	0.66-0.88
Hallways					
	1. Are hallways free of clutter and unnecessary furniture?	87%	0.50*	0.82	0.78-0.96
	2. Are floor coverings secure and in good condition?	79%	0.36*	0.74	0.68-0.89
	3. Is the house free of internal steps?	97%	0.91	0.95	0.92-1.00
Kitchen					
	1. Is there room within the kitchen to easily manoeuvre?	100%	1.00	1.00	1.00-1.00
	2. Are benches clear?	82%	0.38*	0.75	0.72-0.92
	3. Are rugs and floor coverings secure and in good condition?	79%	0.46	0.74	0.68-0.89

	4. Are you able to easily reach or commonly used items without tiptoes, a stepladder, or bending too low?	92%	0.40*	0.91	0.85-0.99
	5. Are taps easily to turn on, off and adjust?	98%	0.00*	0.98	0.95-1.00
	6. Can appliance controls easily be accessed?	100%	1.00	1.00	1.00-1.00
	7. Is there space next to the microwave, oven, and stove top to place hot food?	80%	0.46*	0.70	0.70-0.91
	8. Is there a carbon monoxide detector installed to detect carbon monoxide and prevent poisoning?	93%	0.48*	0.93	0.87-1.00
	9. Is there a space in the kitchen areas where you could sit if needed to prepare food?	89%	0.18*	0.87	0.80-0.97
	10. Are stools a comfortable height and stable?	84%	0.70	0.78	0.74-0.93
	11. Are the oven and microwave located at a suitable height? With access between knee and shoulder?	77%	0.23*	0.68	0.66-0.88
	12. Are bench tops a suitable height (850mm to 1050mm)?	100%	1.00	1.00	1.00-1.00
Internal step					
	1. Do internal stairs have a sturdy rail in place?	91%	0.62	0.88	0.71-1.00
	2. Are doorways a minimum of 850mm wide?	100%	1.00	1.00	1.00-1.00
	3. Are door handles lever style?	82%	0.68	0.75	0.55-1.00
	4. Can doors and windows be easily opened to allow for fresh air?	73%	-0.06*	0.68	0.41-1.00
Bathroom 1					
	1. Is there room within the bedroom to easily manoeuvre?	78%	0.29*	0.67	0.66-0.88
	2. Are rugs or mats secure and in good condition?	64%	0.46	0.48	0.52-0.76
	3. Is there adequate ventilation with presence of a fan or easily opened window?	100%	1.00	1.00	1.00-1.00
	4. Is the transition from the floor to the shower flat?	61%	0.27	0.22	0.48-0.73
	5. Is a shower hose in place?	82%	0.84	0.89	0.85-0.99
	6. Are taps easy to turn on, off and adjust?	66%	0.08*	0.49	0.53-0.78
	7. Is water thermostatically controlled to a delivery temperature of 45 degrees?	84%	0.70	0.77	0.74-0.93
	8. Is the floor surface non-slip?	67%	0.33	0.38	0.55-0.79
	9. Is the shower cubicle a minimum of 900x900mm?	92%	0.70	0.90	0.85-0.99
Bathroom 2					
	1. Is there room within the bathroom to easily manoeuvre?	56%	0.14	0.25	0.42-0.71
	2. Are rugs or mats secure and in good condition?	46%	0.29	0.19	0.31-0.61
	3. Is there adequate ventilation with presence of a fan or easily opened window?	94%	-0.04*	0.93	0.86-1.00
	4. is the transition from the floor to the shower flat?	54%	0.20	0.11	0.39-0.69
	5. is a shower hose in place?	92%	0.84	0.89	0.83-1.00

	6. Are taps easy to turn on, off and adjust?	63%	0.14*	0.40	0.48-0.77
	7. Is water thermostatically controlled to a delivery temperature of 45 degrees?	90%	0.80	0.86	0.80-1.00
	8. Is the floor surface non-slip?	71%	0.33	0.49	0.57-0.84
	9. Is the shower cubicle a minimum of 900x900mm?	79%	0.41	0.75	0.67-0.92
Toilet 1					
	1. Is the toilet a suitable height (460mm-480mm)?	55%	0.10	0.27	0.40-0.71
	2. Are rugs or mats secure and in good condition and necessary?	70%	0.53	0.58	0.59-0.82
	3. Does the door swing outwards?	90%	0.79	0.87	0.82-0.98
Toilet 2					
	1. Is the toilet a suitable height (460mm-480mm)?	55%	0.01*	0.27	0.40-0.71
	2. Are rugs or mats secure and in good condition and necessary?	62%	0.42	0.45	0.46-0.80
	3. Does the door swing outwards?	89%	0.79	0.86	0.78-1.00
Bedroom 1					
	1. Is the bed a comfortable height to access and rise from?	93%	0.31*	0.93	0.87-1.00
	2. Is there space to easily manoeuvre within the bathroom?	75%	0.16*	0.67	0.64-0.87
	3. Is there access to light and phone next to the bed?	97%	0.65*	0.96	0.92-1.00
	4. Are floor covering secure and in good condition?	84%	0.38*	0.81	0.74-0.93
	5. Is there somewhere to sit while dressing and putting on shoes?	92%	0.51*	0.91	0.85-0.99
	6. Is it easy to access clothing and shoes without excessive reaching or bending?	93%	-0.03*	0.93	0.87-1.00
	7. Is it easy to open and close windows and blinds?	85%	0.12*	0.82	0.76-0.94
	8. Can the temperature in the bedroom be easily adjusted?	92%	0.72	0.90	0.85-0.99
Bedroom 2					
	1. Is the bed a comfortable height to access and rise from?	85%	0.39*	0.83	0.74-0.95
	2. Is there space to easily manoeuvre within the bedroom?	81%	0.47*	0.77	0.70-0.92
	3. Is there access to light and phone next to the bed?	90%	0.41*	0.90	0.82-0.99
	4. Are floor covering secure and in good condition?	90%	0.58*	0.89	0.82-0.99
	5. Is there somewhere to sit while dressing and putting on shoes?	94%	0.65*	0.93	0.88-1.00
	6. Is it easy to access clothing and shoes without excessive reaching or bending?	96%	0.73*	0.96	0.91-1.00
	7. Is it easy to open and close windows and blinds?	75%	0.22*	0.64	0.63-0.87
	8. Can the temperature in the bedroom be easily adjusted?	90%	0.62	0.89	0.82-0.99
Living area 1					
	1. Is there space to easily manoeuvre within the living area?	87%	0.29*	0.84	0.78-0.96
	2. Are floor covering secure and in good condition?	80%	0.09*	0.78	0.70-0.90

		%	k		
	3. Is there good storage so that all items have a spot?	95%	0.38*	0.95	0.90-1.00
	4. Is the room free of cords in walkways which may cause trips?	97%	0.00*	0.97	0.92-1.00
	5. Is it easy to access heating and cooling controls?	93%	0.53*	0.93	0.87-1.00
	6. Is it easy to open and close windows and blinds?	90%	-0.03*	0.89	0.82-0.98
	7. Are chairs in the room easy to get in and out of?	44%	0.02	0.04	0.31-0.57
Living area 2					
	1. Is there space to easily manoeuvre within the living area?	87%	0.65	0.78	0.73-1.00
	2. Are floor covering secure and in good condition?	73%	0.13*	0.69	0.57-0.90
	3. Is there good storage so that all items have a spot?	87%	0.52*	0.84	0.74-1.00
	4. Is the room free of cords in walkways which may cause trips?	90%	0.37*	0.88	0.79-1.00
	5. Is it easy to access heating and cooling controls?	100%	1.00	1.00	1.00-1.00
	6. Is it easy to open and close windows and blinds?	77%	0.15*	0.73	0.61-0.93
	7. Are chairs in the room easy to get in and out of?	53%	0.07*	0.42	0.34-0.73
Laundry					
	1. Is there adequate bench space in the laundry?	84%	0.65	0.79	0.74-0.93
	2. Can all appliances by easily access and plugged in when needed?	85%	0.40*	0.83	0.76-0.94
	3. Is there room in the house to hang small items of laundry to dry when needed?	97%	0.78	0.96	0.92-1.00
	4. Is the washing machine front-loading?	100%	1.00	1.00	1.00-1.00
Back garden					
	1. Are paths relatively flat and approximately 1000mm wide?	78%	0.24*	0.75	0.68-0.89
	2. Are doorways a minimum of 850mm wide?	100%	1.00	1.00	1.00-1.00
	3. Is it possible to access the clothesline without excessive reaching?	63%	0.29*	0.52	0.51-0.76
	4. Is the garden low maintenance in terms of watering requirements, lawn mowing and management of autumn leaves?	55%	0.24	0.39	0.42-0.68
	5. Are there shady areas outside to sit?	93%	0.57*	0.92	0.87-1.00
	6. Is outdoor furniture sturdy, comfortable and easy to get on/off?	83%	0.40*	0.81	0.74-0.93

*Where results created a high agreement and the value of kappa was low, Gwet's AC$_1$ was applied
Abbreviations: k= kappa score; %= percentage agreement

Among the 61 participants, the areas which demonstrated the lowest agreement levels with the occupational therapist were: front garden and entry (percentage agreement of 72%-93%), bathroom (percentage agreement of 46%-100%), toilet (percentage agreement of 54%-92%) and backyard (percentage agreement of 55%-100%).

6.3.2.1   Front access

Items which showed a moderate level agreement were: paths being flat and wide, with 72%agreement (Gwet AC_1=0.60); paths and driveways with a non-slip texture and free of moss, with 79% agreement (Gwet AC_1=0.71); and letter box being easy to access and open, with 75% agreement (Gwet AC_1=0.69). Items with weak agreement were related to the front steps of the house. For example, steps being a suitable height, depth and stable demonstrated 79% agreement (k=0.51), and whether the home had at least one access without a step had 77% agreement (Gwet AC_1=0.56). No participants assessed front steps as being unsuitable and unstable, compared to the occupational therapist assessing 17 front steps being unsuitable and unstable.

6.3.2.2   Hallway

Items which showed a strong agreement were the hallway being free of clutter and unnecessary furniture, with 87% agreement (Gwet AC_1= 0.82). A total of 13 floor coverings within the hallways were assessed by the occupational therapist as being unsafe, compared to no participants assessing floor coverings as unsafe.

6.3.2.3   Kitchen

A total of 12 questions regarding the kitchen were compared for levels of agreement between the occupational therapist and the participant. Among the 12 questions, scores ranged from an overall weak to an almost perfect level of agreement, as demonstrated in Table 6.3. The occupational therapist assessed the oven and microwave to be at an unsuitable height on 14 out of 61 occasions, compared with 0 out of 61 by the participants.

6.3.2.4   Bathroom 1

Among the nine questions, the levels of agreement varied from minimal to almost perfect agreement, as demonstrated in Table 6.3.

Both the occupational therapist and participant agreed (100% agreement; k=1.00) there was adequate ventilation, with the presence of a fan or window. There was a moderate agreement of 78% (Gwet AC_1=0.67) for bathroom 1 having ease of access, and a high level of agreement (92%; k=0.70) for the shower cubicle dimensions being a minimum of 900mm x 900m. There was a weaker level of agreement for rugs or mats being secure (64%; k=0.46) and a 66% agreement (k=0.49) for taps being easy to turn on/off and adjust. There was also a weak agreement level for the transition from the floor (61% agreement; k=0.27) to the shower being flat and if floors surfaces were non-slip (k=0.33). Most participants did not

believe 'shower lips' and 'shower alcove tracks' were home hazards and commonly considered these transitions as flat.

6.3.2.5 Toilet 1

Among the three questions, the levels of agreement varied from no agreement to moderate agreement, as demonstrated in Table 6.3. The height of toilet 1 had the lowest agreement (k=0.10, with 55% agreement) between the participants and the occupational therapist. Both agreed the toilet heights were suitable on 31 out of 61 occasions whilst there were 27 out 61 occasions where the occupational therapist assessed the toilet as being unsuitable. Participants commonly reported the toilet height as manageable and not an area of concern.

6.3.2.6 Bedroom 1

Among the eight questions, the levels of agreement varied from moderate to almost perfect, as demonstrated in Table 6.3.

The participants and occupational therapist both highly agreed there was easy access to a light and phone next to their bed (Gwet AC_1= 0.96, 97% agreement). Other items which indicated a high level of agreement were bed height (Gwet AC_1=0.93, an almost perfect agreement, 93%), easy access to clothing and shoes (Gwet AC_1=0.93, an almost perfect agreement,93%), having a place to dress and a seat to put on shoes (Gwet AC_1=0.91, an almost perfect agreement, 92%) and if the temperature in the bedroom could be adjusted (k=0.72, an almost perfect agreement, 92%). in regards to bed height, most interpreted the bed height question as 'was the bed comfortable', rather than whether the bed was 'comfortable height'.

6.3.2.7 Living areas

Living areas 1 and 2 were classified by the participants as their main living area to relax and watch television or a rumpus room or sitting area.

6.3.2.8 Living area 1

Among the seven questions, the levels of agreement varied from no agreement to almost perfect agreement, as demonstrated in Table 6.3.

An almost perfect level of agreement was evident for the following: lounge area and walkways being free of cords (Gwet AC_1=0.97, 97% agreement), lounge area with good storage (Gwet AC_1=0.95, 95% agreement) and easy access to heating and cooling controls (Gwet AC_1=0.93, 93% agreement). A strong agreement level was evident for circulation space (Gwet AC_1=0.84, 90% agreement) and for ease of opening windows or blinds (Gwet AC_1=0.89, 90% agreement).

Floor coverings in the lounge area seemed to indicate 'lower' levels of agreement (Gwet AC_1=0.78, moderate agreement, 80%). The occupational therapist disagreed with the participant, with eight out of 61

lounge rooms found to have unsafe floor coverings.

The lowest agreement level within living area 1 was with ease of getting in and out of chairs (k=0.02, no agreement, 44%).

6.3.2.9 Backyard

Among the six questions, the levels of agreement varied from minimal agreement level to almost perfect agreement, as demonstrated in Table 6.3.

Both the participants and occupational therapist agreed at an almost perfect level that the back garden doorway was or was not a minimum of 850mm wide (k=1.00, 100% agreement) and if there were shady areas outside to sit (Gwet AC_1=0.92, 93% agreement). Whether outdoor furniture was sturdy, comfortable and ease of getting in and out of also had a high level of agreement (Gwet AC_1=0.81, 83%).

There was a moderate level of agreement on paths being relatively flat and approximately 1000m wide (Gwet AC_1=0.75, 78% agreement). Here, the occupational therapist disagreed nine out of 60 occasions and only there were only two agreements among both raters. The lowest agreement levels within the backyard were whether it was possible to access the clothesline without excessive reaching (Gwet AC_1=0.52, weak agreement, 63%) and whether the garden was low maintenance (k=0.24, minimal agreement, 55%).

6.4 Discussion

In this study, a digital home environment self-assessment tool was tested with older people and the validity of the tool was determined through a comparison of the levels of agreement between an occupational therapist and an older person. Overall levels of agreement were high, supporting the validity of the tool in identifying potential hazards. Lower levels of agreement were found between the occupational therapist and older participant in steps, toilet, bathroom and backyard. Other specific areas which also displayed lower levels of agreement were toilet and chair height in the lounge, loose rugs/mats or floor coverings, height of kitchen appliances, and transition from shower alcove to bathroom flooring. Lower levels of agreement likely occurred due to: a) the subjective nature of some questions, such as 'is there at least one way to access the home without a step?', and b) the more critical lens with which an occupational therapist assessed the home environment. There were no items where participants were more likely to identify hazards than the occupational therapist.

Participants found the tool relatively simple and quick to complete, and overall there were high levels of agreement. Other research conducted by Ali and Kumar (2022) also reported that older people were able to self-assess potential risk factors at home. They also found that self-assessments led to older people being able to initiate minor modifications to their home, including the removal of throw rugs and the

reorganisation of kitchen appliances. Other research has shown that older people prefer self-assessment approaches that go beyond identifying hazards and provide people with potential solutions to ensure their homes are safe and comfortable (Lorraine James & Saville-Smith, 2018). Checklists and recommendations to improve age-friendliness of the home environment may also be useful for architects, interior designers and builders to help them gain insight into the practical needs of older people.

Although older people were able to self-assess their homes, there were incidences of disagreement between the perspectives of the occupational therapist and participants. In particular, the assessment of steps, toilet, bathroom and backyard showed conflicting results. It may be possible that participants may potentially take their personal abilities and occupational performance into account when evaluating themselves, which could contribute to the observed variability. Whereas, occupational therapists have extensive training in environmental assessment, with an emphasis on safety (Laver et al., 2022). Other research has also shown that occupational therapists are more critical of the environment than other people (Mackenzie et al., 2002). Lower levels of agreement commonly occurred regarding the bathroom and toilet. These areas have been shown to be particularly hazardous for older people. Gell et al. (2020) found that bathroom modifications were common and usually increased after multiple falls. Similarly, Wellecke et al. (2022) found that bathroom modifications were frequently required to support ageing in place. Their study also found that large step-free showers and bathrooms on the ground floor were beneficial (Wellecke et al., 2022). It was clear from the participants in the study that bathrooms and toilets were not an area of primary concern. Bathroom and toilet modifications, such as grab rails, may be a key feature to consider in the design of new buildings in age-ready cities.

We also found a difference in agreement levels regarding the backyard, with many participants indicating that their gardens did not require high maintenance, despite the occupational therapist believing otherwise. Research shows that gardening contributes to greater levels of well-being, better physical and mental health and sleep quality among older people (Corley et al., 2021). However, as ageing takes place, older people have also expressed their concerns about maintaining large gardens (Coleman et al., 2016). Suitable gardening solutions, such as landscaping solutions and irrigation systems to reduce maintenance, may facilitate age-friendly environments. Given that most older people experience a sense of connection to their homes (Coleman & Wiles, 2020; Glass & Vander Plaats, 2013), practical support for gardening or access to parks and gardens within walking distance can support the development of healthy ageing cities.

6.5 Limitations

There were several limitations in this study which should be acknowledged. Participants were recruited through a variety of methods and the use of convenience sampling may have influenced the results as the population was not representative of the general population. Most of the participants were living in metropolitan areas and were of high socio-economic status. These conditions may differ from those in

other countries and other older populations. Further research should include participants with lower socio-economic status and living in rural or remote areas.

The results may be influenced by various interpretation of the questions. For instance, some participants indicated that some questions were ambiguous. For example, 'Is the home largely clutter free?' depended on the person's definition of clutter. Some of our participants lived in the same house (e.g. spouse or family relative), and although assessments were completed independently and without consultation between cohabitants, there was a risk of bias. Finally, had our sample size been larger, our confidence intervals may have been narrower.

6.6 Conclusion

In conclusion, older people were able to self-assess their own homes using a digital health tool. The purpose of the digital tool was to enable people to start thinking about future housing decisions. This study showed that while agreement levels were generally high, older people and occupational therapists may still have different views on the safety of home environments. In particular, the steps, toilet, bathroom, and backyard were areas subject to different perspectives. Following this research, the digital tool will be modified slightly to address questions that had a higher level of disagreement. Attempts will also be made to reduce the ambiguity of some questions. Tools which identify potential problems and generate solutions are likely to be of value to support future housing decisions as our population ages.

CHAPTER 7   DISCUSSION AND CONCLUSION

This chapter offers a comprehensive summary of the principal outcomes from the suite of studies carried out in this thesis, while also emphasising the original contributions to existing knowledge. Furthermore, the chapter delineates the practical implications, future research directions and recommendations. Strengths and limitations are identified.

7.1 Summary of findings

Overall, the research presented in this thesis found that older adults prefer to reside in their homes for as long as possible, and seek attractive, secure and accessible housing that enables them to do so. To adequately address the needs of an ageing population, a proactive rather than a reactive approach to housing is essential. This involves encouraging individuals to consider and prepare for future housing needs in a timely manner. The desire for more convenient access to credible information, such as through digital health tools that offer insights into ageing in place and various housing options that support this, is becoming increasingly prevalent.

In Chapter 2, I presented a meta-synthesis on what 'home' means to middle-aged and older adults, and to determine the factors that were important in making decisions about their future housing.

In Chapter 3, I presented a qualitative study on the views of middle-aged/older adults and individuals with older relatives on home safety, ageing in place and housing accessibility.

In Chapter 4, I presented a prospective cohort study that examined existing potential household hazards for healthy older adults and the adjustments that may be necessary for age-friendly housing.

In Chapter 5, I presented a study to evaluate the validity of a digital self-assessment tool for home environments by examining whether older people could accurately assess their own homes using the tool and arrive at similar results as those derived from an occupational therapist home assessment.

In addition to the discussion presented in each chapter, the main findings are discussed below.

7.1.1 Older people have a complex relationship with their home

The meta-synthesis (presented in Chapter 3) comprised qualitative data from 46 papers and found multiple factors that influence the housing decisions of middle- and older-aged people. Financial resources, societal stigma, emotional attachment to one's residence, familial and community bonds, and aesthetic preferences play a significant role. This makes the relationship between an ageing person and their home a highly individualised and complex matter, as each factor varies greatly from one person to another based on different resources, experiences and needs. For ageing adults, the relationship with their home goes

beyond the physical characteristics of their house. Over time, middle- and older-aged adults transform their homes into highly personalised spaces comprising valued belongings which reflect their distinctive personalities, experiences and preferences. To ensure that older adults can age in place comfortably, it is important to consider their preferences and needs when designing and planning 'age-friendly' homes.

Involving older adults in designing suitable and desirable age-friendly homes and neighbourhoods not only enables them opportunities to remain in their own homes while receiving the necessary support but also ensures their independence, autonomy and participation in the community as they age. Ageing adults want to grow older in familiar surroundings which are close to friends and support networks that they have established. Enabling this preference may also support older people wishing to die at home rather than being forced to move to care facilities before they are ready or against their desires. Moving house can be disruptive and distressing, especially for older individuals who are forced to do so suddenly due to a medical crisis, with little time to prepare. To support their wish to reside at home and advocate independence in future housing arrangements, it is crucial for society to take a proactive stance. The number of papers included in this meta-synthesis (n=46) demonstrates that this is an often-studied area of research and suggests that the findings are robust. However, much work is required to ensure adequate supply of suitable housing for Australia's ageing population (Productivity Commission, 2015). This work is presented in Chapter 3 of this thesis.

7.1.2   Moving from a reactive to a proactive approach to support our ageing population

Most middle-aged and older adults prefer to reside in their homes for as long as possible, particularly with respect to being receptive to making alterations to their living space to facilitate ageing in place, as presented in Chapter 4. They also acknowledge the importance of planning for future housing requirements as they age, and considering the potential environmental hazards associated with physical and biological changes that may occur during the ageing process, which could hinder their ability to age in place.

Middle-aged and older individuals recognise the potential need for home modifications in their current residence, such as grab rails, or the possibility of downsizing in the future. These individuals have also reported a scarcity of information pertaining to ageing in place. Middle-aged and older adults need more information on accessing services and education about ageing in place, particularly regarding home modifications, alternative housing options and ways to age safely in their own homes.

As middle-aged and older adults age, they desire innovative solutions that provide aesthetically appealing, accessible, connected and secure homes. Other than relocation or the installation of home modifications to support ageing in place, there are limited housing choices or options for the ageing population. The existing housing stock is largely inadequate to meet the requirements of the ageing population, causing older adults

to move or modify their current homes to suit their evolving needs as they grow older (Commonwealth of Australia, 2023b; Das et al., 2022). Additionally, there are limited financial resources available for older adults who wish to renovate or modify their homes to enhance their independence, safety and comfort. The research presented in Chapter 4 demonstrates that older adults who intend to age in place often lack the necessary information to accurately assess safety risks which in turn hinders their ability to make improvements to address these risks. Older adults want more information on how to maintain independence at home, modify their living spaces, and explore affordable housing options at any stage in their lives. Providing older adults with affordable options to downsize or pursue early housing planning (i.e., seek cost-effective modifications and maintenance) from their current homes could present a proactive solution to address their housing needs as they age and this obvious gap in age-friendly housing options.

At present, the approach to housing for older people tends to be a reactive one, leading to housing issues that could have been averted or reduced. For example, some older adults tend to delay changes to their homes until they have experienced a crisis, such as a fall or a fractured hip, which subsequently increases the need for home modifications or relocation (Bailey et al., 2019). Some older individuals may want to alter their housing arrangements in advance but lack the necessary resources, knowledge and support to do so proactively. The housing requirements of individuals vary with age and ability and can also be influenced by their unique characteristics and the complexity of their home environment. The specific needs of each person change with age and health status, for example, some middle-aged adults may experience sudden health crises, such as a stroke (Australian Institute of Health and Welfare, 2023d). While it is acknowledged that not everyone will be able to adopt this proactive approach, innovative tools which support a proactive approach to ageing in place are essential for those who are able and wish to act proactively. The use of tools is necessary in these instances to help identify potential issues early on as individuals age, allowing for adjustments to be incorporated into their future housing plans whilst enhancing home safety. Overall, innovative tools can collectively empower a proactive approach to ageing in place by addressing health, safety social and environmental factors, allowing individuals to maintain their independence while receiving the necessary support.

7.1.3   With the right tools, the public can self-assess suitability for ageing in place

Several approaches have been devised to encourage people to pay closer attention to their health, but progress has been limited and varies among individuals. While some are highly proactive in managing their well-being, others are relatively passive (Gaffney & Hamiduzzaman, 2022). It is essential to recognise the extent to which individuals can take charge of their own healthcare and what it means to be a self-empowered person who can actively contribute to their own well-being and assume a proactive role in shaping their future health (Hibbard & Gilburt, 2014). The concept of encouraging individuals to play an active role in managing their own health is referred to as patient activation, which is a behavioural

approach (Hibbard & Gilburt, 2014). This approach aims to assist people in managing their own health and ageing in place. Similarly, the Health Belief Model posits that perceiving the advantages of taking action to modify behaviour is of paramount importance. In other words, if ageing adults acknowledge the possible dangers that may impede their ability to age in place, they are more likely to embark on a proactive path and adopt healthy behaviours.People who exhibit high levels of patient activation are those who comprehend their part in the care process and believe they can effectively carry it out (Hibbard & Gilburt, 2014). For instance, individuals who are aware of the age-related changes that may impact their ability to age in place may be more proactively engaged in adopting healthy behaviours and making home modifications to enable them to continue living in their own homes. According to research conducted by Hibbard and Cunningham (2008), approximately 25-40% of the population exhibit low levels of patient activation due to factors such as limited confidence in their ability to improve their health, feelings of being overwhelmed by the task of managing their health, inadequate problem-solving skills, avoiding thinking about their health, and insufficient knowledge to effectively manage their health. Therefore, people, particularly the ageing population. need to be provided with the tools to support patient activation and ageing in place. Individuals who take a desire to prepare themselves for the future typically seek user-friendly resources that enable them to age in place, such as digital health tools that are convenient and straightforward to use.

To maintain their independence and increase patient activation and their perceived benefits of behavioural change, individuals, particularly those who are ageing, require supportive tools that assist them in their own homes at any stage. Many middle-aged and older adults have expressed a strong desire to acquire innovate tools that can enhance their understanding of the various options available for ageing in place. Home safety self-assessments in the form of digital health tools can be used to initiate a proactive approach and increase patient activation. This allows for the ageing population to assess their own homes, prompting changes to be made earlier, rather than later.

The employment of a home environment self-assessment tool would empower ageing adults to evaluate potential risk factors in their own homes, fostering self-efficacy and the motivation to make changes and initiate modifications to improve safety and accessibility. Moreover, this approach would allow them to evaluate and enhance other aspects of their home to create a more age-friendly living environment, such as ensuring sufficient lighting. Self-assessment tools could therefore increase patient activation through engagement in age-friendly education, preventive interventions and healthy behaviours. The key aspect is that it enables older individuals to not only determine their own beliefs about their ability to manage ageing, but also to assess the likelihood of putting these beliefs into action.

7.2 Similarity of findings to other research

The findings presented in this thesis are largely in agreement with other research findings. For instance, Bigonnesse and Chaudhury's scoping review (2020) explored various literature on ageing in place to guide future ageing in place programs and interventions (Bigonnesse & Chaudhury, 2020). Their scoping review also revealed that the concept of home is complex and multifaceted as it encompasses a diverse array of meanings and interpretations among individuals and groups (Bigonnesse & Chaudhury, 2020). Their findings were consistent with the meta-synthesis as they also revealed that the ageing population tends to have strong emotional meanings, connections and attachments to their homes formed over an extended time (Bigonnesse & Chaudhury, 2020). The meta-synthesis presented in Chapter 3 expands on the results of this scoping review as it delves into the significance of 'home' for ageing adults while also stressing the necessity of involving middle-aged adults. Although the meta-synthesis examines a smaller number of papers, it is more current and employs a specific strategy that not only focuses on ageing in place but also identifies the critical factors involved in designing and planning age-friendly housing for all ageing adults, thereby contributing to the advancement of the field. Meanwhile quantitative research conducted by Samuel et al. (2019) involving 13,840 completed surveys in the United States between 2012 and 2014 showed that older adults facing financial difficulties may not have the means to obtain secure, high-quality and stable housing. Financial constraints could also affect their ability to remain at home as they may not be able to modify their living environment to accommodate their physical limitations (Samuel et al., 2019). As is similarly explored in the meta-synthesis and quantitative study in Chapter 4, financial resources and the costs to install modifications could also affect their ability to age at home. These studies have made significant contributions to the field by identifying effective strategies that facilitate ageing in place and enable individuals to age comfortably in their homes. This information is particularly valuable for planners and policymakers who are committed to creating affordable and age-friendly housing solutions.

As far back as 15 years ago, Bookman (2008) suggested that, given the significance of the relationship between older individuals and their homes, the approach to urban planning must be transformed, and one way to achieve this is by involving older people in the planning process. The significance of comprehending the requirements of middle-aged and older individuals by consulting this cohort about their experiences with their homes is emphasised in this thesis. There has been a significant increase in the number of reviews and examinations conducted on the age-friendliness of local plans and policies, particularly in Europe, Canada and Australia (Buffel et al., 2020; Liu et al., 2023; Menec & Brown, 2022). The literature on this topic is increasing but there is still a lack of literature specifically on age-friendly planning that involves community consultation. Neville et al.'s (2021) qualitative study in New Zealand, involving 24 interviews, found a lack of community voice among older adults who have lived in their communities for significant periods of time and possess valuable insights into the facilities and opportunities necessary to create age-friendly environments. This thesis highlights the importance of age-friendly local planning and emphasises

that it can only be effective when the ageing population is engaged and included through a proactive and constructive approach to address their needs as they age.

Other studies have similarly found that the current approach to housing for older people tends to be reactive rather than proactive. Zhou et al. (2020) suggested that the focus of housing adaptation services in the UK is still on addressing immediate needs rather than anticipating future requirements. Zhou et al. (2020) highlighted the prolonged wait times for occupational therapy assessments, as well as for funding and installation of home adaptations. To address this issue, the authors recommended that local authorities take a proactive approach to reduce waiting times for occupational therapy assessments (Zhou et al., 2020). Similarly, the Australian Royal commission reported that the model of care for the current aged care system has largely been reactive and not geared towards people's enablement and does not maximise their maintenance or improvement in health, particularly for housing (Royal Commission into Aged Care Quality and Safety, 2021). The Australian Royal Commission has acknowledged that the current system falls short in addressing the needs and experiences of older individuals, and there is a lack of proactive or preventive measures to support their care and desire for a good quality of life while ageing at home (Royal Commission into Aged Care Quality and Safety, 2021). Therefore, it is strongly recommended that strategies such as creating age-friendly communities that allow individuals to continue living in their homes for a longer period be implemented.

Calls for age-friendly housing alternatives have been made by experts in various countries such as England, Denmark and New Zealand (Carroll et al., 2020; Lorraine James & Saville-Smith, 2018; Robinson et al., 2020). Robinson et al. (2020) highlights the importance of providing suitable accommodation for older individuals in England that is both flexible and adaptable to facilitate an optimal living environment and encourage independent living as their needs change as they age. According to Robinson et al. (2020), it is crucial to establish a 'flexible regime' that offers a wide range of housing options for older individuals to avoid forcing them to make a choice between remaining in their current situation and seeking or resorting to residential care. In Demark, the importance of outdoor spaces is stressed by Carroll et al. (2020) when designing age-friendly neighbourhoods and housing. The reason for this is that social interactions are typically conducted in outdoor settings, which is an important aspect for ageing adults. Whilst in New Zealand, Lorraine James and Saville-Smith (2018) emphasised the need for assessment and planning tools that can help older individuals prepare and assess their homes, manage home repairs and maintenance, and ensure the safety of their living spaces.

This research has introduced the use of a digital self-assessment tool to assess the home environment. Development and evaluation of digital health tools for older people to manage their health and care is booming as it has been used for electronic prescribing, telehealth and telemedicine, mobile health (such as use of cognitive apps, wellness apps), wearable devices (fitness trackers and monitors), robotics or artificial

intelligence (Australian Institute of Health and Welfare, 2022b). Digital health tools have the potential to help healthcare users stay informed and empowered to take charge of their own health and care (Abernethy et al., 2022). Furthermore, they can enhance the efficiency and speed of retrieving healthcare users' data and information, and provide immediate assistance for making better clinical decisions and ensuring patient safety (Australian Institute of Health and Welfare, 2022b). By doing so, it potentially helps reduce overall expenses and boost productivity among healthcare workers. Recent evidence affirms that digital health tools can allow older adults to maintain independence, improve well-being and support healthy ageing (Chen et al., 2023; Ienca et al., 2021). Qualitative research by Ienca et al. (2021) found that older people have positive attitudes towards digital tools and feel they could improve their safety and autonomy.

The percentage of older individuals using technology and the internet has increased significantly (Poli et al., 2019). However, a substantial portion of this demographic are still not digitally literate or experienced in using digital technology (Poli et al., 2019). The way older adults embrace digital health technologies depends on their technological proficiency and familiarity, which consequently impacts their self-efficacy (Poli et al., 2019). It has been observed that those with greater Information and Communication Technology (ICT) knowledge demonstrate higher self-efficacy and fewer privacy concerns, but there is no association with perceived usefulness and intention (Jokisch et al., 2022). According to Whitelaw et al. (2021) and Mathews et al. (2019), digital health tools still have implications, as many digital health tools have not yet been tested and validated with users. This research demonstrates the validity of a digital home self-assessment tool developed with input from older individuals, which sets it apart as a unique and innovative contribution in this field. The digital home self-assessment tool used in this thesis is consistent with the results of Kim et al. (2022) which suggest that in-home monitoring technologies can help people age in place through the development innovative home modification approaches or unique age-friendly housing solutions. By employing this technology, older adults can adopt a proactive stance towards their health rather than a reactive one. This enables them to receive early intervention following the early detection of any health issue (Kim et al., 2022).

7.3 Advancing the field

The results of the meta-synthesis provide a comprehensive overview of factors relating to housing and is the first meta-synthesis of its kind to explore up-to-date evidence on the factors and drivers of continuing to reside at home for not only older adults but also middle-aged adults. The meta-analysis is notable for being the first to identify the crucial aspects that older adults should consider when making decisions about their future housing arrangements, as well as the significance of 'home' for healthy ageing individuals without disabilities or age-related illnesses. These findings can be utilised to inform age-friendly housing solutions for ageing individuals. These factors are crucial for planners and policymakers to consider,

ensuring that housing is adapted to meet individuals' evolving needs while fostering continued community involvement. Importantly, the meta-synthesis has revealed the significance of collaborating with older adults to make more knowledgeable decisions about housing choices that align with their lifestyle and emotional attachment to their home.

The qualitative work presented in Chapter 4 provides an understanding of people's current views and planning processes. This can be employed to gain insight into distinct perspectives and requirements, enabling potential policymakers, architects, interior designers, urban planners, builders, family members with older relatives and caregivers to develop tailored housing solutions that cater to individual needs and enhance the ability to age in place while promoting accessibility. As policies and guidelines for age-friendly communities and homes are developed by governments and organisations, these perspectives need to be taken into account to create policies that better align with the actual needs and desires of the ageing population. Moreover, gaining insights into the perspectives and priorities surrounding home safety and accessibility can enable future architects and construction professionals to design living spaces that are not only aesthetically appealing, but also practical and accommodating of the changing needs of individuals as they age. This knowledge can also facilitate the proactive and early decision-making process, reducing the likelihood of being forced into unfavourable circumstances due to unforeseen events. This empowers people to have greater control over their living situation, and promote a more comfortable and secure ageing experience.

The digital health tool presented in Chapters 5 and 6 is one of the first of its kind to be tested with older people, with results that compared the assessments of older people with those of an occupational therapist. The findings showed that older people are capable of utilising digital health tools effectively to assess their homes and detect potential risks that may arise as they age in their current residence. Beyond identifying the potential risks present in their homes, individuals were also able to come up with effective strategies, including making minor changes to their living spaces, to ensure the comfort and safety in their own homes. The next step in this research is to assess whether completion of the tool results in families taking action to improve the age-friendliness of their homes and to understand how the tool can be translated into clinical/industry practice. For instance, the tool may be used through GPs to encourage this proactive approach to health management. The key benefit of this tool is that it empowers older adults to monitor changes in their living situation over time, allowing GPs to intervene early with those who may be at risk of moving if they do not make the necessary modifications to their homes. By doing so, older adults can adjust their living environment and lifestyle early and as needed. Additionally, the digital tool allows users, their family members and GPs to set and track progress towards age-friendly decisions/turning points as they age, promoting greater awareness and independence. Tools that cater to family members with older relatives may offer reassurance by delivering consistent updates or providing insights into their

thoughts about ageing in place, enabling them to comprehend their older relatives' requirements more effectively and offer suitable support.

The digital health tool can be used as an initial step to support ageing in place, enabling local councils and other authorities to make more informed decisions about future housing plans proactively, rather than reacting to a crisis. The employment of this tool, in Australia for example, could serve as the initial step after a thorough evaluation performed by the Aged Care Assessment Team (ACAT) to establish the requirements of older individuals for home care packages or interim care solutions. Utilising the tool immediately following an ACAT assessment may help older individuals to prepare their homes before waiting for an occupational therapy assessment which may be delayed due to extended wait times. By implementing simple home modifications early, individuals can potentially avoid lengthy hospital stays in the future. This would not only lead to cost savings for the healthcare system but could also improve the quality of life for the ageing population.

7.4   Strengths and limitations

This thesis includes four studies along with explanations of the strengths and limitations of each study. One of the strengths of the systematic review presented in Chapter 3 was that it included many studies from a wide range of journals. This enabled inclusion of research conducted in a variety of fields and from different perspectives which enabled a thorough comprehension of the concept of 'home' among middle-aged and older individuals as well as a comprehensive understanding of future housing plans. For example, it was possible to consider housing from the perspectives of researchers in architectural design as well as those in health research. The review included a large number of studies which enabled comprehensive mapping of factors. A limitation was that the topic was quite broad resulting in some potentially relevant studies being missed based on the selected search strategies. Papers which were not in English were excluded, thereby excluding the perspectives of middle-aged and older adults from countries where English is not the primary language. Furthermore, it is possible that the viewpoints of the participants were shaped by unidentified variables such as cognitive decline or chronic ailments.

The qualitative findings presented in Chapter 4 confirmed that older adults and family members with older relatives in South Australia were open to receiving education on home safety and potential adaptations and modifications. Qualitative work enables exploration of personal experiences, leading to a deeper understanding of the ways in which individuals or groups formulate or interpret concepts and choices. However, this work was impacted by social gathering restrictions due to the COVID pandemic, and interviews had to be conducted over the phone which may have missed non-verbal communication or cues, including facial expressions, gestures or body language. Conducting phone interviews can potentially restrict the opportunity for a more in-depth and personal connection between the researcher and participant, making it difficult to establish the same level of rapport that would be possible in a face-to-face

interaction. The sample size used in the study was small and consisted only of participants who were part of an online research panel. This limitation is due to the absence of diverse recruitment methods and cultures.

The results of the cohort study presented in Chapter 5 showed that there are common risks faced by healthy older adults that may necessitate adjustments to ageing in place, particularly in relation to the bathroom, toilet, and backyard areas. This highlighted the importance of age-friendly housing and proactive planning for ageing in place when addressing potential risks in the homes of older individuals. This highlights the need for further education and pre-planning to ensure a safe and comfortable living environment as people age. The study's limitation was that most participants were recruited by convenience sampling and shared similar levels of social advantage, which made the results less diverse. For example, the participants were mainly of higher socioeconomic status and lived in the metropolitan areas, excluding those who living in rural areas and with different ethnicities, cultures, values and beliefs. The use of such methods may have biased the results rendering them not accurately representing the difficulties and realities experienced by individuals from diverse socioeconomic backgrounds.

One limitation of this study is that although an average of 23 actions or improvements were recommended to older participants (section 5.4.1), the likelihood of individuals implementing these changes in their homes may depend on their individual attitudes and resources. For example, it remains uncertain whether they will install and use grabrails. Previous studies indicate that altering one's behavior is a difficult undertaking, as it involves more than simply possessing knowledge, beliefs, attitudes, and motivation (Hughes et al., 2022). As a result, it would be beneficial to investigate this further and determine its implications for both adults and healthcare professionals in helping individuals modify their living environments. According to Hughes et al. (2022), behaviour change can be influenced by factors such as a person's beliefs, knowledge, habits, constraints, networks, self-efficacy, physical and social environments, and brain chemistry. Wilkie et al. (2018) highlight the possibility that older individuals may encounter obstacles in their built or social environments that hinder behaviour change. Therefore, Hughes et al. (2022) recommends interdisciplinary discussions among researchers, clinicians, policymakers, and older adults to achieve and maintain behaviour change in older individuals. This also relates to the findings found in Chapter 3, where the importance of collaboration with middle-aged and older adults to develop age-friendly homes may result in people living in their homes longer. The agreement (validation) study presented in Chapter 6 confirmed that older people can self-assess their own homes using a digital health tool to identify problems and generate solutions to support their future housing needs. Validating a digital health tool is crucial for determining its dependability and accuracy in producing consistent and reproducible results. By comparing its outcomes to an assessment conducted by an occupational therapist, the tool can demonstrate its practical usefulness and relevance in real-world scenarios. This process of examining its validity in real situations is essential to ensure that the tool is effective and reliable to support

ageing individuals. However, some significant limitations can arise from relying on convenience sampling which restricts the scope of the research to a particular group and hinders the ability to draw conclusions that can be applied more broadly. Moreover, the results may have been impacted by variations in the interpretation of the questions in the digital tool. For example, certain questions may have been ambiguous or unclear for different participants, making it difficult for them to comprehend and understand the intended meaning. When participants interpret questions differently, the results may not accurately represent the broader population, which can negatively impact the external validity of the study. The participants could have answer 'yes' to the question 'is the bed at a comfortable height for access and rise from?' based solely on comfort, rather than their ability to transfer easily from the bed as they age.

The results of the systematic review presented in Chapter 3 have further validated the application of the PEO model in this thesis, demonstrating that the interplay between the person, environment, and occupation is essential when examining ageing in place. The present thesis has concentrated principally on the environment; while giving relatively less consideration to the person and occupation and this should be acknowledged as a limitation. With regards to occupation, the self-assessment tool was designed to ensure that the entire home was accessible, allowing individuals to carry out their daily activities with ease. However, the tool primarily focused on the home environment, rather than the individual's specific needs. It was primarily intended for use by healthy older adults, as those with more complex requirements would necessitate the expertise of an occupational therapist to fully comprehend their personal goals and limitations. This thesis has primarily focused on safety, accessibility, falls risk and the home environment; however, it's crucial to consider housing and health more comprehensively as individuals age within a society. In addition, it's essential to recognise, at a societal level, the significance of viewing ageing, housing, and health as the fundamental resources and support necessary to lead a healthy and active life. The World Health Organization (2023) emphasises the importance of access to healthcare, safe housing, and supportive communities as being critical for the health and well-being of all individuals. As we age, if environments do not remain sustainable, our functional ability may decline, preventing us from engaging in the activities we value (World Health Organization, 2023). Therefore, fostering healthy and meaningful ageing requires action in the health, and housing sectors. Overall, this research has demonstrated an extensive understanding of ageing in place strategies, employing numerous research methods to convey effective approaches for supporting the ageing population in remaining in their homes. Despite the limitations, the research provides useful insights and planning strategies that can help create age-friendly homes through a proactive and early decision-making approach, for example, by using a digital health tool.

7.5   Implication for practice

The results of this study have significant implications for practitioners in occupational therapy. Rather than exclusively depending on occupational therapy home assessments when necessary, considering the current

workforce shortages (Australian Goverment, 2023), the digital self-assessment tool employed in this research could be potentially integrated into practice through GPs and local councils, or disseminated through community events and groups. By making this tool accessible to medical clinics and healthcare professionals, it may be possible to reduce some of the workload currently experienced by occupational therapists and provide alternative avenues for older people who wish to address home hazards. This could allow people to begin addressing their simpler needs, while leaving resources such as occupational therapy assessments for individuals with more complex requirements. Expanding access to this resource could help promote widespread education on home safety for the ageing population who may face challenges due to limited awareness, restricted access to information, and the rapid onset of age-related changes. Allowing the older population to take charge of their own healthcare may give them greater control over their well-being, increase their awareness of their health status, and empower them to plan for future needs.

Access to digital tools may also empower older people and enable improved ability to self-manage their health needs. According to Lette et al. (2017), older individuals generally prefer self-sufficiency and may not always be able or inclined to foresee future requirements. This tool can be provided in both hard copy and digital form to cater to individuals who may prefer conventional formats over digital technology, and thus allow them to actively participate in their own ageing in place. To make the process more accessible, affordable and family-oriented, families with older members can opt to complete a home self-assessment on their behalf. This approach allows older individuals to communicate their concerns or potential future needs that they might not be aware of, thereby promoting better communication and understanding within the family unit.

Occupational therapists can play a significant role in making homes and communities more age-friendly. Occupational therapists may advocate for an ageing population by collaborating with policymakers in the health, aged care and housing sectors to ensure that older individuals have access to environmental modifications through approved housing policies. They can also collaborate with local councils, urban and town planners to design new community and/or environmental spaces. Likewise, occupational therapists could work with designers and manufacturers develop stylish assistive devices and modifications that appeal to older individuals rather than those that appear too clinical or hospital-like. Although such products are currently available in the market, they are yet to become the standard. To develop housing and communities suitable for older individuals, it is crucial to consider their specific needs and preferences through consultation. Furthermore, it is crucial to comprehend the intricacies of the concept of 'home' to address the evolving requirements of people as they age.

Introducing older adults to different housing options can be achieved by providing them with current information. Alternative residential care or co-housing options may be explored to address the difficulties faced by individuals who wish to age in place (Tually et al., 2022). As people age, they may encounter

limitations when downsizing their homes within their current neighbourhood, as described in the meta-analysis (chapter 3). The findings of the meta-analysis could therefore be used by relevant groups such as town planners and local councils to ensure acceptability, availability and relevance of housing alternatives. In fact, local councils in South Australia and Adelaide, like the City of Unley, are pioneering new innovative and flexible housing options. The City of Unley is in the process of designing co-housing homes specifically for older individuals with the aim of improving adaptability, accessibility and storage for the preservation of cherished memories accumulated over time (Madigan, 2020). In addition, these homes feature both private and public spaces to foster connections with others. The construction of a greater variety of affordable housing options could offer ageing adults the opportunity to continue living in their homes as they age, thereby fostering a more inclusive and equitable society (Madigan, 2020).

7.6   Implications for research

While I identified a significant body of literature regarding older people, more research is needed into those in middle age. Future research on the middle-aged population, for instance, would be highly valuable, particularly as this is the age at which some start to think about retirement plans, downsizing, renovation plans and healthy ageing. As indicated by Solhi et al. (2022b), it is essential for middle-aged individuals to plan for interventions that encompass all dimensions starting before the onset of old age. Exploring ways to enhance the safety of middle-aged individuals as they age by providing them with the necessary information and knowledge to make informed decisions on future planning could prove beneficial in reducing the risk of injuries and accidents.

Other than middle-aged people, further research on those who live in lower socio-economic areas, rural areas and remote homes would be valuable. According to Hayes et al. (2023), access to occupational therapy, information and healthcare has had limited focus, giving rise to people in these areas having higher mortality, morbidity and disability rates. The reach of the digital tool employed in this study could be extended to additional areas and in doing so to determine whether older people in those regions also consider housing plans as they age. Exploring additional ways to enhance home safety by conducting a self-assessment of one's own residence could be advantageous for older individuals, regardless of their location. Adopting this approach can facilitate proactive planning and enable the identification and addressing of potential issues before they escalate into significant problems.

The objective of the self-assessment tool employed in this study was to determine its applicability as a universal tool for individuals who have not yet experienced age-related changes. Nevertheless, further investigations should be conducted with those who may already have physical and cognitive limitations. For example, the tool could be used by individuals who wish to evaluate their home prior to undergoing surgery for chronic arthritis, such as a total knee or hip replacement. Otherwise, individuals or their family

members could utilise the tool to ensure their safety at home, particularly after an early-onset dementia diagnosis. Home alterations and modifications will need to cater to the changing needs of all people over time, particularly those who may need changes sooner. Involving people of all ages in the development of innovative solutions can help create an inclusive and supportive society that caters to their unique needs and abilities at different stages of life. This tool would be particularly advantageous for middle-aged and older individuals who have yet to commence planning for their future housing requirements to age in place. Particularly, those residing in urban and rural areas might encounter difficulties in accessing occupational therapy assessments.

To ensure that the tool used in this research is universally accessible, further research should be conducted with different populations and cultures. The consideration of cultural diversity is important, as not all ageing adults live in the same way; they may have different beliefs and practices when it comes to living independently at home. For instance, in Korea, the custom of filial piety continues to play a significant role in family dynamics among the elderly population (Choi et al., 2018). Many Korean older people live with their children, some rely on their children financially, and those with poor health status tend to live with their children rather than independently (Choi et al., 2018). Similar to Solhi et al.'s (2022a) qualitative study, middle-aged individuals in Iranian societies typically lack the necessary preparation and planning for healthy ageing. Furthermore, their preparation for healthy ageing is not solely influenced by individual behavioural factors but heavily influenced by economics. The utilisation of culturally diverse self-assessment tools by older individuals would enhance their accessibility, accuracy, relevance and inclusivity. This approach encourages engagement and fosters trust, ultimately resulting in more effective and equitable healthcare interventions and support systems for older adults from various cultural backgrounds.

7.7   Implications for policy

The findings of this study have significant implications for policymakers and housing stakeholders working to enhance strategies for fostering healthy ageing within our society. As ageing adults look for new housing options, changes to funding are also required so that they can access funding for home modifications or alterations, or when the need for relocation is required. Typically, older adults seek funding for these modifications only after a substantial change occurs in their functional abilities. Furthermore, if older people require extensive modifications to their homes due to severe physical or medical impairments, the cost of these modifications can present a considerable obstacle, which only adds to their existing difficulties. The process of installing modifications can also be time-consuming. For those who want to install modifications early in their ageing process but lack the means to do so, involving family members in this process can be helpful, rather than exacerbating the loss of independence within their own homes. Financial support and practical solutions to reduce installation time should be provided to independent individuals who aspire to enhance their homes and have not yet been diagnosed with age-related health

issues or impairments. Based on the findings of the Royal Commission into Aged Care Quality and Safety (2021), the Australian government intends to investigate this matter by implementing innovative measures that seek to offer cost-effective housing options.

The growing cost of housing and its projected increase in the future has led to an increased demand for affordable and age-appropriate housing initiatives, which local governments should take the lead in developing. For instance, the Office for the Ageing and the Government of South Australia (2019) is currently in the process of using a co-design that enables ageing adults to be involved in policy development of age-friendly housing designs. Furthermore, the Office for Ageing (OFTA) have led a 90-day project working with older Housing SA tenants to build and explore age-friendly social housing models for South Australia (Government of South Australia, 2021). Conversations with older people in the community have revealed similar findings to the meta-analysis (Chapter 3) and qualitative study (Chapter 4) in this thesis, as they also perceived that connection to community, security and personal space were important factors to consider when designing age-friendly homes and communities (Figure 7.1). Ensuring that older adults have access to adaptable and convenient support systems is essential for policymakers to acknowledge, given that their abilities and preferences may diminish as they grow older. This includes allocating funding to support their activities of independent daily living tasks (IADLs), such as home support services for domestic and transport assistance for people with changing needs over time. Better access to support can build resilience and the ability to navigate through significant life changes, such as retirement and health decline, while striving to age in their current residence.

Figure 7.1: Perspectives of older people on housing design

Noted. **Sourced from Government of South Australia (2019)**

Policymakers and stakeholders also need to consider not only housing design but community planning. The World Health Organization's principles of age-friendly housing (2020a) highlight the significance of accessibility at all stages of life. In some urban settings, however, ageing may be impeded by various obstacles, such as narrow uneven sidewalks that pose potential risks for individuals, a lack of resting areas and insufficient green spaces due to increasing pollution levels. The promotion of inclusive community planning is therefore crucial, particularly ensuring that infrastructure such as sidewalks, public transportation and buildings are accessible to individuals with mobility challenges. This includes the implementation of measures to ensure that these resources are accessible and usable by all individuals, regardless of their physical abilities. Ensuring a secure environment for every stage of life can help individuals feel safe and comfortable in their communities, leading to a more inclusive and equitable society.

7.8   Conclusion

Ageing adults have a strong desire to remain independent in their own homes. Supporting ageing in place involves the need for more consideration of the needs and preferences of both middle-aged and older people to promote autonomy and independence, reduce isolation, and enable people to stay at home longer, thereby reducing government spending. Various factors, including stigma and financial limitations, play a significant role in shaping the housing decisions made by elderly individuals. These findings reinforce the need to consider how relocation or home alterations can be a positive experience by ensuring that new housing is safe and aesthetically pleasing. Consequently, it is essential to pay more attention to these factors rather than focusing solely on the physical characteristics of the home.

The results show that some older individuals hold positive views about their future housing options, whereas others elect to wait for a crisis to transpire and are hesitant to recognise the necessity for home modifications. Effective solutions are necessary for individuals who wish to make prompt decisions regarding housing, undertake home renovations or downsize. The importance of solutions, such as access to educational resources and information about home safety, including home modifications, was evident in this research. Gaining access to educational resources or tools from individuals of influence, such as family members who are trusted or healthcare providers, may facilitate early decision-making. In addition, making this education accessible to the public through channels such as general practitioners, hardware stores and local councils may be valuable. It may be possible to raise awareness and give individual the opportunities to assess their homes to help them consider their plans for ageing in place.

The results emphasise the importance of including family members of older individuals in the development of strategies for successful ageing by through discussions around housing decisions. The primary support system for ageing individuals frequently consists of family members. The participation of family members ensures a support network that offers emotional, physical and logistical assistance, as needed. Therefore, family members can play a crucial role in advocacy and long-term planning by addressing legal, financial and healthcare concerns, thereby ensuring a comprehensive approach to successful ageing in place.

Greater access to affordable and accessible age-friendly environments and housing, as recommended by the World Health Organization (2021a)**,** can enable people to continue to be involved in the occupations they enjoy despite a decline in capacity. Educating people as they age is required to promote age-friendly housing and to enable them to proactively plan for ageing in place. This study revealed that older adults typically encounter common home hazards that may require modifications in the future. Therefore, engaging with communities early to establish age-friendly environments that enable individuals to continue participating in activities they enjoy, even as their functional abilities change, is important. Using proactive measures, such as digital self-assessment tools, to tackle environmental challenges that older adults may encounter in the future may be one way of creating solutions that can enhance the age friendliness of the environment. In this research I demonstrated that older people can evaluate their own home and the information generated is similar to that generated by an occupational therapist performing the same assessment. By providing practical guidance and support, these tools empower individuals to make informed decisions that can enhance their quality of life as they age, allowing them to remain in their homes for longer periods.

REFERENCES

Abernethy, A., Adams, L., Barrett, M., Bechtel, C., Brennan, P., Butte, A., Faulkner, J., Fontaine, E., Friedhoff, S., Halamka, J., Howell, M., Johnson, K., Long, P., McGraw, D., Miller, R., Lee, P., Perlin, J., Rucker, D., Sandy, L., . . . Valdes, K. (2022). The Promise of Digital Health: Then, Now, and the Future. *NAM Perspect*, *2022*. https://doi.org/10.31478/202206e

Aclan, R., George, S., Block, H., Lane, R., & Laver, K. (2023). Middle aged and older adult's perspectives of their own home environment: a review of qualitative studies and meta-synthesis. *BMC Geriatrics*, *23*(1), 707. https://doi.org/10.1186/s12877-023-04279-1

Aclan, R., George, S., & Laver, K. (2023a). Common home hazards among healthy older aged adults and potential modifications required for age-friendly housing. *Australian Occupational Therapy Journal*. https://doi.org/10.1111/1440-1630.12918

Aclan, R., George, S., & Laver, K. (2023b). Considering the home environment and planning for the future: A qualitative exploration of the views of older adults and individuals with older relatives. *Scandinavian Journal of Occupational Therapy*, 1-13. https://doi.org/https://doi.org/10.1080/11038128.2023.2192027

Aclan, R., George, S., & Laver, K. (2023c). A Digital Tool for the Self-Assessment of Homes to Increase Age-Friendliness: Validity Study. *JMIR Aging*, *6*, e49500. https://doi.org/10.2196/49500

Aged Care Workforce Stategy Taskforce. (2018). *A Matter of Care: Australia's Aged Care Workforce Stategy* https://www.health.gov.au/resources/publications/a-matter-of-care-australias-aged-care-workforce-strategy?language=en

Ainsworth, E., Aplin, T., de Jonge, D., & Bennett, S. (2022). Understanding home modification outcomes from the perspective of older people and people with a disability: informing home modification evaluation. *Disability and Rehabilitation*, 1-10. https://doi.org/10.1080/09638288.2022.2146765

Ali, N., & Kumar, S. (2022). Assessing the physical needs and Creating a Barrier Free Environment at Home for the Person with Challenging Conditions and Elderly. *International journal of convergence in healthcare*, *2*(2), 8-16. https://doi.org/https://doi.org/10.55487/ijcih.v2i2.28

Almevall, A. D., Nordmark, S., Niklasson, J., & Zingmark, K. (2022). Experiences of home as an aspect of well-being in people over 80 years: A mixed method study. *Journal of Advanced Nursing*, *78*(1), 252-263. https://doi.org/https://doi.org/10.1111/jan.15093

Alpert, P. T. (2017). Self-perception of social isolation and loneliness in older adults. *Home Health Care Management & Practice*, *29*(4), 249-252. https://doi.org/https://doi.org/10.1177/1084822317728265

Anzai, T., Sy, M. P., & Bontje, P. (2023). Potential roles of occupational therapists in urban planning for age-friendly environments: A Q-methodology. *Scandinavian Journal of Occupational Therapy*, 1-15. https://doi.org/10.1080/11038128.2023.2170913

Aplin, T., Canagasuriam, S., Petersen, M., & Gustafsson, L. (2020). The experience of home for social housing tenants with a disability: security and connection but limited control. *Housing and Society*, *47*(1), 63-79. https://doi.org/ https://doi.org/10.1080/08882746.2019.1697606

Aplin, T., de Jonge, D., & Gustafsson, L. (2013). Understanding the dimensions of home that impact on home modification decision making. *Australian Occupational Therapy Journal*, *60*(2), 101-109. https://doi.org/10.1111/1440-1630.12022

Aplin, T., Jonge, D., & Gustafsson, L. (2015). Understanding home modifications impact on clients and their family's experience of home: A qualitative study. *Australian Occupational Therapy Journal*, *62*(2), 123-131. https://doi.org/10.1111/1440-1630.12156

Aromataris, E., Munn, Z., & (Editors). (2020). *JBI Manual for Evidence Synthesis* (JBI, Ed.) https://synthesismanual.jbi.global. https://doi.org/10.46658/JBIMES-20-01

Atkin, M. (2021). *Home care package waiting lists slammed as a 'critical failure' as families forced to wait*. Australian Broadcasting Corporation. Retrieved 1/3/2022 from https://www.abc.net.au/news/2021-02-02/home-care-package-wait-list-funding-aged-care-royal-commission/13100080#:~:text=In%20Australia%2C%20there%20are%20almost,of%20care%20is%2028%20months

Atwal, A., Mcintyre, A., Craik, C., & Hunt, J. (2007). Older adults and carers' perceptions of pre-discharge occupational therapy home visits in acute care. *Age and ageing*, *37*(1), 72-76. https://doi.org/https://doi.org/10.1093/ageing/afm137

Atwal, A., Spiliotopoulou, G., Stradden, J., Fellows, V., Anako, E., Robinson, L., & McIntyre, A. (2014). Factors influencing occupational therapy home visit practice: A qualitative study. *Scandinavian Journal of Occupational Therapy*, *21*(1), 40-47. https://doi.org/10.3109/11038128.2013.821162

Australian Bureau of Statistics. (2018a). *Census of Population and Housing: Socio-Economic Indexes for Areas (SEIFA), Australia, 2016*. Retrieved 30/11/2022 from abs.gov.au/ausstats/abs@.nsf/Lookup/by%20Subject/2033.0.55.001~2016~Main%20Features~IRSD%20Interactive%20Map~15

Australian Bureau of Statistics. (2018b). *Disability, Ageing and Carers, Australia: Summary of Findings*. ABS. https://www.abs.gov.au/statistics/health/disability/disability-ageing-and-carers-australia-summary-findings/latest-release

Australian Bureau of Statistics. (2020a). *Retirement and Retirement Intentions, Australia*. Retrieved 8/5/2021 from https://www.abs.gov.au/statistics/labour/employment-and-unemployment/retirement-and-retirement-intentions-australia/latest-release#key-statistics

Australian Bureau of Statistics. (2020b). *Twenty years of population change*. Retrieved 17/12/2021 from https://www.abs.gov.au/articles/twenty-years-population-change

Australian Bureau of Statistics. (2021). *Snapshot of Australia*. Retrieved 17/12/2021 from https://www.abs.gov.au/statistics/people/people-and-communities/snapshot-australia/2021#data-download

Australian Competition & Consumer Commission. (2024). *Retirement villages* Retrieved 26/3/2024 from https://www.accc.gov.au/consumers/specific-products-and-activities/retirement-villages

Australian Digital Health Agency. (2023). *Safe, seamless and secure: evolving health and care to meet the needs of modern Australia.* A. Goverment. https://www.digitalhealth.gov.au/sites/default/files/2020-11/Australia%27s%20National%20Digital%20Health%20Strategy%20-%20Safe%2C%20seamless%20and%20secure.pdf

Australian Goverment. (2023). *Skills Priority List* Retrieved 25/1/2024 from https://www.jobsandskills.gov.au/data/skills-priority-list?code=252411

Australian Housing and Urban Research Institute. (2023). *What is the difference between social housing and affordable housing - and why do they matter?* Retrieved 14/08/2024 from https://www.ahuri.edu.au/analysis/brief/what-difference-between-social-housing-and-affordable-housing-and-why-do-they-matter

Australian Human Rights Commission. (2010). *Age Discrimination – exposing the hidden barrier for mature age workers*. Retrieved 14/5/2022 from https://humanrights.gov.au/our-work/age-discrimination/publications/age-discrimination-exposing-hidden-barrier-mature-age#fn6

Australian Institute of Health and Welfare. (2018). *Older Australia at a glance*. AIHW. Retrieved 11/3/2021 from https://www.aihw.gov.au/reports/older-people/older-australia-at-a-glance/contents/summary

Australian Institute of Health and Welfare. (2021a). *Housing and living arrangements* Retrieved 1/2/2022 from https://www.aihw.gov.au/reports/older-people/older-australians/contents/housing-and-living-arrangements

Australian Institute of Health and Welfare. (2021b). *Older Australians*. Retrieved 1/2/2022 from https://www.aihw.gov.au/reports/older-people/older-australians

Australian institute of Health and Welfare. (2022a). *People with disability in Australia*. Retrieved 31/10/2023 from https://www.aihw.gov.au/reports/disability/people-with-disability-in-australia/contents/about

Australian Institute of Health and Welfare. (2022b). *What is digital health?* Retrieved 9/1/2024 from https://aihw.gov.au/reports/australias-health/digital-health

Australian Institute of Health and Welfare. (2023a). *Chronic conditions and multimorbidity*. Retrieved 18/10/2023 from https://www.aihw.gov.au/reports/australias-health/chronic-conditions-and-multimorbidity

Australian Institute of Health and Welfare. (2023b). *Deaths in Australia*. Retrieved 16/7/2023 from https://www.aihw.gov.au/reports/life-expectancy-death/deaths-in-australia/contents/life-expectancy

Australian Institute of Health and Welfare. (2023c). *Health status and functioning*. Retrieved 4/1/2024 from https://www.aihw.gov.au/reports/older-people/older-australians/contents/health/health-status-and-functioning#Life%20expectancy

Australian Institute of Health and Welfare. (2023d). *Heart, stroke and vascular disease: Australian facts*. Retrieved 4/1/2024 from https://www.aihw.gov.au/reports/heart-stroke-vascular-disease/hsvd-facts/contents/all-heart-stroke-and-vascular-disease/stroke

Australian Institute of Health and Welfare. (2023e). *People using aged care*. Retrieved 4/1/2024 from https://www.gen-agedcaredata.gov.au/Topics/People-using-aged-care

Australian Institute of Health and Welfare. (2024). *Older Australians*. Retrieved 13/08/2024 from https://www.aihw.gov.au/reports/older-people/older-australians/contents/population-groups-of-interest/indigenous-australians#Health

Avlund, K., Jepsen, E., Vass, M., & Lundemark, H. (2002). Effects of Comprehensive Follow-up Home Visits after Hospitalization on Functional Ability and Readmissions among Old Patients. A Randomized Controlled Study. *Scandinavian Journal of Occupational Therapy*, *9*(1), 17-22. https://doi.org/10.1080/110381202753505827

Bailey, C., Aitken, D., Wilson, G., Hodgson, P., Douglas, B., & Docking, R. (2019). "What? That's for Old People, that." Home Adaptations, Ageing and Stigmatisation: A Qualitative Inquiry. *International Journal of Environmental Research and Public Health*, *16*(24), 4989. https://doi.org/10.3390/ijerph16244989

Baldwin, C., Dendle, K., & McKinlay, A. (2019). Initiating Senior Co-Housing: People, Place, and Long-Term Security. *Journal of Housing For the Elderly*, *33*(4), 358-381. https://doi.org/10.1080/02763893.2019.1583152

Baron, M., Fletcher, C., & Riva, M. (2020). Aging, Health and Place from the Perspective of Elders in an Inuit Community. *Journal of Cross-Cultural Gerontology*, *35*(2), 133-153. https://doi.org/https://doi.org/10.1007/s10823-020-09398-5

Barras, S. (2005). A systematic and critical review of the literature: the effectiveness of occupational therapy home assessment on a range of outcome measures. *Australian Occupational Therapy Journal*, *52*(4), 326-336. https://doi.org/ https://doi.org/10.1111/j.1440-1630.2005.00496.x

Berg-Warman, A., & Brodsky, J. (2006). The supportive community: a new concept for enhancing the quality of life of elderly living in the community. *Journal of Aging & Social Policy*, *18*(2), 69-83. https://doi.org/https://doi.org/10.1300/J031v18n02_05

Bergland, A., & Slettebø, Å. (2018). Older Women's Experience Of Everyday Life In Old Age: Past, Present And Future. *Physical & Occupational Therapy in Geriatrics*, *36*(2/3), 279-296. https://doi.org/10.1080/02703181.2018.1508169

Bigonnesse, C., Beaulieu, M., & 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*(4), 357-382. https://doi.org/10.1080/02763893.2014.930367

Bigonnesse, C., & Chaudhury, H. (2020). The Landscape of "Aging in Place" in Gerontology Literature: Emergence, Theoretical Perspectives, and Influencing Factors. *Journal of Aging and Environment*, *34*(3), 233-251. https://doi.org/10.1080/02763893.2019.1638875

Black, K., Dobbs, D., & Young, T. L. (2015). Aging in community: mobilizing a new paradigm of older adults as a core social resource [Research Support, Non-U.S. Gov't]. *Journal of Applied Gerontology*, *34*(2), 219-243. https://doi.org/https://doi.org/10.1177/0733464812463984

Board, M., & McCormack, B. (2018). Exploring the meaning of home and its implications for the care of older people. *Journal of Clinical Nursing*, *27*(15-16), 3070-3080. https://doi.org/https://doi.org/10.1111/jocn.14495

Bodenheimer, T., Lorig, K., Holman, H., & Grumbach, K. (2002). Patient self-management of chronic disease in primary care. *JAMA*, *288*(19), 2469-2475. https://doi.org/10.1001/jama.288.19.2469

Bookman, A. (2008). Innovative models of aging in place: Transforming our communities for an aging population. *Community, Work & Family*, *11*(4), 419-438. https://doi.org/https://doi.org/10.1080/13668800802362334

Bosch-Farre, C., Malagon-Aguilera, M. C., Ballester-Ferrando, D., Bertran-Noguer, C., Bonmati-Tomas, A., Gelabert-Vilella, S., & Juvinya-Canal, D. (2020). Healthy Ageing in Place: Enablers and Barriers from the Perspective of the Elderly. A Qualitative Study. *International Journal of Environmental Research & Public Health 17*(18), 04. https://doi.org/https://doi.org/10.3390/ijerph17186451

Braun, V., & Clarke, V. (2019). Reflecting on reflexive thematic analysis. *Qualitative Research in Sport, Exercise and Health*, *11*(4), 589-597. https://doi.org/10.1080/2159676x.2019.1628806

Braun, V., & Clarke, V. (2020a). Can I use TA? Should I use TA? Should I not use TA? Comparing reflexive thematic analysis and other pattern-based qualitative analytic approaches. *Counselling and Psychotherapy Research*, *21*(1), 37-47. https://doi.org/https://doi.org/10.1002/capr.12360

Braun, V., & Clarke, V. (2020b). One size fits all? What counts as quality practice in (reflexive) thematic analysis? *Qualitative Research in Psychology*, *18*(3), 328-352. https://doi.org/10.1080/14780887.2020.1769238

Breeden, L. E. (2016). Occupational Therapy Home Safety Intervention via Telehealth. *International journal of telerehabilitation*, *8*(1), 29-40. https://doi.org/https://doi.org/10.5195/ijt.2016.6183

Brim, B., Fromhold, S., & Blaney, S. (2021). Older Adults' Self-Reported Barriers to Aging in Place. *Journal of Applied Gerontology*, 1678-1686. https://doi.org/https://doi.org/10.1177/0733464820988800

Broderick, J. P., Adeoye, O., & Elm, J. (2017). Evolution of the Modified Rankin Scale and Its Use in Future Stroke Trials. *Stroke*, *48*(7), 2007-2012. https://doi.org/10.1161/strokeaha.117.017866

Buffel, T., Rémillard-Boilard, S., Walsh, K., McDonald, B., Smetcoren, A.-S., & De Donder, L. (2020). Age-friendly approaches and old-age exclusion: A cross-city analysis. *International Journal of Ageing and Later Life*, *14*(2), 89-117. https://doi.org/https://doi.org/10.3384/ijal.1652-8670.1470

Burgess, G., & Quinio, V. (2021). Unpicking the downsizing discourse: understanding the housing moves made by older people in England. *Housing Studies*, *36*(8), 1177-1192. https://doi.org/10.1080/02673037.2020.1754346

Carrington, M., & Shahidul Islam, M. (2022). The Use of Telehealth to Perform Occupational Therapy Home Assessments: An Integrative Literature Review. *Occupational Therapy in Health Care*, 1-16. https://doi.org/10.1080/07380577.2022.2056779

Carroll, S., Jespersen, A. P., & Troelsen, J. (2020). Going along with older people: exploring age-friendly neighbourhood design through their lens. *Journal of Housing and the Built Environment*, *35*(2), 555-572. https://doi.org/10.1007/s10901-019-09700-z

Chau, H.-W., & Jamei, E. (2021). Age-Friendly Built Environment. *Encyclopedia*, *1*(3), 781-791. https://doi.org/10.3390/encyclopedia1030060

Cheek, J., Ballantyne, A., Byers, L., & Quan, J. (2007). From retirement village to residential aged care: what older people and their families say. *Health & Social Care in the Community*, *15*(1), 8-17. https://doi.org/https://doi.org/10.1111/j.1365-2524.2006.00646.x

Chen, C., Ding, S., & Wang, J. (2023). Digital health for aging populations. *Nature Medicine*, *29*(7), 1623-1630. https://doi.org/10.1038/s41591-023-02391-8

Cheng, Z., Nielsen, I., & Cutler, H. (2019). Perceived job quality, work-life interference and intention to stay: Evidence from the aged care workforce in Australia. *International Journal of Manpower*. https://doi.org/ https://doi.org/10.1108/IJM-08-2017-0208

Choi, J. S. (2004). Evaluation of community planning and life of senior cohousing projects in northern European countries. *European Planning Studies*, *12*(8), 1189-1216. https://doi.org/10.1080/0965431042000289296

Choi, Y., Kwon, Y.-H., & Kim, J. (2018). The effect of the social networks of the elderly on housing choice in Korea. *Habitat International*, *74*, 1-8. https://doi.org/https://doi.org/10.1016/j.habitatint.2018.02.003

Chui, E. (2008). Ageing in Place in Hong Kong—Challenges and Opportunities in a Capitalist Chinese City. *Ageing International*, *32*(3), 167-182. https://doi.org/10.1007/s12126-008-9015-2

Clarivate Analytics. (2021). *Endnote X9.3.3.* https://endnote.com/?_ga=2.268551096.890425446.1619582231-1605498152.1619582231

Clemson, L., Donaldson, A., Hill, K., & Day, L. (2014). Implementing person-environment approaches to prevent falls: a qualitative inquiry in applying the Westmead approach to occupational therapy home visits. *Australian Occupational Therapy Journal*, *61*(5), 325-334. https://doi.org/10.1111/1440-1630.12132

Clemson, L., Fitzgerald, M. H., Heard, R., & Cumming, R. G. (1999). Inter-Rater Reliability of a Home Fall Hazards Assessment Tool. *The Occupational therapy journal of research*, *19*(2), 83-98. https://doi.org/10.1177/153944929901900201

Clemson, L., Stark, S., Pighills, A. C., Fairhall, N. J., Lamb, S. E., Ali, J., & Sherrington, C. (2023). Environmental interventions for preventing falls in older people living in the community. *Cochrane Database of Systematic Reviews*, *2023*(3), CD013258–CD013258. https://doi.org/10.1002/14651858.CD013258.pub2

Clemson, L., Stark, S., Pighills, A. C., Torgerson, D. J., Sherrington, C., & Lamb, S. E. (2019). Environmental interventions for preventing falls in older people living in the community. *The Cochrane Database of Systematic Reviews*, *2019*(2). https://doi.org/https://doi.org/10.1002/14651858.CD013258

Coleman, T., Kearns, R. A., & Wiles, J. (2016). Older adults' experiences of home maintenance issues and opportunities to maintain ageing in place. *Housing Studies*, *31*(8), 964-983. https://doi.org/10.1080/02673037.2016.1164834

Coleman, T., & Wiles, J. (2020). Being With Objects of Meaning: Cherished Possessions and Opportunities to Maintain Aging in Place. *Gerontologist*, *60*(1), 41-49. https://doi.org/10.1093/geront/gny142

Commonwealth of Australia. (2023a). *Help at home*. Retrieved 22/7/2023 from https://www.myagedcare.gov.au/help-at-home

Commonwealth of Australia. (2023b). *Intergenerational Report 2023 Australia's future to 2063*. https://treasury.gov.au/publication/2023-intergenerational-report

Corcoran, G., Bernard, P., Kenna, L., Malone, A., Horgan, F., O'Brien, C., Ward, P., Howard, W., Hogan, L., Mooney, R., & Masterson, S. (2023). "Older People Want to Be in Their Own Homes": A Service Evaluation of Patient and Carer Feedback after Pathfinder Responded to Their Emergency Calls. *Prehospital Emergency Care*, 1-9. https://doi.org/10.1080/10903127.2023.2168094

Corley, J., Okely, J. A., Taylor, A. M., Page, D., Welstead, M., Skarabela, B., Redmond, P., Cox, S. R., & Russ, T. C. (2021). Home garden use during COVID-19: Associations with physical and mental wellbeing in older adults. *Journal of Environmental Psychology*, *73*, 101545-101545. https://doi.org/https://doi.org/10.1016/j.jenvp.2020.101545

Courtin, E., & Knapp, M. (2017). Social isolation, loneliness and health in old age: a scoping review. *Health and Social care 25*(3), 799-812. https://doi.org/https://doi.org/10.1111/hsc.12311

Covidence systematic review software. (2021). Veritas Health Innovation www.covidence.org

Cox, C., & Pardasani, M. (2017). Aging and Human Rights: a Rights-Based Approach to Social Work with Older Adults. *Journal of Human Rights and Social Work*, *2*(3), 98-106. https://doi.org/10.1007/s41134-017-0037-0

Crisp, D. A., Windsor, T. D., Anstey, K. J., & Butterworth, P. (2013). Considering relocation to a retirement village: Predictors from a community sample. *Australasian Journal on Ageing*, *32*(2), 97-102. https://doi.org/https://doi.org/10.1111/j.1741-6612.2012.00618.x

Curtis, K., & Price, K. (2017). Factors that influence older people's engagement with digital health technology. *Nursing Older People*, *29*(10), 27-30. https://doi.org/https://doi.org/10.7748/nop.2017.e986

Dahlin-Ivanoff, S., Haak, M., Fänge, A., & Iwarsson, S. (2007). The multiple meaning of home as experienced by very old Swedish people. *Scandinavian Journal of Occupational Therapy*, *14*(1), 25-32. https://doi.org/10.1080/11038120601151714

Daley, T., Cristian, A., & Fitzpatrick, M. (2006). The role of occupational therapy in the care of the older adult. *Clinics in geriatric medicine*, *22*(2), 281-290. https://doi.org/https://doi.org/10.1016/j.cger.2005.12.004

Daniel, H., Oesch, P., Stuck, A. E., Born, S., Bachmann, S., & Schoenenberger, A. (2013). Evaluation of a novel photography-based home assessment protocol for identification of environmental risk factors for falls in elderly persons. *Swiss Medical Weekly*, *143*(4546), w13884–w13884. https://doi.org/https://doi.org/10.4414/smw.2013.13884

Das, M. B., Yuko, A., Chapman, T. B., & Jain, V. (2022). *Silver Hues Building Age-Ready Cities*. Retrieved from https://www.worldbank.org/en/topic/urbandevelopment/publication/age-ready-cities

Davey, J. (2006). "Ageing in place": The views of older homeowners on maintenance, renovation and adaptation. *Social Policy Journal of New Zealand*, *27*, 128-141.

Davey, J. A., de Joux, V., Nana, G., & Arcus, M. (2004). *Accommodation options for older people in Aotearoa/New Zealand*. Centre for Housing Research Christchurch.

de Jonge, D. M., Jones, A., Phillips, R., & Chung, M. (2011). Understanding the essence of home: Older people's experience of home in Australia. *Occupational Therapy International*, *18*(1), 39-47. https://doi.org/10.1002/oti.312

DeJonckheere, M., & Vaughn, L. M. (2019). Semistructured interviewing in primary care research: A balance of relationship and rigour. *Family Medicine and Community Health*, *7*(2), e000057-e000057. https://doi.org/10.1136/fmch-2018-000057

Demiris, G., Rantz, M. J., Aud, M. A., Marek, K. D., Tyrer, H. W., Skubic, M., & Hussam, A. A. (2004). Older adults' attitudes towards and perceptions of 'smart home' technologies: a pilot study. *Medical Informatics & the Internet in Medicine*, *29*(2), 87-94. https://doi.org/10.1080/14639230410001684387

Dendle, K., Miller, E., Buys, L., & Vine, D. (2021). My home in later life: A phenomenographic study of older adults' experience of home. *Journal of Aging Studies*, *57*, 100935-100935. https://doi.org/https://doi.org/10.1016/j.jaging.2021.100935

Dettori, J. R., & Norvell, D. C. (2020). Kappa and Beyond: Is There Agreement? *Global spine journal.*, *10*(4), 499-501. https://doi.org/10.1177/2192568220911648

Di Stefano, M., Stuckey, R., & Lovell, R. (2012). Promotion of safe community mobility: Challenges and opportunities for occupational therapy practice. *Australian Occupational Therapy Journal*, *59*(1), 98-102. https://doi.org/https://doi.org/10.1111/j.1440-1630.2011.00993.x

Doyle, L., McCabe, C., Keogh, B., Brady, A., & McCann, M. (2020). An overview of the qualitative descriptive design within nursing research. *Journal of Research in Nursing*, *25*(5), 443-455. https://doi.org/https://doi.org/10.1177/1744987119880234

Drisko, J. W. (2020). Qualitative research synthesis: An appreciative and critical introduction. *Qualitative Social Work*, *19*(4), 736-753. https://doi.org/https://doi.org/10.1177/1473325019848808

Dupuis-Blanchard, S., Gould, O. N., Gibbons, C., Simard, M., Éthier, S., & Villalon, L. (2015). Strategies for aging in place: The experience of language-minority seniors with loss of independence [Article]. *Global Qualitative Nursing Research*, *2015*, 1-9. https://doi.org/10.1177/2333393614565187

Faulkner, D., Verdouw, J., Cook, P., Tually, S., Liu, E., Judd, B., Barrie, H., & Coram, V. (2021). *Ageing well in public housing* (369). https://www.ahuri.edu.au/sites/default/files/documents/2021-11/AHURI-Final-Report-369-Ageing-well-in-public-housing_0.pdf

Fausset, C. B., Kelly, A. J., Rogers, W. A., & Fisk, A. D. (2011). Challenges to Aging in Place: Understanding Home Maintenance Difficulties. *Journal of Housing For the Elderly*, *25*(2), 125-141. https://doi.org/10.1080/02763893.2011.571105

Feinstein, A. R., & Cicchetti, D. V. (1990). High agreement but low Kappa: I. the problems of two paradoxes. *Journal of Clinical Epidemiology*, *43*(6), 543-549. https://doi.org/https://doi.org/10.1016/0895-4356(90)90158-L

Finlay, J., Franke, T., McKay, H., & Sims-Gould, J. (2015). Therapeutic landscapes and wellbeing in later life: Impacts of blue and green spaces for older adults. *Health & Place*, *34*, 97-106. https://doi.org/https://doi.org/10.1016/j.healthplace.2015.05.001

Finlay, J. M., Gaugler, J. E., & Kane, R. L. (2020). Ageing in the margins: expectations of and struggles for 'a good place to grow old' among low-income older Minnesotans. *Ageing & Society*, *40*(4), 759-783. https://doi.org/10.1017/S0144686X1800123X

Fjell, A., Eriksen, K. A., Hermann, M., Bostrom, A. M., & Cronfalk, S. B. (2021). Older people living at home: experiences of healthy ageing. *Primary Health Care Research & Development*, *22*, e6-e6. https://doi.org/https://doi.org/10.1017/S1463423621000049

Fjordside, S., & Morville, A. (2016). Factors influencing older people's experiences of participation in autonomous decisions concerning their daily care in their own homes: a review of the literature. *International Journal of Older People Nursing*, *11*(4), 284-297. https://doi.org/10.1111/opn.12116

Flick, U. (2022). *An introduction to qualitative research*. SAGE Publications Ltd.

Gaffney, H. J., & Hamiduzzaman, M. (2022). Factors that influence older patients' participation in clinical communication within developed country hospitals and GP clinics: A systematic review of current literature. *PLoS ONE*, *17*(6), e0269840–e0269840. https://doi.org/10.1371/journal.pone.0269840

Gagliardi, A. R., Légaré, F., Brouwers, M. C., Webster, F., Badley, E., & Straus, S. (2016). Patient-mediated knowledge translation (PKT) interventions for clinical encounters: a systematic review. *Implementation Science*, *11*(1), 26. https://doi.org/10.1186/s13012-016-0389-3

Gardner, I. L., Browning, C., & Kendig, H. (2005). Accommodation options in later life: retirement village or community living? *Australasian Journal on Ageing*, *24*(4), 188-195. https://doi.org/https://doi.org/10.1111/j.1741-6612.2005.00121.x

Garner, I. W., & Holland, C. A. (2020). Age-friendliness of living environments from the older person's viewpoint: development of the Age-Friendly Environment Assessment Tool. *Age and ageing*, *49*(2), 193-198. https://doi.org/10.1093/ageing/afz146

Gaugler, J., & Schulz, R. (2021). *Bridging the family care gap* (Vol. 5). Academic Press, an imprint of Elsevier

Gell, N. M., Brown, H., Karlsson, L., Peters, D. M., & Mroz, T. M. (2020). Bathroom modifications, clutter, and tripping hazards: prevalence and changes after incident falls in community-dwelling older adults. *Journal of Aging and Health*, *32*(10), 1636-1644. https://doi.org/https://doi.org/10.1177/0898264320949773

Genet, N., Boerma, W., Kroneman, M., Hutchinson, A., Saltman, R. B., & Organization, W. H. (2012). *Home care across Europe: current structure and future challenges*. World Health Organization. Regional Office for Europe.

Gibler, K. M., & Tyvimaa, T. (2015). Middle-Aged and Elderly Finnish Households Considering Moving, Their Preferences, and Potential Downsizing Amidst Changing Life Course and Housing Career. *Journal of Housing For the Elderly*, *29*(4), 373-395. https://doi.org/10.1080/02763893.2015.1055029

Gillespie, L. D., Robertson, M. C., Gillespie, W. J., Sherrington, C., Gates, S., Clemson, L., & Lamb, S. E. (2009). Interventions for preventing falls in older people living in the community. *Cochrane Database of Systematic Reviews*(2), CD007146–CD007146. https://doi.org/https://doi.org/10.1002/14651858.CD007146.pub2

Gillsjö, C., & Schwartz-Barcott, D. (2011). A concept analysis of home and its meaning in the lives of three older adults. *International Journal of Older People Nursing*, *6*(1), 4-12. https://doi.org/https://doi.org/10.1111/j.1748-3743.2010.00207.x

Gillsjö, C., Schwartz-Barcott, D., & von Post, I. (2011). Home: The place the older adult can not imagine living without. *BMC Geriatrics*, *11*(1), 10. https://doi.org/10.1186/1471-2318-11-10

Gitlin, L. N., Hauck, W. W., Dennis, M. P., Winter, L., Hodgson, N., & Schinfeld, S. (2009). Long-Term Effect on Mortality of a Home Intervention that Reduces Functional Difficulties in Older Adults: Results from a Randomized Trial. *Journal of the American Geriatrics Society*, *57*(3), 476-481. https://doi.org/https://doi.org/10.1111/j.1532-5415.2008.02147.x

Glass, A. P., & Vander Plaats, R. S. (2013). A conceptual model for aging better together intentionally. *Journal of Aging Studies*, *27*(4), 428-442. https://doi.org/https://doi.org/10.1016/j.jaging.2013.10.001

Godfrey, M., Cornwell, P., Eames, S., Hodson, T., Thomas, T., & Gillen, A. (2019). Pre-discharge home visits: A qualitative exploration of the experience of occupational therapists and multidisciplinary stakeholders. *Australian Occupational Therapy Journal*, *66*(3), 249-257. https://doi.org/10.1111/1440-1630.12561

Gould, O. N., Dupuis-Blanchard, S., Villalon, L., Simard, M., & Ethier, S. (2017). Hoping for the Best or Planning for the Future: Decision Making and Future Care Needs [Research Support, Non-U.S. Gov't]. *Journal of Applied Gerontology*, *36*(8), 953-970. https://doi.org/https://doi.org/10.1177/0733464815591213

Goverment of South Australia. (2024). *South Australia's Plan for Ageing Well 2020-2025*. Department of health and Wellbeing. https://www.sahealth.sa.gov.au/wps/wcm/connect/public+content/sa+health+internet/resources/south+australias+plan+for+ageing+well+2020-2025

Government of South Australia. (2012). *Guidelines: South Australia's Communities for All: Our Age-friendly Future: Age-friendly Neighbourhoods: Guidelines and Toolkit for Local Government*. Retrieved 14/2/22 from https://www.sahealth.sa.gov.au/wps/wcm/connect/e373ac0042a5706fa978edd8cec31b16/Age-friendlyGuidelinesLocalGovernment2012-PC-OFTA-

20131218.pdf?MOD=AJPERES&CACHEID=ROOTWORKSPACE-
e373ac0042a5706fa978edd8cec31b16-nKKlBz0

Government of South Australia. (2019). *Housing for Life: Designed for Living* Department of Health and Wellbeing. https://www.sahealth.sa.gov.au/wps/wcm/connect/public+content/sa+health+internet/resources/housing+for+life+-+designed+for+living

Government of South Australia. (2021). *Better Together: A Practical Guide to Effective Engagement with Older People*. Government of South Australia. Retrieved 22/4/2021 from https://www.sahealth.sa.gov.au/wps/wcm/connect/efc56a004efc69f1b7ccf79ea2e2f365/Better+Together+-+A+Practical+Guide+to+Effective+Engagement+with+Older+People.pdf?MOD=AJPERES&CACHEID=ROOTWORKSPACE-efc56a004efc69f1b7ccf79ea2e2f365-nwLmRMW

Grasso, A. Y., Murphy, A., & Abbott-Gaffney, C. (2023). The Impact of a Two-Visit Occupational Therapy Home Modification Model on Low-Income Older Adults. *The Open Journal of Occupational Therapy*, *11*(1), 1-9. https://doi.org/https://doi.org/10.15453/2168-6408.2047

Greenfield, E. A., & Buffel, T. (2022). Age-friendly cities and communities: Research to strengthen policy and practice. *Journal of Aging & Social Policy*, *34*(2), 161-174. https://doi.org/https://doi.org/10.1080/08959420.2022.2049573

Grimmer, K., Kay, D., Foot, J., & Pastakia, K. (2015). Consumer views about aging-in-place. *Clinical Interventions In Aging*, *10*, 1803-1811. https://doi.org/https://doi.org/10.2147/CIA.S90672

Hagsten, B., Svensson, O., & Gardulf, A. (2004). Early individualized postoperative occupational therapy training in 100 patients improves ADL after hip fracture A randomized trial. *Acta Orthopaedica Scandinavica*, *75*(2), 177-183. https://doi.org/https://doi.org/10.1080/00016470412331294435

Hammond, A. (2004). What is the role of the occupational therapist? *Best Practice & Research Clinical Rheumatology*, *18*(4), 491-505. https://doi.org/https://doi.org/10.1016/j.berh.2004.04.001

Hatcher, D., Chang, E., Schmied, V., & Garrido, S. (2019). Exploring the Perspectives of Older People on the Concept of Home. *Journal of Aging Research*, *2019*, 2679680–2679610. https://doi.org/https://doi.org/10.1155/2019/2679680

Hayes, K., Dos Santos, V., Costigan, M., & Morante, D. (2023). Profile of occupational therapy services in non-urban settings: A global scoping review. *Australian Occupational Therapy Journal*, *70*(1), 119-141.

Hendriks, M. R., Bleijlevens, M. H., Van Haastregt, J. C., Crebolder, H. F., Diederiks, J. P., Evers, S. M., Mulder, W. J., Kempen, G. I., Van Rossum, E., & Ruijgrok, J. M. (2008). Lack of effectiveness of a multidisciplinary fall-prevention program in elderly people at risk: A randomized, controlled trial. *Journal of the American Geriatrics Society*, *56*(8), 1390-1397. https://doi.org/https://doi.org/10.1111/1440-1630.12835

Hibbard, J., & Gilburt, H. (2014). *An introduction to patient activation*. T. K. s. Fund. https://www.kingsfund.org.uk/sites/default/files/field/field_publication_file/supporting-people-manage-health-patient-activation-may14.pdf

Hibbard, J. H., & Cunningham, P. J. (2008). *How engaged are consumers in their health and health care, and why does it matter?* (Vol. 8). Center for Studying Health System Change Washington, DC.

Hibbard, J. H., & Greene, J. (2013). What the evidence shows about patient activation: better health outcomes and care experiences; fewer data on costs. *Health Affairs*, *32*(2), 207-214. https://doi.org/https://doi.org/10.1377/hlthaff.2012.1061

Hoffmann, T., & Russell, T. (2008). Pre-admission orthopaedic occupational therapy home visits conducted using the Internet. *Journal of Telemedicine & Telecare*, *14*(2), 83-87. https://doi.org/10.1258/jtt.2007.070808

Hong, A., Sallis, J. F., King, A. C., Conway, T. L., Saelens, B., Cain, K. L., Fox, E. H., & Frank, L. D. (2018). Linking green space to neighborhood social capital in older adults: The role of perceived safety. *Social Science & Medicine*, *207*, 38-45. https://doi.org/https://doi.org/10.1016/j.socscimed.2018.04.051

Horowitz, B. P., Almonte, T., & Vasil, A. (2016). Use of the Home Safety Self-Assessment Tool (HSSAT) within Community Health Education to Improve Home Safety. *Occupational Therapy in Health Care*, *30*(4), 356-372. https://doi.org/10.1080/07380577.2016.1191695

Horowitz, B. P., Nochajski, S. M., & Schweitzer, J. A. (2013). Occupational Therapy Community Practice and Home Assessments: Use of the Home Safety Self-Assessment Tool (HSSAT) to Support Aging in Place. *Occupational Therapy in Health Care*, *27*(3), 216-227. https://doi.org/10.3109/07380577.2013.807450

Hoy, J., Twigg, V., & Pearson, E. (2008). Occupational Therapy Home Assessments: More than Just a Visit? An Audit of Occupational Therapy Practice in Oncology and Palliative Care. *British Journal of Occupational Therapy*, *71*(2), 59-63. https://doi.org/10.1177/030802260807100204

Huang, T. T., & Acton, G. J. (2004). Effectiveness of home visit falls prevention strategy for Taiwanese community-dwelling elders: Randomized trial. *Public Health Nursing*, *21*(3), 247-256. https://doi.org/https://doi.org/10.1111/j.0737-1209.2004.21307.x

Hughes, J. M., Brown, R. T., Fanning, J., Raj, M., Bisson, A., Ghneim, M., & Kritchevsky, S. B. (2022). Achieving and sustaining behavior change for older adults: A Research Centers Collaborative Network workshop report. *Gerontologist*, *63*(8), 1268-1278. https://doi.org/10.1093/geront/gnac173

Hugo, G. (2003). Australia's ageing population. *Australian Planner*, *40*(2), 109-118. https://doi.org/10.1080/07293682.2003.9995264

Hutchings, B. L., Olsen, R. V., & Moulton, H. J. (2008). Environmental evaluations and modifications to support aging at home with a developmental disability. *Journal of Housing For the Elderly*, *22*(4), 286-310. https://doi.org/10.1080/02763890802458445

Hwang, E., Cummings, L., Sixsmith, A., & Sixsmith, J. (2011). Impacts of Home Modifications on Aging-in-Place. *Journal of Housing For the Elderly*, *25*(3), 246-257. https://doi.org/10.1080/02763893.2011.595611

IBM Corp. (2021). *IBM SPSS Statistics for Windows*. In

Ienca, M., Schneble, C., Kressig, R. W., & Wangmo, T. (2021). Digital health interventions for healthy ageing: a qualitative user evaluation and ethical assessment. *BMC Geriatr*, *21*(1), 412. https://doi.org/10.1186/s12877-021-02338-z

Ivanoff, S. D., Iwarsson, S., & Sonn, U. (2006). Occupational therapy research on assistive technology and physical environmental issues: A literature review. *Canadian Journal of Occupational Therapy*, *73*(2), 109-119. https://doi.org/https://doi.org/10.1177/000841740607300203

Iwarsson, S. (1999). The Housing Enabler: An Objective Tool for Assessing Accessibility. *British Journal of Occupational Therapy*, *62*(11), 491-497. https://doi.org/10.1177/030802269906201104

Iwarsson, S., Haak, M., & Slaug, B. (2012). Current Developments of the Housing Enabler Methodology. *British Journal of Occupational Therapy*, *75*(11), 517-521. https://doi.org/10.4276/030802212X13522194759978

Johansson, A., & Björklund, A. (2016). The impact of occupational therapy and lifestyle interventions on older persons' health, well-being, and occupational adaptation. *Scandinavian Journal of Occupational Therapy*, *23*(3), 207-219. https://doi.org/10.3109/11038128.2015.1093544

Jokisch, M. R., Schmidt, L. I., & Doh, M. (2022). Acceptance of digital health services among older adults: Findings on perceived usefulness, self-efficacy, privacy concerns, ICT knowledge, and support seeking. *Frontiers in Public Health*, *10*, 1073756–1073756. https://doi.org/https://doi.org/10.3389/fpubh.2022.1073756

Jolanki, O. H. (2021). Senior Housing as a Living Environment That Supports Well-Being in Old Age. *Frontiers in Public Health*, *8*, 589371. https://doi.org/https://doi.org/10.3389/fpubh.2020.589371

Judd, B., Olsberg, D., Quinn, J., Groenhart, L., & Demirbilek, O. (2010). *Dwelling, land and neighbourhood use by older home owners*.

Juvani, S., Isola, A., & Kyngäs, H. (2005). The northern physical environment and the well-being of the elderly aged over 65 years. *International Journal of Circumpolar Health*, *64*(3), 246-256. https://doi.org/10.3402/ijch.v64i3.17988

Kallio, H., Pietila, A. M., Johnson, M., & Kangasniemi, M. (2016). Systematic methodological review: developing a framework for a qualitative semi-structured interview guide. *Journal of Advanced Nursing*, *72*(12), 2954-2965. https://doi.org/10.1111/jan.13031

Keglovits, M., Clemson, L., Hu, Y.-L., Nguyen, A., Neff, A. J., Mandelbaum, C., Hudson, M., Williams, R., Silianoff, T., & Stark, S. (2020). A scoping review of fall hazards in the homes of older adults and

development of a framework for assessment and intervention. *Australian Occupational Therapy Journal*, *67*(5), 470-478. https://doi.org/https://doi.org/10.1111/1440-1630.12682

Keglovits, M., & Stark, S. (2020). Home Modifications to Improve Function and Safety in the United States. *Journal of Aging and Environment*, *34*(2), 110-125. https://doi.org/10.1080/26892618.2020.1743510

Kendig, H., Clemson, L., & Mackenzie, L. (2012). Older people: well-being, housing and neighbourhoods. *International Encyclopedia of housing and home 5*. https://doi.org/10.1016/B978-0-08-047163-1.00018-7

Kendig, H., Elias, A.-M., Matwijiw, P., & Anstey, K. (2014). Developing Age-Friendly Cities and Communities in Australia. *Journal of Aging and Health*, *26*(8), 1390-1414. https://doi.org/10.1177/0898264314532687

Kim, D., Bian, H., Chang, C. K., Dong, L., & Margrett, J. (2022). In-Home Monitoring Technology for Aging in Place: Scoping Review. *Interact J Med Res*, *11*(2), e39005. https://doi.org/https://doi.org/10.2196/39005

Kim, H., Sefcik, J. S., & Bradway, C. (2017). Characteristics of qualitative descriptive studies: A systematic review. *Research in Nursing & Health*, *40*(1), 23-42. https://doi.org/10.1002/nur.21768

Kimberlin, C. L., & Winterstein, A. G. (2008). Validity and reliability of measurement instruments used in research. *American Journal of Health-System Pharmacy*, *65*(23), 2276-2284.

Klimova, B., & Poulova, P. (2018). Older People and Technology Acceptance. Human Aspects of IT for the Aged Population. Acceptance, Communication and Participation, Cham.

Knickman, J. R., & Snell, E. K. (2002). The 2030 Problem: Caring for Aging Baby Boomers. *Health Services Research*, *37*(4), 849-884. https://doi.org/https://doi.org/10.1034/j.1600-0560.2002.56.x

Kok, L., Berden, C., & Sadiraj, K. (2015). Costs and benefits of home care for the elderly versus residential care: a comparison using propensity scores. *The European Journal of Health Economics*, *16*(2), 119-131. https://doi.org/10.1007/s10198-013-0557-1

König, H.-H., Leicht, H., Brettschneider, C., Bachmann, C., Bickel, H., Fuchs, A., Jessen, F., Köhler, M., Luppa, M., Mösch, E., Pentzek, M., Werle, J., Weyerer, S., Wiese, B., Scherer, M., Maier, W., & Riedel-Heller, S. G. (2014). The Costs of Dementia From the Societal Perspective: Is Care Provided in the Community Really Cheaper than Nursing Home Care? *Journal of the American Medical Directors Association*, *15*(2), 117-126. https://doi.org/https://doi.org/10.1016/j.jamda.2013.10.003

Kramer, C., & Pfaffenbach, C. (2015). Should I stay or should I go? Housing preferences upon retirement in Germany. *Journal of Housing and the Built Environment*, *31*(2), 239-256. https://doi.org/10.1007/s10901-015-9454-5

La Grow, S., Robertson, M. C., Campbell, A. J., Clarke, G., & Kerse, N. M. (2006). Reducing hazard related falls in people 75 years and older with significant visual impairment: how did a successful program work? *Injury Prevention*, *12*(5), 296-301. https://doi.org/https://doi.org/10.1136/ip.2006.012252

Lachman, M. E. (2004). Development in midlife. *Annual Review of Psychology*, *55*(1), 305-331. https://doi.org/10.1146/annurev.psych.55.090902.141521

Lannin, N. A., Clemson, L., & McCluskey, A. (2011). Survey of current pre-discharge home visiting practices of occupational therapists. *Australian Occupational Therapy Journal*, *58*(3), 172-177. https://doi.org/https://doi.org/10.1111/j.1440-1630.2010.00911.x

Laver, K. (2023). Developing age-friendly homes in age-friendly communities. *Australian Occupational Therapy Journal*, *70*(1), 1-2. https://doi.org/https://doi.org/10.1111/1440-1630.12856

Laver, K., Davis, A., Gwilt, I., Dalistan, R., Lane, R., & Block, H. (2022). Self-assessment of the home environment to plan for successful ageing: Report from a digital health co-design workshop. *PLOS Digital Health*, *1*(7), e0000069–e0000069. https://doi.org/10.1371/journal.pdig.0000069

Law, M., Cooper, B., Strong, S., Stewart, D., Rigby, P., & Letts, L. (1996). The person-environment-occupation model: A transactive approach to occupational performance. *Canadian Journal of Occupational Therapy*, *63*(1), 9-23. https://doi.org/https://doi.org/10.1177/000841749606300103

Layton, N., Brusco, N., Callaway, L., Henley, L., & Wang, R. H. (2023). It is time for nationally equitable access to assistive technology and home modifications in Australia: An equity benchmarking study. *Australian Journal of Social Issues*. https://doi.org/https://doi.org/10.1002/ajs4.290

Lette, M., Stoop, A., Lemmens, L. C., Buist, Y., Baan, C. A., & de Bruin, S. R. (2017). Improving early detection initiatives: a qualitative study exploring perspectives of older people and professionals. *BMC Geriatr*, *17*(1), 132. https://doi.org/10.1186/s12877-017-0521-5

Lewis, C., & Buffel, T. (2020). Aging in place and the places of aging: A longitudinal study. *Journal of Aging Studies*, *54*, 100870–100870. https://doi.org/ https://doi.org/10.1016/j.jaging.2020.100870

Li, S., Hu, W., & Guo, F. (2022). Recent Relocation Patterns Among Older Adults in the United States. *Journal of the American Planning Association*, *88*(1), 15-29. https://doi.org/10.1080/01944363.2021.1902842

Lindley, S., & Wallace, J. (2015). Placing in age: Transitioning to a new home in later life. *ACM Transactions on Computer-Human Interaction*, *22*(4), 1-39. https://doi.org/https://doi.org/10.1145/2755562

Liu, E., Atkins, M. T., Chomik, R., & Judd, B. (2023). The World Health Organization's impacts on age-friendly policymaking: A case study on Australia. *Australian Journal of Social Issues*, *58*(3), 714-728. https://doi.org/https://doi.org/10.1002/ajs4.240

Lockwood, C., Munn, Z., & Porritt, K. (2015). Qualitative research synthesis: methodological guidance for systematic reviewers utilizing meta-aggregation. *International journal of evidence-based healthcare*, *13*(3), 179-187. https://doi.org/https://doi.org/10.1097/XEB.0000000000000062

Lockwood, C., Porrit, K., Munn, Z., Rittenmeyer, L., Salmond, S., Bjerrum, M., Loveday, H., Carrier, J., & Stannard, D. (2020). *Chapter 2: Systematic reviews of qualitative evidence. In: Aromataris E, Munn Z (Editors). JBI Manual for Evidence Synthesis*. JBI. https://synthesismanual.jbi.global. https://doi.org/10.46658/JBIMES-20-03

Lockwood, K., Harding, K., Boyd, J., & Taylor, N. (2020). Home visits by occupational therapists improve adherence to recommendations: Process evaluation of a randomised controlled trial. *Australian Occupational Therapy Journal*, *67*(4), 287-296. https://doi.org/https://doi.org/10.1111/1440-1630.12651

Loecker, C., Schmaderer, M., & Zimmerman, L. (2021). Frailty in Young and Middle-Aged Adults: An Integrative Review. *The Journal of Frailty & Aging*, *10*(4), 327-333. https://doi.org/10.14283/jfa.2021.14

Löfqvist, C., Tomsone, S., Iwarsson, S., Horstmann, V., & Haak, M. (2017). Changes in Home and Health over Nine Years among very Old People in Latvia - Results from the ENABLE-AGE Project. *Journal of Cross-Cultural Gerontology*, *32*(1), 17-29. https://doi.org/10.1007/s10823-016-9311-3

Lorraine James, B., & Saville-Smith, K. (2018). Designing housing decision-support tools for resilient older people. *Architectural Science Review*, *61*(5), 305-312. https://doi.org/10.1080/00038628.2018.1505597

Luciano, A., Pascale, F., Polverino, F., & Pooley, A. (2020). Measuring age-friendly housing: A framework. *Sustainability (Basel, Switzerland)*, *12*(3), 848. https://doi.org/10.3390/su12030848

Lux, M., & Sunega, P. (2014). The impact of housing tenure in supporting ageing in place: exploring the links between housing systems and housing options for the elderly. *International Journal of Housing Policy*, *14*(1), 30-55. https://doi.org/10.1080/14616718.2014.884880

Macdonald, J., McDermott, D., Woods, M., Brown, A., & Sliwka, G. (2000). A salutogenic approach to men's health: Challenging the stereotypes. 12th Australian National Health Promotion Conference, Melbourne, Australia

Mackenzie, L. (2017). Evaluation of the clinical utility of the Home Falls and Accidents Screening Tool (HOME FAST). *Disability and Rehabilitation*, *39*(15), 1489-1501. https://doi.org/10.1080/09638288.2016.1204015

Mackenzie, L., Byles, J., & Higginbotham, N. (2002). Reliability of the Home Falls and Accidents Screening Tool (HOME FAST) for identifying older people at increased risk of falls. *Disability and Rehabilitation*, *24*(5), 266-274. https://doi.org/10.1080/09638280110087089

Mackenzie, L., Curryer, C., & Byles, J. E. (2015). Narratives of home and place: Findings from the Housing and Independent Living Study. *Ageing & Society*, *35*(8), 1684-1712. https://doi.org/https://doi.org/10.1017/S0144686X14000476

Madigan, D. (2020). *Cohousing for ageing well a collborative design research project*. https://www.unley.sa.gov.au/files/assets/public/v/1/community-services/senior-services-and-support/cohousing-for-ageing-well-design-report-reduced-size-web-version-august-2020-web.pdf

Mah, J. C., Stevens, S. J., Keefe, J. M., Rockwood, K., & Andrew, M. K. (2021). Social factors influencing utilization of home care in community-dwelling older adults: a scoping review. *BMC Geriatrics*, *21*(1), 145. https://doi.org/10.1186/s12877-021-02069-1

Martin, D., Long, O., & Kessler, L. (2019). Planning for Aging in Place: Incorporating the Voice of Elders to Promote Quality of Life. *Journal of Housing For the Elderly*, *33*(4), 382-392. https://doi.org/10.1080/02763893.2019.1593280

Mathews, S. C., McShea, M. J., Hanley, C. L., Ravitz, A., Labrique, A. B., & Cohen, A. B. (2019). Digital health: a path to validation. *npj Digital Medicine*, *2*(1), 38. https://doi.org/10.1038/s41746-019-0111-3

McHugh, M. L. (2012). Interrater reliability: the kappa statistic. *Biochemia Medica*, *22*(3), 276-282. https://doi.org/https://doi.org/10.11613/bm.2012.031

Menec, V., & Brown, C. (2022). Facilitators and Barriers to Becoming Age-Friendly: A Review. *Journal of Aging & Social Policy*, *34*(2), 175-197. https://doi.org/10.1080/08959420.2018.1528116

Metzler, M. J., & Metz, G. A. (2010). Analyzing the Barriers and Supports of Knowledge Translation Using the PEO Model. *Canadian Journal of Occupational Therapy*, *77*(3), 151-158. https://doi.org/10.2182/cjot.2010.77.3.4

Miller, E., & Burton, L. O. (2023). Redesigning aged care with a biophilic lens: a call to action. *Cities & Health*, *7*(2), 260-272. https://doi.org/10.1080/23748834.2020.1772557

Miller, E. A., Livingstone, I., & Ronneberg, C. R. (2017). Media Portrayal of the Nursing Homes Sector: A Longitudinal Analysis of 51 U.S. Newspapers. *Gerontologist*, *57*(3), 487-500. https://doi.org/10.1093/geront/gnv684

Miller, E. A., Tyler, D. A., & Mor, V. (2013). National newspaper portrayal of nursing homes: tone of coverage and its correlates. *Medical Care*, *51*(1), 78-83. https://doi.org/10.1097/MLR.0b013e318270baf2

Moilanen, T., Kangasniemi, M., Papinaho, O., Mynttinen, M., Siipi, H., Suominen, S., & Suhonen, R. (2021). Older people's perceived autonomy in residential care: An integrative review. *Nursing Ethics*, *28*(3), 414-434. https://doi.org/https://doi.org/10.1177/0969733020948115

Molinsky, J., & Forsyth, A. (2018). Housing, the built environment, and the good life. *Hastings Center Report*, *48*(S3), S50-S56. https://doi.org/ https://doi.org/10.1002/hast.914

Mortenson, W. B., Sixsmith, A., & Beringer, R. (2016). No Place Like Home? Surveillance and What Home Means in Old Age. *Canadian Journal on Aging*, *35*(1), 103-114. https://doi.org/https://doi.org/10.1017/S0714980815000549

Munn, Z., Peters, M. D. J., Stern, C., Tufanaru, C., McArthur, A., & Aromataris, E. (2018). Systematic review or scoping review? Guidance for authors when choosing between a systematic or scoping review approach. *BMC medical research methodology*, *18*(1), 143. https://doi.org/10.1186/s12874-018-0611-x

Narushima, M., & Kawabata, M. (2020). "Fiercely independent": Experiences of aging in the right place of older women living alone with physical limitations. *Journal of Aging Studies*, *54*, 100875-100875. https://doi.org/10.1016/j.jaging.2020.100875

National Center for Health Statistics. (2023). *Older Persons' Health*. National Center for Health Statistics. Retrieved 15/7/2023 from https://www.cdc.gov/nchs/fastats/older-american-health.htm

Neville, S., Napier, S., Adams, J., Shannon, K., & Clair, V. W.-S. (2021). Older people's views about ageing well in a rural community. *Ageing & Society*, *41*(11), 2540-2557. https://doi.org/10.1017/S0144686X20000458

Neville, S., Napier, S., Shannon, K., & Adams, J. (2021). Beginning on an age-friendly journey: Barriers to implementing age-friendly initiatives. *Australasian Journal on Ageing*, *40*(4), e287-e293. https://doi.org/https://doi.org/10.1111/ajag.12930

Neville, S., Russell, J., Adams, J., & Jackson, D. (2016). Living in your own home and being socially connected at 95 years and beyond: a qualitative study. *Contemporary Nurse: A Journal for the Australian Nursing Profession*, *52*(2-3), 258-268. https://doi.org/10.1080/10376178.2016.1205457

Nikolaus, T., & Bach, M. (2003). Preventing Falls in Community-Dwelling Frail Older People Using a Home Intervention Team (HIT): Results From the Randomized Falls-HIT Trial. *Journal of the American Geriatrics Society*, *51*(3), 300-305. https://doi.org/https://doi.org/10.1046/j.1532-5415.2003.51102.x

Ninnis, K., Van Den Berg, M., Lannin, N. A., George, S., & Laver, K. (2018). Information and communication technology use within occupational therapy home assessments: A scoping review. *British Journal of Occupational Therapy*, *82*(3), 141-152. https://doi.org/10.1177/0308022618786928

Nix, J., & Comans, T. (2017). Home quick– Occupational therapy home visits using mHealth, to facilitate discharge from acute admission back to the community. *International journal of telerehabilitation* *9*(1), 47. https://doi.org/https://doi.org/10.5195/ijt.2017.6218

Nord, C. (2016). Free choice in residential care for older people — A philosophical reflection. *Journal of Aging Studies*, *37*, 59-68. https://doi.org/https://doi.org/10.1016/j.jaging.2016.02.003

Northcott, H. C., & Petruik, C. R. (2011). The geographic mobility of elderly Canadians. *Canadian Journal on Aging*, *30*(3), 311-322. https://doi.org/https://doi.org/10.1017/S0714980811000262

Nosraty, L., Jylha, M., Raittila, T., & Lumme-Sandt, K. (2015). Perceptions by the oldest old of successful aging, Vitality 90+ Study. *Journal of Aging Studies*, *32*, 50-58. https://doi.org/https://doi.org/10.1016/j.jaging.2015.01.002

Novek, S., & Menec, V. H. (2014). Older adults' perceptions of age-friendly communities in Canada: a photovoice study. *Ageing & Society*, *34*(6), 1052-1072. https://doi.org/10.1017/S0144686X1200150X

Occupational Therapy Australia. (2023). *What is occupational therapy* https://aboutoccupationaltherapy.com.au/

Ollevier, A., Aguiar, G., Palomino, M., & Simpelaere, I. S. (2020). How can technology support ageing in place in healthy older adults? A systematic review. *Public Health Reviews*, *41*(1), 26. https://doi.org/10.1186/s40985-020-00143-4

Ong, A. D., Uchino, B. N., & Wethington, E. (2016). Loneliness and Health in Older Adults: A Mini-Review and Synthesis. *Gerontology*, *62*(4), 443-449. https://doi.org/10.1159/000441651

Organisation for Economic Co-operation and Development. (2011). *Health at a Glance 2011: OECD indicators*. O. Publishing. https://www.oecd.org/els/health-systems/49105858.pdf

Oswald, F., & Wahl, H.-W. (2005). Dimensions of the meaning of home in later life. In In G.D Rowles & H Chaudhury (Ed.), *Home and identity in late life: International perspectives*. Springer

Oswald, F., Wahl, H.-W., Schilling, O., Nygren, C., Fänge, A., Sixsmith, A., Sixsmith, J., Szeman, Z., Tomsone, S., & Iwarsson, S. (2007). Relationships between housing and healthy aging in very old age. *The Gerontologist*, *47*(1), 96-107. https://doi.org/https://doi.org/10.1093/geront/47.1.96

Owens, O. L., Beer, J. M., Revels, A. A., & White, K. (2021). The Lived Experiences of Older Low-Income African Americans Living Alone: Implications for Aging in Place in the United States. *Journal of Aging & Environment*, *35*(1), 42-61. https://doi.org/10.1080/26892618.2020.1780662

Page, M. J., McKenzie, J. E., Bossuyt, P. M., Boutron, I., Hoffmann, T. C., Mulrow, C. D., Shamseer, L., Tetzlaff, J. M., Akl, E. A., Brennan, S. E., Chou, R., Glanville, J., Grimshaw, J. M., Hróbjartsson, A., Lalu, M. M., Li, T., Loder, E. W., Mayo-Wilson, E., McDonald, S., . . . Moher, D. (2021). The PRISMA 2020 statement: an updated guideline for reporting systematic reviews. *Systematic Reviews*, *10*(1), 89. https://doi.org/10.1186/s13643-021-01626-4

Pani-Harreman, K. E., Bours, G. J. J. W., Zander, I., Kempen, G. I. J. M., & van Duren, J. M. A. (2021). Definitions, key themes and aspects of 'ageing in place': a scoping review. *Ageing and Society*, *41*(9), 2026-2059. https://doi.org/10.1017/S0144686X20000094

Papageorgiou, N., Marquis, R., Dare, J., & Batten, R. (2016). Occupational Therapy and Occupational Participation in Community Dwelling Older Adults: A Review of the Evidence. *Physical & Occupational Therapy in Geriatrics*, *34*(1), 21-42. https://doi.org/10.3109/02703181.2015.1109014

Pardessus, V., Puisieux, F., Di Pompeo, C., Gaudefroy, C., Thevenon, A., & Dewailly, P. (2002). Benefits of Home Visits for Falls and Autonomy in the Elderly: A Randomized Trial Study. *American Journal of Physical Medicine & Rehabilitation*, *81*(4), 247-252. https://doi.org/https://doi.org/10.1097/00002060-200204000-00002

Park, J., & Porteous, J. (2019). *Age-friendly Housing*. Routledge.

Park, S., & Ko, Y. (2020). The Sociocultural Meaning of "My Place": Rural Korean Elderly People's Perspective of Aging in Place. *Asian Nursing Research*, *14*(2), 97-104. https://doi.org/10.1016/j.anr.2020.04.001

Patry, A., Vincent, C., Duval, C., & Careau, E. (2019). Psychometric properties of home accessibility assessment tools: A systematic review. *Canadian Journal of Occupational Therapy*, *86*(3), 172-184. https://doi.org/ttps://doi.org/10.1177/0008417418824731

Patterson, C. J., Viner, J., Saville, C., & Mulley, G. P. (2001). Too many pre-discharge home assessment visits for older patients? A postal questionnaire survey. *Clinical Rehabilitation*, *15*(3), 291-295. https://doi.org/10.1191/026921501671555357

Peek, S. T. M., Wouters, E. J. M., van Hoof, J., Luijkx, K. G., Boeije, H. R., & Vrijhoef, H. J. M. (2014). Factors influencing acceptance of technology for aging in place: A systematic review. *International Journal of Medical Informatics*, *83*(4), 235-248. https://doi.org/https://doi.org/10.1016/j.ijmedinf.2014.01.004

Petersen, M., Tilse, C., & Cockburn, T. (2017). Living in a Retirement Village: Choice, Contracts, and Constraints. *Journal of Housing For the Elderly*, *31*(3), 229-242. https://doi.org/10.1080/02763893.2017.1280580

Petersson, I., Kottorp, A., Bergström, J., & Lilja, M. (2009). Longitudinal changes in everyday life after home modifications for people aging with disabilities. *Scandinavian Journal of Occupational Therapy*, *16*(2), 78-87.

Phillipson, C. (2011). Developing Age-Friendly Communities: New Approaches to Growing Old in Urban Environments. In R. A. Settersten & J. L. Angel (Eds.), *Handbook of Sociology of Aging* (pp. 279-293). Springer New York. https://doi.org/10.1007/978-1-4419-7374-0_18

Pighills, A. C., Torgerson, D. J., Sheldon, T. A., Drummond, A. E., & Bland, J. M. (2011). Environmental Assessment and Modification to Prevent Falls in Older People. *Journal of the American Geriatrics Society*, *59*(1), 26-33. https://doi.org/https://doi.org/10.1111/j.1532-5415.2010.03221.x

Podgórniak-Krzykacz, A., Przywojska, J., & Wiktorowicz, J. (2020). Smart and Age-Friendly Communities in Poland. An Analysis of Institutional and Individual Conditions for a New Concept of Smart Development of Ageing Communities. *Energies*, *13*(9), 1-23. https://doi.org/10.3390/en13092268

Poli, A., Kelfve, S., & Motel-Klingebiel, A. (2019). A research tool for measuring non-participation of older people in research on digital health. *BMC Public Health*, *19*(1), 1487. https://doi.org/10.1186/s12889-019-7830-x

Potter, J. F. (2010). Aging in America: essential considerations in shaping senior care policy. *Aging Health*, *6*(3), 289-299. https://doi.org/https://doi.org/10.2217/ahe.10.25

Powell, J., Macintosh, S., Bird, E., Ige, J., Garrett, H., & Roys, M. (2017). *The role of home adaptations in improving later life* https://ageing-better.org.uk/sites/default/files/2017-12/The%20role%20of%20home%20adaptations%20in%20improving%20later%20life.pdf

Productivity Commission. (2011). *Caring for Older Australians* (Productivity Commission Inquiry Report, Issue. https://www.pc.gov.au/inquiries/completed/aged-care/report/aged-care-overview-booklet.pdf

Productivity Commission. (2013). *An Ageing Australia: Preparing for the Future* (Australian Institute of Health and Welfare, Issue. https://www.pc.gov.au/research/completed/ageing-australia#:~:text=A%20report%20by%20the%20Productivity,budgets%20of%20all%20Australian%20governments.

Productivity Commission. (2015). *Housing Decisions of Older Australians* (Productiviity Commision Research paper, Issue. https://www.pc.gov.au/research/completed/housing-decisions-older-australians

Puplampu, V., Matthews, E., Puplampu, G., Gross, M., Pathak, S., & Peters, S. (2020). The Impact of Cohousing on Older Adults' Quality of Life [Article]. *Canadian Journal on Aging*, *39*(3), 406-420. https://doi.org/10.1017/S0714980819000448

Quine, S., & Carter, S. (2006). Australian baby boomers' expectations and plans for their old age. *Australasian Journal on Ageing*, *25*(1), 3-8. https://doi.org/https://doi.org/10.1111/j.1741-6612.2006.00147.x

Ramulu, P. Y., Mihailovic, A., E, J.-Y., Miller, R. B., West, S. K., Gitlin, L. N., & Friedman, D. S. (2021). Environmental Features Contributing to Falls in Persons With Vision Impairment: The Role of Home Lighting and Home Hazards. *American Journal of Ophthalmology*, *230*, 207-215. https://doi.org/https://doi.org/10.1016/j.ajo.2021.04.022

Read, J., Jones, N., Fegan, C., Cudd, P., Simpson, E., Mazumdar, S., & Ciravegna, F. (2020). Remote Home Visit: Exploring the feasibility, acceptability and potential benefits of using digital technology to

undertake occupational therapy home assessments. *British Journal of Occupational Therapy*, *83*(10), 648-658. https://doi.org/10.1177/0308022620921111

Renaut, S., Ogg, J., Petite, S., & Chamahian, A. (2015). Home environments and adaptations in the context of ageing. *Ageing & Society*, *35*(6), 1278-1303. https://doi.org/10.1017/S0144686X14000221

Riedy, C., Wynne, L., McKenna, K., & Daly, M. (2019). "It's a Great Idea for Other People": Cohousing as a Housing Option for Older Australians. *Urban Policy and Research*, *37*(2), 227-242. https://doi.org/10.1080/08111146.2018.1531750

Robertson, L., & Blaga, L. (2013). Occupational therapy assessments used in acute physical care settings. *Scandinavian Journal of Occupational Therapy*, *20*(2), 127-135. https://doi.org/10.3109/11038128.2012.737369

Robinson, D., Green, S., & Wilson, I. (2020). Housing options for older people in a reimagined housing system: a case study from England. *International Journal of Housing Policy*, *20*(3), 344-366. https://doi.org/10.1080/19491247.2019.1644020

Robnett, R. H., Hopkins, V., & Kimball, J. G. (2002). The SAFE AT HOME: A Quick Home Safety Assessment. *Physical & Occupational Therapy in Geriatrics*, *20*(3-4), 77-101. https://doi.org/10.1080/J148v20n03_06

Roden, P. (2023). *Age-friendly home 18 features* Retrieved 26/10/23 from https://aginginplace.com/18-features-of-an-age-friendly-home/

Rogers, W. A., & Mitzner, T. L. (2017). Envisioning the future for older adults: Autonomy, health, well-being, and social connectedness with technology support. *Futures*, *87*, 133-139. https://doi.org/https://doi.org/10.1016/j.futures.2016.07.002

Royal Commission into Aged Care Quality and Safety. (2020a). *They look after you, you look after them: Community attitudes to ageing and aged care*. Australian Government Publishing Service. https://apo.org.au/sites/default/files/resource-files/2020-07/apo-nid306868.pdf

Royal Commission into Aged Care Quality and Safety. (2020b). *What Australians think of ageing and aged care*. https://agedcare.royalcommission.gov.au/sites/default/files/2020-07/research_paper_4_-_what_australians_think_of_ageing_and_aged_care.pdf

Royal Commission into Aged Care Quality and Safety. (2021). *Aged Care Royal Commission Final Report: Summary*. https://agedcare.royalcommission.gov.au/sites/default/files/2021-03/final-report-executive-summary.pdf

Rudnicka, E., Napierała, P., Podfigurna, A., Męczekalski, B., Smolarczyk, R., & Grymowicz, M. (2020). The World Health Organization (WHO) approach to healthy ageing. *Maturitas*, *139*, 6-11. https://doi.org/https://doi.org/10.1016/j.maturitas.2020.05.018

Russell, L. B., Suh, D. C., & Safford, M. M. (2005). Time requirements for diabetes self-management: Too much for many? *Journal of Family Practice*, *54*(1), 52-56.

Ryan, R. M., & Deci, E. L. (2000). Self-determination theory and the facilitation of intrinsic motivation, social development, and well-being. *American Psychologist*, *55*(1), 68-78. https://doi.org/10.1037/0003-066X.55.1.68

Saarnio, L., Boström, A. M., Gustavsson, P., & Öhlén, J. (2016). Meanings of at-homeness at end-of-life among older people. *Scandinavian Journal of Caring Sciences*, *30*(2), 312-319. https://doi.org/10.1111/scs.12246

Safran-Norton, C. E. (2010). Physical Home Environment as a Determinant of Aging in Place for Different Types of Elderly Households. *Journal of Housing For the Elderly*, *24*(2), 208-231. https://doi.org/10.1080/02763891003757494

Samuel, L. J., Szanton, S. L., Seplaki, C. L., Cudjoe, T. K. M., Thorpe, R. J., Jr., & Agree, E. M. (2019). Longitudinal and reciprocal associations between financial strain, home characteristics and mobility in the National Health and Aging Trends Study. *BMC Geriatrics*, *19*(1), 338. https://doi.org/10.1186/s12877-019-1340-7

Sandelowski, M. (2010). *What's in a Name? Qualitative Description Revisited* (Vol. 33). Research in Nursing & Health. https://doi.org/10.1002/nur.20362

Sarah, J. W., Amy, N., Peter, R., Tim, T., John, A. C., & Simon Mark, W. (2022). Experiences of telehealth in general practice in Australia: research protocol for a mixed-methods study. *BJGP Open*, *6*(1), BJGPO.2021.0187. https://doi.org/10.3399/BJGPO.2021.0187

Severinsen, C., Breheny, M., & Stephens, C. (2016). Ageing in Unsuitable Places. *Housing Studies*, *31*(6), 714-728. https://doi.org/10.1080/02673037.2015.1122175

Shankar, A., Hamer, M., McMunn, A., & Steptoe, A. (2013). Social Isolation and Loneliness: Relationships With Cognitive Function During 4 Years of Follow-up in the English Longitudinal Study of Ageing. *Psychosomatic Medicine*, *75*(2), 161-170. https://doi.org/ https://doi.org/10.1097/PSY.0b013e31827f09cd

Shaw, R., & Langman, M. (2017). Perceptions of Being Old and the Ageing Process. *Ageing International*, *42*(1), 115-135. https://doi.org/10.1007/s12126-017-9279-5

Sheppard, C. L., Kwon, C., Yau, M., Rios, J., Austen, A., & Hitzig, S. L. (2022). Aging in Place in Social Housing: A Scoping Review of Social Housing for Older Adults. *Canadian Journal on Aging* 1-11. https://doi.org/10.1017/S0714980822000125

Sherman, E., & Dacher, J. (2005). *Home and identity in late life: International perspectives* (G. Rowles & H. Chaudhury, Eds.). Springer Publishing Company.

Shin, J. H., Her-Xiong, Y., Tredinnick, R., & Ponto, K. (2021). Toward Understanding Everyday Lives of Older Adults: A Methodological Exploration. *Gerontologist*, *61*(8), 1241-1253. https://doi.org/https://doi.org/10.1093/geront/gnab045

Sim, S., Barr, C., & George, S. (2015). Comparison of equipment prescriptions in the toilet/bathroom by occupational therapists using home visits and digital photos, for patients in rehabilitation. *Australian Occupational Therapy Journal*, *62*(2), 132-140. https://doi.org/10.1111/1440-1630.12121

Sinclair, S., de Silva, A., Kopanidis, F., & Thomas, S. (2020). Housing and Ageing Well. In S. Awaworyi Churchill, L. Farrell, & S. Appau (Eds.), *Measuring, Understanding and Improving Wellbeing Among Older People* (pp. 211-236). Springer Singapore. https://doi.org/10.1007/978-981-15-2353-3_10

Sixsmith, A., & Sixsmith, J. (2008). Ageing in Place in the United Kingdom. *Ageing International*, *32*(3), 219-235. https://doi.org/10.1007/s12126-008-9019-y

Sixsmith, J., Sixsmith, A., Fänge, A. M., Naumann, D., Kucsera, C., Tomsone, S., Haak, M., Dahlin-Ivanoff, S., & Woolrych, R. (2014). Healthy ageing and home: The perspectives of very old people in five european countries. *Social Science and Medicine*, *106*, 1-9. https://doi.org/10.1016/j.socscimed.2014.01.006

Slaug, B., Chiatti, C., Oswald, F., Kaspar, R., & Schmidt, S. M. (2017). Improved housing accessibility for older people in Sweden and Germany: Short term costs and long-term gains. *International Journal of Environmental Research and Public Health*, *14*(9), 964. https://doi.org/https://doi.org/10.3390/ijerph14090964

Solhi, M., Pirouzeh, R., & Zanjari, N. (2022a). Middle-aged preparation for healthy aging: a qualitative study. *BMC Public Health*, *22*(1), 274-274. https://doi.org/10.1186/s12889-022-12715-x

Solhi, M., Pirouzeh, R., & Zanjari, N. (2022b). Perspectives on healthy aging in middle age: Evidence for health promotion interventions. *Journal of Education and Health Promotion*, *11*(1), 5-5. https://doi.org/10.4103/jehp.jehp_972_20

Standfield, L. B., Comans, T., & Scuffham, P. (2018). A simulation of dementia epidemiology and resource use in Australia. *Australian and New Zealand Journal of Public Health* *42*(3), 291-295. https://doi.org/https://doi.org/10.1111/1753-6405.12700

Stark, S. (2004). Removing environmental barriers in the homes of older adults with disabilities improves occupational performance. *OTJR: Occupation, Participation and Health*, *24*(1), 32-40. https://doi.org/https://doi.org/10.1177/153944920402400105

Stark, S., Keglovits, M., Arbesman, M., & Lieberman, D. (2017). Effect of Home Modification Interventions on the Participation of Community-Dwelling Adults With Health Conditions: A Systematic Review. *The American journal of occupational therapy : official publication of the American Occupational Therapy Association.*, *71*(2), 7102290010p7102290011-7102290010p7102290011. https://doi.org/10.5014/ajot.2017.018887

Stark, S., Landsbaum, A., Palmer, J. L., Somerville, E. K., & Morris, J. C. (2009). Client-centred home modifications improve daily activity performance of older adults. *Canadian Journal of Occupational Therapy 76*, 235-245. https://doi.org/https://doi.org/10.1177/000841740907600s09

StataCorp. (2021). *Stata Statistical Software*. In *Release 17* StaaCorp LLC.

Stav, W. B., Hallenen, T., Lane, J., & Arbesman, M. (2012). Systematic Review of Occupational Engagement and Health Outcomes Among Community-Dwelling Older Adults. *American Journal of Occupational Therapy*, *66*(3), 301-310. https://doi.org/10.5014/ajot.2012.003707

Stefaniak, J. (2020). *Needs assessment for learning and performance: Theory, process, and practice*. Routledge.

Stones, D., & Gullifer, J. (2014). 'At home it's just so much easier to be yourself': older adults' perceptions of ageing in place. *Ageing and Society*, *36*(3), 449-481. https://doi.org/10.1017/s0144686x14001214

Strong, S., Rigby, P., Stewart, D., Law, M., Letts, L., & Cooper, B. (1999). Application of the Person-Environment-Occupation Model: A practical Tool. *Canadian Journal of Occupational Therapy*, *66*(3), 122-133. https://doi.org/10.1177/000841749906600304

Struckmeyer, L. R., Campbell, N., Ellison, C., Ahrentzen, S., & Classen, S. (2022). Home modifications and repurposing: perspectives on the accessibility, affordability, and attractiveness. *Disability and Rehabilitation*, *44*(17), 4619-4628. https://doi.org/10.1080/09638288.2021.1910866

Sumsion, T., & Law, M. (2006). A review of evidence on the conceptual elements informing client-centred practice. *Canadian Journal of Occupational Therapy*, *73*(3), 153-162. https://doi.org/10.1177/000841740607300303

Szanton, S. L., Thorpe, R. J., Boyd, C., Tanner, E. K., Leff, B., Agree, E., Xue, Q.-L., Allen, J. K., Seplaki, C. L., Weiss, C. O., Guralnik, J. M., & Gitlin, L. N. (2011). Community Aging in Place, Advancing Better Living for Elders: A Bio-Behavioral-Environmental Intervention to Improve Function and Health-Related Quality of Life in Disabled Older Adults. *Journal of the American Geriatrics Society*, *59*(12), 2314-2320. https://doi.org/https://doi.org/10.1111/j.1532-5415.2011.03698.x

Tan, K. K., He, H. G., Chan, S. W., & Vehvilainen-Julkunen, K. (2015). The experience of older people living independently in Singapore. *International Nursing Review*, *62*(4), 525-535. https://doi.org/https://doi.org/10.1111/inr.12200

Tanner, B., Tilse, C., & de Jonge, D. (2008). Restoring and Sustaining Home: The Impact of Home Modifications on the Meaning of Home for Older People. *Journal of Housing For the Elderly*, *22*(3), 195-215. https://doi.org/10.1080/02763890802232048

The Joanna Briggs Institute. (2019). *The System for the Unified Management, Assessment and Review of Information (SUMARI).* Retrieved 10/4/2021 from https://www.jbisumari.org/

Thornton, G. (2014). *Property council of Australia*. Retrieved 15/4/2021 from https://www.grantthornton.com.au/globalassets/1.-member-firms/australian-website/industry/hac/pdfs/gtal_2014_hac_national-overview-of-the-retirement-village-sector.pdf

Tomita, M. R., Mann, W. C., Stanton, K., Tomita, A. D., & Sundar, V. (2007). Use of Currently Available Smart Home Technology by Frail Elders: Process and Outcomes. *Topics in Geriatric Rehabilitation*, *23*(1). https://doi.org/https://doi.org/10.1097/00013614-200701000-00005

Tomita, M. R., Saharan, S., Rajendran, S., Nochajski, S. M., & Schweitzer, J. A. (2014). Psychometrics of the Home Safety Self-Assessment Tool (HSSAT) to prevent falls in community-dwelling older adults. *The American Journal of Occupational Therapy*, *68*(6), 711-718. https://doi.org/https://doi.org/10.5014/ajot.2014.010801

Tomstad, S., Dale, B., Sundsli, K., Sævareid, H. I., & Söderhamn, U. (2017). Who often feels lonely? A cross-sectional study about loneliness and its related factors among older home-dwelling people. *International Journal of Older People Nursing*, *12*(4), e12162. https://doi.org/https://doi.org/10.1111/opn.12162

Tong, A., Sainsbury, P., & Craig, J. (2007). Consolidated criteria for reporting qualitative research (COREQ): a 32-item checklist for interviews and focus groups. *International Journal for Quality in Health Care*, *19*(6), 349-357. https://doi.org/https://doi.org/10.1093/intqhc/mzm042

Tsertsidis, A., Kolkowska, E., & Hedström, K. (2019). Factors influencing seniors' acceptance of technology for ageing in place in the post-implementation stage: A literature review. *International Journal of Medical Informatics*, *129*, 324-333. https://doi.org/https://doi.org/10.1016/j.ijmedinf.2019.06.027

Tually, S., Coram, V., Faulkner, D., Barrie, H., Sharma, A., James, A., Lowies, B., Bevin, K., Webb, E., Hodgson, H., & Cebulla, A. (2022). *Alternative housing models for precariously housed older Australians*. A. Australian Housing and Urban Research Institute Limited Melbourne.

Tufanaru, C., Munn, Z., Aromataris, E., Campbell, J., & Hopp, L. (2020). *Chapter 3: Systematic reviews of effectiveness. In: Aromataris E, Munn Z (Editors). JBI Manual for Evidence Synthesis*. JBI. https://synthesismanual.jbi.global. https://doi.org/10.46658/JBIMES-20-04

van Gaans, D., & Dent, E. (2018). Issues of accessibility to health services by older Australians: a review. *Public health reviews.*, *39*(1), 1. https://doi.org/10.1186/s40985-018-0097-4

Velligan, D. I., Diamond, P. M., Maples, N. J., Mintz, J., Li, X., Glahn, D. C., & Miller, A. L. (2008). Comparing the efficacy of interventions that use environmental supports to improve outcomes in patients with schizophrenia. *Schizophrenia Research*, *102*(1), 312-319. https://doi.org/https://doi.org/10.1016/j.schres.2008.02.005

Victor, C., Grenade, L., & Boldy, D. (2005). Measuring loneliness in later life: A comparison of differing measures. *Reviews in Clinical Gerontology*, *15*(1), 63-70. https://doi.org/https://doi.org/10.1017/S0959259805001723

Vincenzo, J. L., Patton, S. K., Lefler, L. L., McElfish, P. A., Wei, J., & Curran, G. M. (2022). Older Adults' Perceptions and Recommendations Regarding a Falls Prevention Self-Management Plan Template Based on the Health Belief Model: A Mixed-Methods Study. *International Journal of Environmental Research and Public Health 19*(4). https://doi.org/10.3390/ijerph19041938

Vrkljan, B. (2010). Facilitating Technology Use in Older Adulthood: The Person-Environment-Occupation Model Revisited. *British Journal of Occupational Therapy*, *73*(9), 396-404. https://doi.org/10.4276/030802210x12839367526011

Vrkljan, B. H., Leuty, V., & Law, M. (2011). Aging-in-place: exploring the transactional relationship between habits and participation in a community context. *OTJR: Occupation, Participation & Health*, *31*(3), 151-159. https://doi.org/10.3928/15394492-20110218-01

Wahl, H.-W., & Weisman, G. D. (2003). Environmental gerontology at the beginning of the new millennium: Reflections on its historical, empirical, and theoretical development. *The Gerontologist*, *43*(5), 616-627. https://doi.org/https://doi.org/10.1093/geront/43.5.616

Wahl, H. W., Fange, A., Oswald, F., Gitlin, L. N., & Iwarsson, S. (2009). The home environment and disability-related outcomes in aging individuals: what is the empirical evidence? *Gerontologist*, *49*(3), 355-367. https://doi.org/10.1093/geront/gnp056

Wang, S., Bolling, K., Mao, W., Reichstadt, J., Jeste, D., Kim, H.-C., & Nebeker, C. (2019). Technology to Support Aging in Place: Older Adults' Perspectives. *Healthcare*, *7*(2). https://doi.org/10.3390/healthcare7020060

Webber, R., May, V., & Lewis, C. (2022). Ageing in Place Over Time: The Making and Unmaking of Home. *Sociological Research Online*, *28*(3), 759-774. https://doi.org/10.1177/13607804221089351

Wellecke, C., D'Cruz, K., Winkler, D., Douglas, J., Goodwin, I., Davis, E., & Mulherin, P. (2022). Accessible design features and home modifications to improve physical housing accessibility: A mixed-methods survey of occupational therapists. *Disability and Health Journal*, *15*(3), 101281–101281. https://doi.org/https://doi.org/10.1016/j.dhjo.2022.101281

Whitelaw, S., Pellegrini, D. M., Mamas, M. A., Cowie, M., & Van Spall, H. G. C. (2021). Barriers and facilitators of the uptake of digital health technology in cardiovascular care: a systematic scoping review. *European Heart Journal - Digital Health*, *2*(1), 62-74. https://doi.org/10.1093/ehjdh/ztab005

Wiles, J. L., Leibing, A., Guberman, N., Reeve, J., & Allen, R. E. (2012). The meaning of "aging in place" to older people. *Gerontologist*, *52*(3), 357-366. https://doi.org/https://doi.org/10.1093/geront/gnr098

Wilkie, S., Townshend, T., Thompson, E., & Ling, J. (2018). Restructuring the built environment to change adult health behaviors: a scoping review integrated with behavior change frameworks. *Cities & Health*, *2*(2), 198-211. https://doi.org/10.1080/23748834.2019.1574954

Wongpakaran, N., Wongpakaran, T., Wedding, D., & Gwet, K. L. (2013). A comparison of Cohen's Kappa and Gwet's AC1 when calculating inter-rater reliability coefficients: a study conducted with personality disorder samples. *BMC medical research methodology*, *13*(1), 61. https://doi.org/10.1186/1471-2288-13-61

Woolrych, R., Duvurru, J., Portella, A., Sixsmith, J., Menezes, D., Fisher, J., Lawthom, R., Reddy, S., Datta, A., Chakravarty, I., Khan, A. M., Murray, M., Makita, M., Zubair, M., & Pereira, G. (2020). Ageing in Urban Neighbourhoods: Exploring Place Insideness Amongst Older Adults in India, Brazil and the

United Kingdom. *Psychology and Developing Societies*, *32*(2), 201-223. https://doi.org/10.1177/0971333620937106

Woolrych, R., Sixsmith, J., Duvvuru, J., Portella, A., Fang, M. L., Menezes, D., Henderson, J., Fisher, J., & Lawthom, R. (2022). Cross-National Perspectives on Aging and Place: Implications for Age-Friendly Cities and Communities. *The Gerontologist*, *62*(1), 119-129. https://doi.org/10.1093/geront/gnab170

World health Organization. (2002). *Active Ageing: A Policy Framework*. https://extranet.who.int/agefriendlyworld/wp-content/uploads/2014/06/WHO-Active-Ageing-Framework.pdf

World Health Organization. (2007). *Global age-friendly cities: a guide*. Retrieved 23/10/2023 from https://iris.who.int/handle/10665/43755

World Health Organization. (2010). *Ageing: Global Population*. Retrieved 3/08/2021 from https://www.who.int/news-room/q-a-detail/population-ageing

World Health Organization. (2019). *GHE: Life expectancy and healthy life expectancy*. Retrieved 3/08/2021 from https://www.who.int/data/gho/data/themes/mortality-and-global-health-estimates/ghe-life-expectancy-and-healthy-life-expectancy

World Health Organization. (2020a). *Decade of healthy ageing: baseline report*. https://www.who.int/publications/i/item/9789240017900

World Health Organization. (2020b). *UN Decade of Healthy Ageing 2021-2023*. Retrieved 3/08/2021 from https://www.who.int/initiatives/decade-of-healthy-ageing

World Health Organization. (2021a). *Age-friendly World* Retrieved 3/08/2021 from https://extranet.who.int/agefriendlyworld/age-friendly-practices/housing/

World Health Organization. (2021b). *Ageing*. Retrieved 3/8/2021 from https://www.who.int/health-topics/ageing#tab=tab_1

World Health Organization. (2021c). *Social isolation and loneliness among older people: advocacy brief*. Retrieved 3/08/2021 from https://www.who.int/publications/i/item/9789240030749

World Health Organization. (2022). *Ageing and Health*. Retrieved 3/08/2021 from https://www.who.int/news-room/fact-sheets/detail/ageing-and-health

World Health Organization. (2023). *National programmes for age-friendly cities and communities: a guide*. W. H. Organisation. https://www.who.int/publications/i/item/9789240068698

Wu, C., Lam, C. H., Xhafa, F., Tang, V., & IP, W. (2022). Building Long-Term Care Services Around the World. In *IoT for Elderly, Aging and eHealth: Quality of Life and Independent Living for the Elderly* (pp. 17-26). Springer.

Yu, J., & Rosenberg, M. W. (2017). "No place like home": Aging in post-reform Beijing. *Health & Place*, *46*, 192-200. https://doi.org/https://doi.org/10.1016/j.healthplace.2017.05.015

Zhou, W., Oyegoke, A. S., Sun, M., & Zhu, H. (2020). Older Clients' Pathway through the Adaptation System for Independent Living in the UK. *International Journal of Environmental Research and Public Health*, *17*(10). https://doi.org/10.3390/ijerph17103640

Ziebart, C., Dewan, N., Tuazon, J., & MacDermid, J. (2021). Development of the Home Fall Hazard Checklist. *Rehabilitation Research and Practice*, *2021*, 5362197–5362197. https://doi.org/https://doi.org/10.1155/2021/5362197

APPENDICES

APPENDIX A   Qualitative meta-analysis protocol

Roslyn Dalistan
Master of Science by research/ PhD candidate
College of Medicine and Public Health, Flinders University
DOI: https://doi.org/10.25957/pk90-9092

Review title

Middle aged and older adults' perspectives of their own home environment: A qualitative systematic review protocol

Authors: Roslyn Dalistan, Kate Laver

Institution: Flinders University

Review question

What are middle aged and older adults' perspective of their own home environment?

Introduction

The number of middle and older aged Australians is projected to grow steadily over the coming decades (Australian Institute of Health and Welfare, 2018). The ageing of the population places immense pressure on public spending associated with the rising health costs and the ability of the health system to serve more numbers needing care (Australian Institute of Health and Welfare, 2014). Based on the original qualifying age for the Aged Pension, people aged 65 and over are commonly classified as 'old' (Australian Institute of Health and Welfare, 2014). Due to health, economic and social circumstances faced by all Australians, the diversity of the older Australian population results in a complex range of circumstances access the ageing spectrum. In 2020, 55 per cent of middle-aged adults over the age of 55 years old were retired (Australian Bureau of Statistics, 2020). This age is the beginning of downsizing from the family home and consideration of appropriate accommodation for the years ahead (Australian Bureau of Statistics, 2020). Whereas, for those aged 70 and over there are new or greater challenges associated with mobility, health and independence (Office for the ageing & Government of South Australia, 2021).

The demand for health services and change in health profiles will have a far-reaching implication for society (Hatcher, Chang, Schmied, & Garrido, 2019). Most Australians consider themselves to be in good health and are living in their homes independently with or without community-based supports until their final days (Australian Goverment & Department of Health, 2021). Consequently, the Australian Government has taken steps to support people to remain in their own home, such as providing more home care packages (Nygard, Grahn, Rudenhammar, & Hydling, 2004). In fact, the expenditure of supporting someone to age at home is still much lower for governments compared to the substantial cost to fund residential care facilities (Royal Commission into Aged Care Quality and Safety, 2020).

The importance of open discussions with older people about how to remain in their own home is an increasingly important area of practice (Atwal, Spiliotopoulou, Plastow, McIntyre, & McKay, 2012; Kramer & Pfaffenbach, 2015). Middle and older aged people have the desire to maintain their independence and live within their own home (Tanner, Tilse, & de Jonge, 2008). This is usually dependent on an individual's design and environment of the home in relation to their changing care needs (Australian Institute of Health and Welfare, 2018). The desire to remain at home during ageing is much to do with subjective feelings about what homes means to them (Sherman and Dacher, 2005;

Roslyn Dalistan
Master of Science by research/ PhD candidate
College of Medicine and Public Health, Flinders University

Oswald & Wahl, 2005). Many people prefer to remain at home until they die or no longer remain independent in their homes (Tanner et al. 2008). In a large study, Oswald et al. (2007) found older people had a better sense of wellbeing and were more independent if they lived in accessible homes.

Studies on the experiences of home have been explored for a range of population groups; however limited attention has been placed on the perspectives of home for middle and older people as ageing takes place. Research has described the clear relationship between older people and their physical environment and their subjective perspectives, as being a personal place for comfort, enabling of freedom, meaning, anchoring of self, independence and safety net (Aplin, Canagasuriam, Petersen, & Gustafsson, 2020; Coleman & Wiles, 2020; Hatcher et al., 2019; Tanner et al., 2008). For example, Hatcher et al. (2019) reported that living at home gave older people a sense of being "anchored to their living environment" and sense of personality when they could decorate or alter their home. Cherished possessions within an older person's home also creates opportunities for self-reflection and reconciliation to cope with health-related challenges and increase the quality of life by maintaining access to important objects (Coleman & Wiles, 2020). Likewise, Aplin et al. (2020) suggests, home for people aged between 39-64, was a place they could call their "own", particularly when being able to change the layout/refurbishment of the home environment. Most importantly, Aplin et al. (2020) found individuals within this age group would prefer functionality and comfort to tailor their home according to personal needs. According to Stones and Gullifer (2014), Kramer and Pfaffenbach (2015) and Hatcher et al. (2019), the importance of living at home for older people positioned close by family, friends, neighbours, social activities and local shops was found to be essential towards a positive ageing process. All of these qualitative studies agreed that living at home to maintain their social identity whilst remaining socially connected was important while ageing (Hatcher et al., 2019; Kramer & Pfaffenbach, 2015; Stones & Gullifer, 2014). Therefore, the need to understand personal meanings and subjective psychological drivers of being assigned to their home will influence their commitment to remaining at home (Stones & Gullifer, 2014).

Research conducted by Hatcher et al. (2019) suggest that there is a link between older people and the effect of disruption to the home on their well-being. For example, for one participant in the study, the maintenance of the garden they created was much more meaningful than the installation of home modifications to enable access to their homes (Hatcher et al., 2019). Participants spoke of this as a way of preserving control over their home environment (Hatcher et al., 2019). Bailey et al. (2019), found that older people may delay installing home modifications or adaptations due to the negative perceptions of stigma associated with functional decline and vulnerability. Participants spoke about how home adaptations were a signal for being old and that it reminded older people of a hospital environment, and not fitting in their existing home décor (Bailey et al., 2019). By understanding what home means to older people and the impact that changes towards their home environment can make, it is important in formulating strategies associated with ageing to ensure older people can remain at home as long as possible.

Roslyn Dalistan
Master of Science by research/ PhD candidate
College of Medicine and Public Health, Flinders University

Why it is important to do this review

The aim of this qualitative systematic review is to explore middle and older adult's perspective of their home environment and concept of home to determine the factors that are important when making decisions about their housing.

Keywords: aged, ageing, aging, older, home, housing, ageing in place, attitudes, beliefs, perspectives, interviews, qualitative, focus groups

Inclusion criteria

Participants

This systematic review will consider qualitative studies that include all middle and older aged adults (aged 65 and over). To be included, the study must indicate the inclusion of middle or older adults living at home within the community setting (either within the metropolitan or rural area) in any country. We will not include studies which focus on a specific diagnostic population (e.g., post hip fracture); instead we will only include studies which are broadly representative of the population.

Phenomena of interest

The review will consider studies that explore the experience of middle and/or older aged adults with outcomes related to their personal experiences/ beliefs/ attitudes/ views/ perspectives/ opinions/ thoughts/ reactions towards ageing and their concept of home and home environment.

These perspectives can include those related to:

- What they are most concerned about when ageing in relation to the home?
- What factors are most important to remain at home?
- What are the important features of their home?
- How changes to the home environment can affect their experience/meaning of home in the community?
- Whether they are open to adapting to changes in their home environment to live at home as long as possible?
- How do they adapt to age-related changes within the home?
- Are there other aspects that make it hard to live at home?

Context

This systematic review will consider studies that explore the perspectives of middle and older aged adults in any community setting and in any country and at any time.

Type of studies

This review will consider qualitative studies including focus groups, interviews (face to face, structured or semi-structured), surveys with open ended responses, phenomenology, grounded theory,

Roslyn Dalistan
Master of Science by research/ PhD candidate
College of Medicine and Public Health, Flinders University

ethnography, action research and qualitative descriptive studies. Only studies published in English will be considered for inclusion in this review, with no publication date restrictions. Mixed method studies will only be considered if data from the qualitative components can be clearly extracted. Authors of included studies will be contacted for clarifying information where necessary to ascertain relevant qualitative findings.

Methods

The proposed systematic review will be conducted in accordance with the Joanna Briggs Institute (JBI) methodology for systematic reviews of qualitative evidence (Drisko, 2020; Lockwood, Munn, & Porritt, 2015).

Search strategy

The search strategy will aim to find both published and unpublished studies. An initial limited search of Medline and Scopus was undertaken to identify articles on the topic. The text words contained in the titles and abstracts of relevant articles, and the index terms used to describe the articles were used to develop a full search strategy. A full search strategy Medline is detailed in Appendix I. The search strategy, including all identified keywords and index terms, will be adapted for each included information source. The reference list of all eligible studies will be screened for additional studies.

Information sources

The databases to be searched include: Medline, PyscInfo (Ovid), Scopus (Elsevier) and CINAHL (EBSCOhost). Sources of unpublished studies and gray literature to be searched will include: Google Scholar and Council on the Ageing (COTA), ProQuest Dissertations and Theses, Google Scholar and WorldWideScience.org

Study selection

Following the search, all identified citations will be collated and uploaded into Endnote X9.3 and duplicates removed (Clarivate Analytics, 2021). Titles and abstracts will then be screened by two independent reviewers for assessment against the inclusion criteria for the review. Relevant studies will be retrieved in full and their citation details imported into Covidence (Covidence, 2021). The full text of selected citations will be assessed in detail against the inclusion criteria by two independent reviewers. Included studies will be imported into the Joanna Briggs Institute System for Unified Management, Assessment and Review of Information (JBI SUMARI) for extraction and synthesis. Reasons for exclusion of full text studies that do not meet the inclusion criteria will be recorded and reported in the systematic review. Any disagreements that arise between the reviewers at each stage of the study selection process will be resolved through discussion, or with a third reviewer. The results of the search will be reported in full in the final systematic review and presented in a Preferred

Roslyn Dalistan
Master of Science by research/ PhD candidate
College of Medicine and Public Health, Flinders University

Reporting Items for Systematic Reviews and Meta-analyses (PRISMA 2) flow diagram (Page et al., 2021)

Assessment of methodological quality

Relevant studies will be critically appraised by two independent reviewers for methodological quality using the JBI Critical Appraisal Checklist for Qualitative Research (The Joanna Briggs Institute, 2017). All studies, regardless of their methodological quality will be included and undergo data extraction and data synthesis, where possible, in order to employ an inclusive approach with diverse studies and datasets. The impact of the methodological quality of the studies will be addressed in the discussion and considered in the generation of recommendations. Authors of papers will be contacted to request missing or additional data for clarification, where required. Any disagreements that arise between the reviewers will be resolved through discussion, or with a third reviewer. The results of critical appraisal will be reported in narrative form and in a table. All studies, regardless of their methodological quality, will undergo data extraction and synthesis (where possible (Drisko, 2020).

Data extraction

Qualitative data will be extracted from studies included in the review using the standardized data extraction tool from JBI SUMARI by the primary reviewer (The Joanna Briggs Institute, 2019). The data extracted will include specific details about the populations, context, culture, geographical location, study methods and the phenomena of interest relevant to the review objective. Findings, and their illustrations, will be extracted and assigned a level of credibility (The Joanna Briggs Institute, 2017). Any disagreements that arise between the reviewers will be resolved through discussion, or with a third reviewer.

Data synthesis

Qualitative research findings will, where possible, be pooled using JBI SUMARI using the meta-aggregative approach (Drisko, 2020; Lockwood et al., 2015; The Joanna Briggs Institute, 2019). This will involve the aggregation or synthesis of findings to generate a set of statements that represent that aggregation, through assembling the findings and categorising these findings on the basis of similarity in meaning. These categories will then be subjected to a synthesis in order to produce a single comprehensive set of synthesized findings that can be used as a basis for evidence-based practice. Where textual pooling is not possible the findings will be presented in narrative form.

Assessing certainty in the findings

The final synthesized findings will be graded according to the ConQual approach for establishing confidence in the output of qualitative research synthesis and presented in a Summary of Findings (Munn, Porritt, Lockwood, Aromataris, & Pearson, 2014). The Summary of Findings includes the major elements of the review and details how the ConQual score is developed. Included in the Summary of Findings will be the title, population, phenomena of interest and context for the specific

Roslyn Dalistan
Master of Science by research/ PhD candidate
College of Medicine and Public Health, Flinders University

review. Each synthesized finding from the review will then be presented, along with the type of research informing it, score for dependability and credibility and the overall ConQual score.

Conflict of interest

The authors have no conflicts of interest to declare.

Search Strategy- please refer to Appendix 1

Type and method of review

Systematic review

Anticipated or actual start date.

30 April 2021

Anticipated completion date.

30 April 2022

Stage of review at time of this submission.

The review has not yet started: Yes

Review stage	Started Completed
Preliminary searches	Yes
Piloting of the study selection process	Yes
Formal screening of search results against eligibility criteria	No
Data extraction	No
Risk of bias (quality) assessment	No
Data analysis	No

Authors:
a) **Named Contact**

   Roslyn Dalistan, Flinders University, College of Medicine and Public Health
   Email: dali0009@flinders.edu.au

b) **Named contact address**

   Level 4, Rehabilitation and Palliative care services building

Roslyn Dalistan
Master of Science by research/ PhD candidate
College of Medicine and Public Health, Flinders University

Flinders Medical Centre, Bedford Park, SA, 5042

Support:

    a. **Review team members and their organisational affiliations.**

        A/ Prof Kate Laver

        Prof Stacey George

    b. **Organisational affiliation of the review.**

        Flinders health and medical research Institute (FHMRI)

        Organisation web address: www.flinders.edu.au

Funding sources

This review aligns with the work of A/Prof Kate Laver who was awarded a DECRA on this topic.

    c. **Conflicts of interest**

        None

    d. **Collaborators**

        None

Roslyn Dalistan
Master of Science by research/ PhD candidate
College of Medicine and Public Health, Flinders University

References

Aplin, T., Canagasuriam, S., Petersen, M., & Gustafsson, L. (2020). The experience of home for social housing tenants with a disability: security and connection but limited control. *Housing and Society, 47*(1), 63-79.

Atwal, A., Spiliotopoulou, G., Plastow, N., McIntyre, A., & McKay, E. A. (2012). Older Adults' Experiences of Occupational Therapy Predischarge Home Visits: A Systematic Thematic Synthesis of Qualitative Research. *British Journal of Occupational Therapy, 75*(3), 118-127. doi:10.4276/030802212x13311219571701

Australian Bureau of Statistics. (2020). Retirement and Retirement Intentions, Australia. Retrieved from https://www.abs.gov.au/statistics/labour/employment-and-unemployment/retirement-and-retirement-intentions-australia/latest-release#key-statistics

Australian Goverment, & Department of Health. (2021). Home Care Packages Program Reforms. Retrieved from https://www.health.gov.au/health-topics/aged-care/aged-care-reforms-and-reviews/home-care-packages-program-reforms#older-reforms-5

Australian Institute of Health and Welfare. (2014). Australia's Health Series,. *Ageing and the health system challenges, opportunities and adaptations*. Retrieved from https://www.aihw.gov.au/getmedia/19dbc591-b1ef-4485-80ce-029ff66d6930/6_9-health-ageing.pdf.aspx#:~:text=The%20ageing%20of%20the%20population,use%2C%20and%20ris ing%20health%20costs.&text=These%20challenges%20may%20influence%20future,health% 2Dcare%20delivery%20and%20engagement.

Australian Institute of Health and Welfare. (2018). Older Australia at a glance. Retrieved from https://www.aihw.gov.au/reports/older-people/older-australia-at-a-glance/contents/summary

Bailey, C., Aitken, D., Wilson, G., Hodgson, P., Douglas, B., & Docking, R. (2019). "What? That's for Old People, that." Home Adaptations, Ageing and Stigmatisation: A Qualitative Inquiry. *Int J Environ Res Public Health, 16*(24). doi:10.3390/ijerph16244989

Clarivate Analytics. (2021). Endnote X9.3.3. Retrieved from https://endnote.com/?_ga=2.268551096.890425446.1619582231-1605498152.1619582231

Coleman, T., & Wiles, J. (2020). Being With Objects of Meaning: Cherished Possessions and Opportunities to Maintain Aging in Place. *Gerontologist, 60*(1), 41-49. doi:10.1093/geront/gny142

Covidence. (2021). Better systematic review management. Retrieved from https://www.covidence.org/

Drisko, J. W. (2020). Qualitative research synthesis: An appreciative and critical introduction. *Qualitative Social Work, 19*(4), 736-753.

Hatcher, D., Chang, E., Schmied, V., & Garrido, S. (2019). Exploring the Perspectives of Older People on the Concept of Home. *J Aging Res, 2019*, 2679680. doi:10.1155/2019/2679680

Kramer, C., & Pfaffenbach, C. (2015). Should I stay or should I go? Housing preferences upon retirement in Germany. *Journal of Housing and the Built Environment, 31*(2), 239-256. doi:10.1007/s10901-015-9454-5

Lockwood, C., Munn, Z., & Porritt, K. (2015). Qualitative research synthesis: methodological guidance for systematic reviewers utilizing meta-aggregation. *International journal of evidence-based healthcare, 13*(3), 179-187.

Munn, Z., Porritt, K., Lockwood, C., Aromataris, E., & Pearson, A. (2014). Establishing confidence in the output of qualitative research synthesis: the ConQual approach. *BMC medical research methodology, 14*(1), 1-7.

Nygard, L., Grahn, U., Rudenhammar, A., & Hydling, S. (2004). Reflecting on practice: are home visits prior to discharge worthwhile in geriatric inpatient care?. Clients' and occupational therapists' perceptions. *Scandinavian journal of caring sciences., 18*(2), 193-203. doi:10.1111/j.1471-6712.2004.00270.x

Office for the ageing, & Government of South Australia. (2021). Better Together: A Practical Guide to Effective Engagement with Older People. Retrieved from https://www.sahealth.sa.gov.au/wps/wcm/connect/efc56a004efc69f1b7ccf79ea2e2f365/Better +Together+-+A+Practical+Guide+to+Effective+Engagement+with+Older+People.pdf?MOD=AJPERES&C ACHEID=ROOTWORKSPACE-efc56a004efc69f1b7ccf79ea2e2f365-nwLmRMW

Oswald, F., Wahl, H.-W., Schilling, O., Nygren, C., Fänge, A., Sixsmith, A., . . . Iwarsson, S. (2007). Relationships between housing and healthy aging in very old age. *The Gerontologist, 47*(1), 96-107.

Roslyn Dalistan
Master of Science by research/ PhD candidate
College of Medicine and Public Health, Flinders University

Page, M. J., McKenzie, J. E., Bossuyt, P. M., Boutron, I., Hoffmann, T. C., Mulrow, C. D., . . . Moher, D. (2021). The PRISMA 2020 statement: an updated guideline for reporting systematic reviews. *BMJ, 372*, n71. doi:10.1136/bmj.n71

Stones, D., & Gullifer, J. (2014). 'At home it's just so much easier to be yourself': older adults' perceptions of ageing in place. *Ageing and Society, 36*(3), 449-481. doi:10.1017/s0144686x14001214

Tanner, B., Tilse, C., & de Jonge, D. (2008). Restoring and Sustaining Home: The Impact of Home Modifications on the Meaning of Home for Older People. *Journal of Housing For the Elderly, 22*(3), 195-215. doi:10.1080/02763890802232048

The Joanna Briggs Institute. (2017). The Joanna Briggs Institute Critical Appraisal tools for use in JBI Systematic Reviews Checklist for Qualitative Research. Retrieved from https://jbi.global/sites/default/files/2019-05/JBI_Critical_Appraisal-Checklist_for_Qualitative_Research2017_0.pdf

The Joanna Briggs Institute. (2019). The System for the Unified Management, Assessment and Review of Information (SUMARI). . Retrieved from https://www.jbisumari.org/

Appendix 1: Search Strategy for Medline

Database(s): Ovid MEDLINE(R) and Epub Ahead of Print, In-Process, In-Data-Review & Other Non-Indexed Citations, Daily and Versions(R) 1946 to May 07, 2021

#	Searches	Results
1	aged/ or "aged, 80 and over"/ or frail elderly/	3238503
2	(elder* or geriatric* or gerontolog* or old age* or grandparent* or retire* or pensioner* or senior* or later life).tw.	402073
3	((old* or age* or aging) adj1 (person* or people* or adult* or resident* or population* or men* or women* or male* or female*)).tw.	578177
4	(aged adj1 ("65" or "70" or "75" or "80" or "85")).tw.	45241
5	or/1-4	3727292
6	independent living/	7385
7	("aging in place" or "ageing in place" or "aging-in-place" or "ageing-in-place" or "age in place" or "aging at home" or "ageing at home" or "aging-at-home" or "ageing-at-home" or living independently or independent* living or living autonomously or autonomous living or "living at home" or "remaining at home" or "residing at home" or retirement communit* or "communit* for retirement" or "home environment*").tw,kw.	14621
8	((physical or environment*) adj2 (space or limit* or challang*)).tw,kw.	12249
9	((physical or environment*) adj2 (space or limit* or challang*)).tw,kw.	12249
10	or/6-9	33053
11	interviews as topic/ or focus groups/ or narration/ or qualitative research/	139055
12	((semi-structured or semistructured or unstructured or informal or "in-depth" or indepth or "face-to-face" or structured or guide? or group*) adj3 (discussion* or questionnaire*)).tw.	52693
13	(Interview* or focus group* or diary or diaries or transcrib* or verbatim or field not* or memo? or memoing).tw.	487121

Roslyn Dalistan
Master of Science by research/ PhD candidate
College of Medicine and Public Health, Flinders University

14	(audiotap* or audio-tap* or audio record* or audiorecord* or tape record* or taperecord* or video*).tw.	151365
15	((context* or semantic or content) adj2 analys*).tw.	38296
16	(narrat* or qualitative* or ethnograph* or fieldwork or field work or field research* or informant* or phenomenolog* or hermeneutic* or grounded or interpretive* or participant observ* or background observ* or reflective* or reflection* or textual* or open-ended or theme? or thematic* or triangulat*).tw.	577237
17	((personal* or patient* or participant* or lived) adj2 (experience or experiences or perception* or perceptive or perspective*)).tw.	99779
18	or/11-17	1170046
19	5 and 10 and 18	3664

192

APPENDIX B   PRISMA 2020 checklist

Section and Topic	Item #	Checklist item	Location where item is reported
TITLE			
Title	1	Identify the report as a systematic review.	1
ABSTRACT			
Abstract	2	See the PRISMA 2020 for Abstracts checklist.	1-2
INTRODUCTION			
Rationale	3	Describe the rationale for the review in the context of existing knowledge.	3
Objectives	4	Provide an explicit statement of the objective(s) or question(s) the review addresses.	3
METHODS			
Eligibility criteria	5	Specify the inclusion and exclusion criteria for the review and how studies were grouped for the syntheses.	3
Information sources	6	Specify all databases, registers, websites, organisations, reference lists and other sources searched or consulted to identify studies. Specify the date when each source was last searched or consulted.	3
Search strategy	7	Present the full search strategies for all databases, registers and websites, including any filters and limits used.	Supplement material: Appendix I
Selection process	8	Specify the methods used to decide whether a study met the inclusion criteria of the review, including how many reviewers screened each record and each report retrieved, whether they worked independently, and if applicable, details of automation tools used in the process.	4
Data collection process	9	Specify the methods used to collect data from reports, including how many reviewers collected data from each report, whether they worked independently, any processes for obtaining or confirming data from study investigators, and if applicable, details of automation tools used in the process.	4
Data items	10a	List and define all outcomes for which data were sought. Specify whether all results that were compatible with each outcome domain in each study were sought (e.g. for all measures, time points, analyses), and if not, the methods used to decide which results to collect.	4
	10b	List and define all other variables for which data were sought (e.g. participant and intervention characteristics, funding sources). Describe any assumptions made about any missing or unclear information.	NA
Study risk of bias assessment	11	Specify the methods used to assess risk of bias in the included studies, including details of the tool(s) used, how many reviewers assessed each study and whether they worked independently, and if applicable, details of automation tools used in the process.	4
Effect measures	12	Specify for each outcome the effect measure(s) (e.g. risk ratio, mean difference) used in the synthesis or presentation of results.	NA
Synthesis methods	13a	Describe the processes used to decide which studies were eligible for each synthesis (e.g. tabulating the study intervention characteristics and comparing against the planned groups for each synthesis (item #5)).	4
	13b	Describe any methods required to prepare the data for presentation or synthesis, such as handling of missing summary statistics, or data conversions.	Supplement material- Appendix II

Section and Topic	Item #	Checklist item	Location where item is reported
	13c	Describe any methods used to tabulate or visually display results of individual studies and syntheses.	Supplement Material: Appendix II and III
	13d	Describe any methods used to synthesize results and provide a rationale for the choice(s). If meta-analysis was performed, describe the model(s), method(s) to identify the presence and extent of statistical heterogeneity, and software package(s) used.	3-4
	13e	Describe any methods used to explore possible causes of heterogeneity among study results (e.g. subgroup analysis, meta-regression).	NA
	13f	Describe any sensitivity analyses conducted to assess robustness of the synthesized results.	4
Reporting bias assessment	14	Describe any methods used to assess risk of bias due to missing results in a synthesis (arising from reporting biases).	NA
Certainty assessment	15	Describe any methods used to assess certainty (or confidence) in the body of evidence for an outcome.	NA
RESULTS			
Study selection	16a	Describe the results of the search and selection process, from the number of records identified in the search to the number of studies included in the review, ideally using a flow diagram.	5-6
	16b	Cite studies that might appear to meet the inclusion criteria, but which were excluded, and explain why they were excluded.	5
Study characteristics	17	Cite each included study and present its characteristics.	Supplement material: Appendix III
Risk of bias in studies	18	Present assessments of risk of bias for each included study.	NA
Results of individual studies	19	For all outcomes, present, for each study: (a) summary statistics for each group (where appropriate) and (b) an effect estimate and its precision (e.g. confidence/credible interval), ideally using structured tables or plots.	NA
Results of syntheses	20a	For each synthesis, briefly summarise the characteristics and risk of bias among contributing studies.	5-11
	20b	Present results of all statistical syntheses conducted. If meta-analysis was done, present for each the summary estimate and its precision (e.g. confidence/credible interval) and measures of statistical heterogeneity. If comparing groups, describe the direction of the effect.	NA
	20c	Present results of all investigations of possible causes of heterogeneity among study results.	NA
	20d	Present results of all sensitivity analyses conducted to assess the robustness of the synthesized results.	NA
Reporting biases	21	Present assessments of risk of bias due to missing results (arising from reporting biases) for each synthesis assessed.	13
Certainty of evidence	22	Present assessments of certainty (or confidence) in the body of evidence for each outcome assessed.	NA
DISCUSSION			
Discussion	23a	Provide a general interpretation of the results in the context of other evidence.	11-13
	23b	Discuss any limitations of the evidence included in the review.	13-14

194

Section and Topic	Item #	Checklist item	Location where item is reported
	23c	Discuss any limitations of the review processes used.	13-14
	23d	Discuss implications of the results for practice, policy, and future research.	14
OTHER INFORMATION			
Registration and protocol	24a	Provide registration information for the review, including register name and registration number, or state that the review was not registered.	3
	24b	Indicate where the review protocol can be accessed, or state that a protocol was not prepared.	3
	24c	Describe and explain any amendments to information provided at registration or in the protocol.	NA
Support	25	Describe sources of financial or non-financial support for the review, and the role of the funders or sponsors in the review.	None
Competing interests	26	Declare any competing interests of review authors.	None
Availability of data, code and other materials	27	Report which of the following are publicly available and where they can be found: template data collection forms; data extracted from included studies; data used for all analyses; analytic code; any other materials used in the review.	Supplement material: Appendix I-III

195

APPENDIX C   Search strategies

MEDLINE, search conducted May 11, 2021 and July 12, 2022

#	Searches	Records retrieved
1	aged/ or "aged, 80 and over"/ or frail elderly/	3406338
2	(elder* or geriatric* or gerontolog* or old age* or grandparent* or retire* or pensioner* or senior* or later life).tw.	431814
3	((old* or age* or aging) adj1 (person* or people* or adult* or resident* or population* or men* or women* or male* or female*)).tw.	636866
4	(aged adj1 ("65" or "70" or "75" or "80" or "85")).tw.	50588
5	or/1-4	3929212
6	independent living/	9946
7	("aging in place" or "ageing in place" or "aging-in-place" or "ageing-in-place" or "age in place" or "aging at home" or "ageing at home" or "aging-at-home" or "ageing-at-home" or living independently or independent* living or living autonomously or autonomous living or "living at home" or "remaining at home" or "residing at home" or retirement communit* or "communit* for retirement" or "home environment*").tw,kw.	16056
8	((physical or environment*) adj2 (space or limit* or challang*)).tw,kw.	13719
9	or/6-8	38227
10	interviews as topic/ or focus groups/ or narration/ or qualitative research/	155357
11	((semi-structured or semistructured or unstructured or informal or "in-depth" or indepth or "face-to-face" or structured or guide? or group*) adj3 (discussion* or questionnaire*)).tw.	59965
12	(Interview* or focus group* or diary or diaries or transcrib* or verbatim or field not* or memo? or memoing).tw.	533378
13	(audiotap* or audio-tap* or audio record* or audiorecord* or tape record* or taperecord* or video*).tw.	169793
14	((context* or semantic or content) adj2 analys*).tw.	44937

#	Searches	Records retrieved
15	(narrat* or qualitative* or ethnograph* or fieldwork or field work or field research* or informant* or phenomenolog* or hermeneutic* or grounded or interpretive* or participant observ* or background observ* or reflective* or reflection* or textual* or open-ended or theme? or thematic* or triangulat*).tw.	652499
16	((personal* or patient* or participant* or lived) adj2 (experience or experiences or perception* or perceptive or perspective*)).tw.	112736
17	or/10-16	1293890
18	5 and 9 and 17	4297

PsycINFO (Ovid), search conducted May 11, 2021 and July 12, 2022

#	Searches	Records retrieved
1	older adulthood/	10552
2	(elder* or geriatric* or gerontolog* or old age* or grandparent* or retire* or pensioner* or senior* or later life).tw.	153951
3	((old* or age* or aging) adj1 (person* or people* or adult* or resident* or population* or men* or women* or male* or female*)).tw.	230213
4	(aged adj1 ("65" or "70" or "75" or "80" or "85")).tw.	14233
5	or/1-4	343352
6	("aging in place" or "ageing in place" or "aging-in-place" or "ageing-in-place" or "age in place" or "aging at home" or "ageing at home" or "aging-at-home" or "ageing-at-home" or living independently or independent* living or living autonomously or autonomous living or "living at home" or "remaining at home" or "residing at home" or retirement communit* or "communit* for retirement" or "home environment*").tw,id.	13493
7	((physical or environment*) adj2 (space or limit* or challang*)).tw,id.	3968
8	or/6-7	17396
9	qualitative methods/ or exp focus group/ or grounded theory/ or interpretative phenomenological analysis/ or narrative analysis/ or semi-structured interview/	18437

10	((semi-structured or semistructured or unstructured or informal or "in-depth" or indepth or "face-to-face" or structured or guide? or group*) adj3 (discussion* or questionnaire*)).tw.	30141
11	(Interview* or focus group* or diary or diaries or transcrib* or verbatim or field not* or memo? or memoing).tw.	409666
12	(audiotap* or audio-tap* or audio record* or audiorecord* or tape record* or taperecord* or video*).tw.	87038
13	((context* or semantic or content) adj2 analys*).tw.	36052
14	(narrat* or qualitative* or ethnograph* or fieldwork or field work or field research* or informant* or phenomenolog* or hermeneutic* or grounded or interpretive* or participant observ* or background observ* or reflective* or reflection* or textual* or open-ended or theme? or thematic* or triangulat*).tw.	548875
15	((personal* or patient* or participant* or lived) adj2 (experience or experiences or perception* or perceptive or perspective*)).tw.	75621
16	or/9-15	894142
17	5 and 8 and 16	1567

CINAHL, search conducted May 11, 2021 and July 12, 2022

#	Searches	Records retrieved
S18	S5 AND S16 AND S17	6,118
S17	S6 OR S7 OR S8	34,200
S16	S9 OR S10 OR S11 OR S12 OR S13 OR S14 OR S15	674,090
S15	TI (((personal* OR patient* OR participant* OR lived) N1 (experience OR experiences OR perception* OR perceptive OR perspective*))) OR AB (((personal* OR patient* OR participant* OR lived) N1 (experience OR experiences OR perception* OR perceptive OR perspective*)))	65,411
S14	TI ((narrat* OR qualitative* OR ethnograph* OR fieldwork OR "field work " OR "field research* " OR informant* OR phenomenolog* OR hermeneutic* OR grounded OR interpretive* OR "participant observ* " OR background observ* OR reflective* OR reflection* OR textual* OR "open-ended " OR theme* OR thematic* OR triangulat*)) OR AB ((narrat* OR qualitative* OR	327,112

	ethnograph* OR fieldwork OR "field work " OR "field research* " OR informant* OR phenomenolog* OR hermeneutic* OR grounded OR interpretive* OR "participant observ* " OR background observ* OR reflective* OR reflection* OR textual* OR "open-ended " OR theme* OR thematic* OR triangulat*))	
S13	TI (((context* OR semantic OR content) N1 analys*)) OR AB (((context* OR semantic OR content) N1 analys*))	32,932
S12	TI ((audiotap* OR "audio-tap* " OR "audio record* " OR audiorecord* OR "tape record* " OR taperecord* OR video*)) OR AB ((audiotap* OR "audio-tap* " OR "audio record* " OR audiorecord* OR "tape record* " OR taperecord* OR video*))	62,973
S11	TI ((Interview* OR "focus group* " OR diary OR diaries OR transcrib* OR verbatim OR "field not*" OR memo* OR memoing)) OR AB ((Interview* OR "focus group* " OR diary OR diaries OR transcrib* OR verbatim OR "field not* " OR memo* OR memoing))	354,253
S10	TI (((semi-structured OR semistructured OR unstructured OR informal OR "in-depth" OR indepth OR "face-to-face" OR structured OR guide? OR group*) N2 (discussion* OR questionnaire*))) OR AB (((semi-structured OR semistructured OR unstructured OR informal OR "in-depth" OR indepth OR "face-to-face" OR structured OR guide? OR group*) N2 (discussion* OR questionnaire*)))	30,675
S9	(MH "Qualitative Studies+")	170,793
S8	TI (((physical OR environment*) N1 (space OR limit* OR challang*))) OR AB (((physical OR environment*) N1 (space OR limit* OR challang*)))	4,144
S7	TI (("aging in place" OR "ageing in place" OR "aging-in-place" OR "ageing-in-place" OR "age in place" OR "aging at home" OR "ageing at home" OR "aging-at-home" OR "ageing-at-home" OR "living independently" OR "independent* living" OR "living autonomously" OR "autonomous living" OR "living at home" OR "remaining at home" OR "residing at home" OR "retirement communit*" OR "communit* for retirement" OR "home environment*")) OR AB (("aging in place" OR "ageing in place" OR "aging-in-place" OR "ageing-in-place" OR "age in place" OR "aging at home" OR "ageing at home" OR "aging-at-home" OR "ageing-at-home" OR "living independently" OR "independent* living" OR "living autonomously" OR "autonomous living" OR "living at home" OR "remaining at home" OR "residing at home" OR "retirement communit*" OR "communit* for retirement" OR "home environment*"))	10,773
S6	(MH "Community Living") OR (MH "Assisted Living")	21,597
S5	S1 OR S2 OR S3 OR S4	1,546,461

S4	TI ((aged N0 ("65" OR "70" OR "75" OR "80" OR "85"))) OR AB ((aged N0 ("65" OR "70" OR "75" OR "80" OR "85")))	21,041
S3	TI (((old* OR age* OR aging) N0 (person* OR people* OR adult* OR resident* OR population* OR men* OR women* OR male* OR female*))) OR AB (((old* OR age* OR aging) N0 (person* OR people* OR adult* OR resident* OR population* OR men* OR women* OR male* OR female*)))	220,927
S2	TI (elder* OR geriatric* OR gerontolog* OR "old age*" OR grandparent* OR retire* OR pensioner* OR senior* OR "later life") OR AB (elder* OR geriatric* OR gerontolog* OR "old age*" OR grandparent* OR retire* OR pensioner* OR senior* OR "later life")	189,281
S1	(MH "Middle Age") OR (MH "Frail Elderly") OR (MH "Aged, Hospitalized") OR (MH "Aged, 80 and Over") OR (MH "Aged")	1,409,450

Scopus (Elsevier), search conducted May 12, 2021 and July 12, 2022

#	Search	Records retrieved
S1	((TITLE-ABS-KEY ((elder* OR geriatric* OR gerontolog* OR old AND age* OR grandparent* OR retire* OR pensioner* OR senior* OR later AND life)) OR TITLE-ABS-KEY (((old* OR age* OR aging) W/0 (person* OR people* OR adult* OR resident* OR population* OR men* OR women* OR male* OR female*))) OR TITLE-ABS-KEY ((aged W/0 ("65" OR "70" OR "75" OR "80" OR "85"))))) AND ((TITLE-ABS-KEY (("aging in place" OR "ageing in place" OR "ageing-in-place" OR "age in place" OR "aging at home" OR "ageing at home" OR "aging-at-home" OR "ageing-at-home" OR "living independently" OR "living autonomously" OR "living at home" OR "remaining at home" OR "residing at home" OR "retirement communit*" OR "communit* for retirement" OR "home environment*")) OR TITLE-ABS-KEY (((physical OR environment*) W/1 (space OR limit* OR challang*))))) AND ((TITLE-ABS-KEY (((semistructured OR unstructured OR informal OR "in-depth" OR indepth OR "face-to-face" OR structured OR guide* OR group*) W/2 (discussion* OR questionnaire*))) OR TITLE-ABS-KEY ((interview* OR focus AND group* OR diary OR diaries OR transcrib* OR verbatim OR field AND not* OR memo*)) OR TITLE-ABS-KEY ((audiotap* OR audio-tap* OR audio AND record* OR tape AND record* OR video*)) OR TITLE-ABS-KEY (((context* OR semantic OR content) W/1 analys*)) OR TITLE-ABS-KEY ((narrat* OR qualitative* OR ethnograph* OR fieldwork OR field AND work OR field AND research* OR informant* OR phenomenolog* OR hermeneutic* OR grounded OR interpretive* OR "participant observ*" OR "background observ*" OR reflective* OR reflection* OR textual* OR open-ended OR theme* OR thematic* OR triangulat*)) OR	1620

	TITLE-ABS-KEY (((personal* OR patient* OR participant* OR lived) W/1 (experience OR experiences OR perception* OR perceptive OR perspective*)))))	

APPENDIX D   Characteristics of included studies

Study	Methods for data collection and analysis	Phenomena of interest	Participant characteristics and sample size	Description of main results
Almevall et al. (2022), Sweden	Methodology: Cross-sectional, convergent parallel-results mixed methods design Methods: Data collection: Semi-structured interviews. Specific questions for the current study regarding well-being in relation to home were posed. Interview questions were open-ended and consisted of two areas: what are the most positive aspects of living in your home, and do you find that there are any difficulties involved with living in your home?	To describe experiences of home from a well-being perspective, describe participant characteristics and well-being measures in relation to housing type, and how the aforementioned aspects may affect well-being in very old persons	n=50 Age: 80 years or older living in ordinary housing were interviewed (July 2017 to November 2018) about home in relation to well-being, along with collection of participant characteristics and well-being measures related to home. 20 men and 30 women, ages 81-96 years living in ordinary housing were interviewed.	Six subcategories, three categories and one theme describing experiences of home in relation to well-being among very old persons. For some, home is described as a place of loneliness and isolation. Ageing in place as a political vision might be misdirected if it fails to take consideration the complexity and nuances of home and what these mean for well-being in very old persons. Rather than focusing on preventing older people from moving into specialised housing or offering alternative living adapted

	Data analysis: qualitative content analysis, data saturation was reached in the sense that the information would be enough to replicate the study. Microsoft Office Excel 2013 was used for structuring coding and categorisation.			with only built environment in focus, society must offer this group living conditions and support that maintain their sense of well-being.
Aplin et al. (2013), Australia	Methodology: Qualitative descriptive approach Methods: Data collection: in-depth interview using a semi-structured questionnaire in their own home. Interviews were audio recorded and transcribed verbatim. Data analysis: template analysis was selected as this form of qualitative descriptive analysis.	To explore the impact of home modifications on clients and their family's experience of home	n=55 Age: 25-87 years, living in a metropolitan area in Australia, with an average age of 64, ranging from 25 to 87 years. They had lived in their homes on average for 18 years, ranging from six months to 62 years.	Home is linked to the occupant's identity. It reflects who they are, with both positive and negative effects. Positive appearance of modified area was enhanced by the modification. New modern bathroom, kitchen or front access was often enjoyed. Freedom was negatively impacted or not restored for a small number of participants as she was not provided with the modification that enabled access to her garden or

				outdoor area. Carer roles and activities became easier as a result of modifications.
Aplin et al. (2015), Australia	Methodology: qualitative descriptive approach Methods: Data collection: one in-depth interview using a semi-structured questionnaire in their own home. Interviews were audio recorded and transcribed verbatim. Data analysis: template analysis was selected as this form of qualitative descriptive analysis.	To explore the impact of home modifications on clients and their family's experience of home	n=55 Age: 64-87 years, clients, spouses, family and carers of the service, living in metropolitan area in Australia. 42 household interviews including 13 joint interviews.	Home is linked to the occupant's identity. It reflects who they are, with both positive and negative effects. Positive: appearance of modified area was enhanced by the modification. New modern bathroom, kitchen or front access was often enjoyed. Participants were disappointed with the appearance of modifications, feeling like they made their home look clinical or like a hospital. Some did not worry about appearance of modifications as they then valued their home as practical and functional places – modifications allowed people to regain or maintain

				independence and freedom in the home.
Bailey et al. (2019), Australia	Methodology: phenomenological approach

Methods: Data collection: Strand 1: semi-structured interviews carried out with older adults in their own homes. Strand 2: practitioner focus group discussions with a total of 39 practitioners, involved two focus group discussions at each of the two participating local authority sites.

Data analysis: interviews and focus groups discussions were transcribed verbatim and entered into NVivo. | To explore the experiences of 30 older people acquiring and living with home adaptations and on the findings from four focus group discussions | n=30 older people and 39 practitioners

Age: 65-74, 75-84, and 85+ . Over six months, participants' lived experiences were captured within this two-strand approach. | An overarching finding raised by older adults and practitioners was that delaying having home adaptations until a person was 'struggling' was partly to do with perceived negative associations with ageing, i.e. loss of independence and vulnerability, medicalised appearance. Ageism and home adaptations: participants spoke about triggers signalling disability and clinical aesthetics (appearance and utility). Practitioners talked of how when they saw older adults they were not aware that there was something wrong or needed at their age. Word of mouth raised awareness of adaptations – older people |

				might have experience of a friend or neighbour who had specific equipment.
Baron et al. (2020), Canada	Methodology: Qualitative study Methods: Data collection: in-depth Interviews and the focus group. Data analysis: thematic content.	To explore the perspective of Inuit elders on the relationships between aging, health and place	The community of Baker Lake was selected for the study because of its provision of several housing units dedicated to adults over 60 years old, as well as the presence of a long-term care centre for Inuits with chronic conditions or disabilities. 20Inuits aged50-86 from one community in Nunavut participated to in-depth qualitative interviews.	Themes discussed included ageing and health, housing conditions, community conditions, land-based activities, medical and leisure travel outside of the community, and mobility and accessibility. Four main groups of resources for healthy ageing were identified by participants during individual interviews and the focus group discussions: 1) family relationships, 2) adequate housing conditions, 3) positive community, and; 4) being on the land.
Bergland and Slettebø (2018), Norway	Methodology: qualitative design	To explore how older Norwegian women living at home experience ageing, and how their	N=10 women aged 90 years or older living in their own home in Norway.	The overall theme for the findings is how everyday life in old age is influenced by the past, present and future.

	Methods: Data collection: semi-structured interviews. Data analysis: qualitative content analysis in line with Kvale and Brinkmann's analysis of interview transcripts.	everyday life is influenced by their encounters with the challenges of life		Participants find it difficult to make plans in old age. Participants accept that their lives hved to become what they are now. Acceptance of life as it is has become: acceptance of relocation later in life.
Bigonnesse et al. (2014), Canada	Methodology: qualitative methodology Methods: Data collection: in-depth interviews. Data analysis: thematic analysis of these 2 sources of qualitative data and open coding.	To explore how older adults express meaning of home and what their needs are regarding housing and relocation	n=392 (49 focus groups) and one case study from the Age-Friendly Cities Project in Quebec. Age: 65-74 years and 75 years and older. Income levels (low and mid).	Three subthemes emerged under the theme 'built environment': 1) affordable housing and services, which cover issues around affordability of housing resources and home-based services; 2) adapted and adaptable homes, which cover home adaptation and home modification; and 3) safe and good quality homes, which cover the safety and

				suitability of current housing resource
Black et al. (2015), United States	Methodology: PAR (participatory action research) and multiple methods of qualitative inquiry, including grounded theory Methods: Data collection: focus groups and open-ended surveys with semi structured interview guide for the focus group. Data analysis:- grounded theory.	To better understand how older adults and the broader community perceive and promote dignity and independence in the context of everyday community life	n=484 persons participated in the study, including community-based forums and online participation (n=217) and qualitative inquiry (n=261), including seven focus groups and e-surveys. 3 different samples of participants for the qualitative inquiry included community forums (n=113), seven focus groups (51 participants), and online surveys (n=320). Age: 65 or older	Synthesised findings yielded 6 'actionable themes': 1) meaningful involvement, 2) ageing in place, 3) respect and inclusion, 4) communication and information, 5) transportation and mobility, and 6) health and well-being.
Bosch-Farre et al. (2020), Spain	Methodology: Qualitative design Methods: Data collection: 6 focus groups, semi-structured guide.	To explore the ageing in place phenomenon, as well as the enablers and barriers that interact in healthy ageing from the	n=71 Age: men and women aged 65 years who can speak Catalan or Spanish, 62-92 years.	Three key themes: 1) Participants experienced ageing differently. Physical and mental health, family environment and financial stability were key elements of life quality.

	Data analysis: inductive and deductive thematic analysis.	perspective of the elderly connected to local entities	60.56% were women and 39.43% were men.	2) The perception of the elderly's role in the community depended on their age, health status and attitude towards life. 3) The participants identified several enablers and barriers to healthy ageing in place. Home was described as a place to feel free, comfort and enjoyment of your own privacy. Living in place was an important factor for connection and social inclusion, especially if people went out and engages with providers of social support, such as in the case of the present study.
Brim et al. (2021), United States	Methodology: grounded theory Methods: Data collection: review of	To narrow the literature gap and explore perceived barriers reported by older	n=36 Age: 55 years living in the Mt. Airy, Chestnut Hill,	Home mobility and safety were recognised by older adults as current or potential hazards to moving safely in their home. Older adults

	reports from older adult home safety assessments. Assessments were scheduled by the older adult via phone or email. Semi-structured interview followed by an older adult-guided tour through the home. Data analysis: constant comparison with existing data form the last 4 years.	adults who are ageing in place	Germantown and Northwest Philadelphia neighbourhoods	reported fall hazards as barriers to ageing in place. Lighting within the home was a common barrier to ageing in place. Clutter or junk within the home interfered with function within an older person's home. Safety devices within the bathroom was needed to age in place.
Burgess and Quinio (2021), United Kingdom	Methodology: mixed methods Methods: English Housing Survey (EHS), two online surveys to collect primary data. Data analysis: qualitative analysis	To explore why older households move and why they choose either newly built housing or existing stock	n=13 Age: 55 years or over and has moved less than a year ago.	Only a minority of them actually chose to downsize. Older peoples' narratives and experiences confirmed that their decisions to move were often driven by a variety of factors, circumstances and aspirations which characterised a heterogeneous group of older people

| Coleman and Wiles (2020), New Zealand | Methodology: phenomenological inspired research

Methods:
Data collection: in-depth interviews, photo elicitations interviews and journaling.

Data analysis: interpretive approach. | To examine how possessions that older adults keep at home inform their present experiences of ageing and also facilitate the ongoing maintenance of ageing in place | n=28 (20 women, 8 men)

Age: 65-94 years. Four were 90-94 years. 11 participants returned journals with annotated comments. | 3 main experiences from the participants:
1) Being surrounded and maintaining 'insideness'.
2) Being with past achievements and maintaining self.
3) Being self-reflective, connected and reconciling.

All 3 factors played a role in the experience of ageing in place and being able to maintain daily life during ageing.
Cherished possessions fostered connection and belonging (in other words, an 'insideness' of place), and a routine way of perceiving ageing in place and the character of everyday experiences. |
| Dahlin-Ivanoff et al. | Methodology: grounded theory as per ENABLE-AGE | To explore and broaden understanding of home. as | n=40 (17men and 23 women) | Home is a central place in the lives of very old people |

(2007), Sweden	project, ENABLE-AGE survey study Methods: Data collection: interviews and field notes. Data analysis: constant comparative analysis	experienced by very old persons, the meaning of home and how the concept of home is related to autonomy, well-being and participation	Age: 80-89 years All participants lived in ordinary housing, majority lived in apartments and in single-family housing. Lived in their apartment from 1-81 years.	because it is where they live and spend so much time. Home means security and freedom. Home means security, living in a familiar neighbourhood, everything functions, and having memories to live on. Home means freedom. a place for reflection, a social-meeting point and a place to leave your own mark. Home has a central place within the lives of older people. Living in a familiar neighbourhood home means being close to someone in case one needs help, which creates a feeling of safety and security. Having memories, being surrounded by people who have their memories and by the people who have been there.

de Jonge et al. (2011), Australia	Methodology: Phenomenological approach Methods: Data collection: semi-structured interviews, open-ended questions, audio taped and transcribed verbatim. Data analysis: content analysis.	To explore the experiences of older people of their home environments in Australia; to explore and describe the role of the home environment in older people's lives	n=30 older people with diverse characteristics. Sample recruited from 3 states: Queensland, South Australia and Victoria. Age: 56-90 years 7 men, 23 women and 16 living alone, 11/14 were couples that participated in the interview together.	Five themes from 30 transcripts: 1) Capacity of the home to support valued roles and meaningful occupations. 2) Independence and autonomy. Home gave a sense of freedom, autonomy, remaining in the home was central to independence. 3) Social connectedness. Older people were happy with their current home as it provided connection with community services e.g. transport, shops, bowls club, GPs and hydro pools. Being around family and neighbours was important 4) Ambience of the home and lifestyle afforded. 5) History and emotional connection with the home.

213

Dendle K, Miller E, Buys L, Vine D (2021), Australia	Methodology: qualitative phenomenographic framework Methods: Data collection: focus groups which ran over a 4-day period, in conjunction with a private online focus group. Data analysis: experiences of home identified using Nvivo 12. Further manual analysis and discussion with co-authors grouped into 'conceptions'.	To explore how a diverse older adults across Australia experience their homes	n=103 Age: 50-92 years Included were those aged 50+ because decisions affecting housing and their subjective effects are often influenced by life-stage (e.g. empty nest, retirement) and changes of circumstance (e.g. divorce, health changes) which may occur prior to an arbitrary age.	Older people saw their home as the centre of their wider world. Their home extended beyond the bounds of the yard or grounds to public, private and virtual spaces outside the private dwelling that the literature usually considers as 'home'. Greater focus is needed from policymakers and practitioners on the 'home' as a combination of place, space and community unique to each person. More adaptable housing options is needed through housing policy to enable people to access to various resources to optimise the match between needs aspiration.
Dupuis-Blanchard et	Methodology: qualitative descriptive study	To gain a better understanding of ageing in place by exploring how older adults who	n=39 older adults residing at home but experiencing a loss of independence. 14 family members; 10 family	6 themes: attitude and self-determination, health consciousness, housing choice, access to services,

al. (2015), Canada	Methods: Data collection: semi structured interviews. Data analysis: Content analysis, verbatim transcriptions were analysed line by line using open coding.	experience a loss of independence and speak a minority language (French) are able to remain in their homes, despite the challenges they face	members were relatives of older participants in the study and 4 were relatives of an older person with loss of independence who resided at home. Age: Average age of the older participants was 81 years, ranging from 65 to 93 years.	social support and income. Older people explained that they lived in a home which met their needs, outdoor maintenance and cleaning tasks like lawn mowing, cleaning, painting, washing floors were presented by older people as challenging. Home was a place of security. Older people, including family members attributed apartment living to a feeling of security.
Elo et al. (2011), Finland	Methodology: both qualitative and quantitative methods Methods: Data collection: focus, postal questionnaires and interviews. Inductive concept synthesis, hypothetical models. Second phase was evaluated by a panel of experts consisting of	To construct a theory on an environment that would support the well-being of home-dwelling elderly people in northern Finland	Phase 1 consisted of 39 interviews of elderly people over 65 years. Phase 2 consisted of 96 postal questionnaires and 3 expert evaluations and 15 panel evaluations. Phase 3 consisted of 328 postal questionnaires.	An environment that enables safe activity and is physically pleasant is important for the elderly. Climate and availability of services are related to the well-being of the elderly. An environment that enables safe activity, comprising safety both at home and in the immediate surroundings, enables safe

	15 nurses by postal questionnaire. Data analysis: principal component analysis and confirmatory factor analysis			mobility. At home, safe aspects include ensuring safety of stairs and steps, reducing the need to reach or climb using various support rails, making floors and the bathroom less slippery.
Fausset et al. (2009), United States	Methodology: focus group method Methods: Data collection: focus groups were conducted with 6 to 7 individuals. Groups were divided by sex, marital status and race. Telephone pre-screening was conducted to assess basic cognitive functioning, followed by the use of a background questionnaire and a technology questionnaire, and an exit survey.	To explore how older adults cope with their problems and suggested areas for redesign to improve older adults' daily lives, to investigate and understand how older adults manage and maintain their homes, and to inform designers (architects) and industrial designers how to support these tasks	n=20 (13 women and 7 men). Eligible participants were those living independently and not residing in any type of housing with home maintenance support. Age: 73-85 years	Home maintenance is required to ensure a safe and healthy environment. Understanding how older adults manage and maintain their homes (human factors) can inform architects, home renovation workers and designers on the areas of greatest need for modification for older adults. Designers can enable ageing in place and support older adults' desire to live in their home as long as they want.

	Data analysis: detailed coding scheme to identify patterns and themes from the discussions.			
Finlay et al. (2020), United States	Methodology: qualitative study Methods: Data collection: seated and mobile interviews. Interviews with semi-structured questions; transcripts, photographs and field notes. Data analysis: qualitative thematic analysis.	To identify characteristics and features of built and social environments that are essential to support low-income ageing residents	38 older participants aged 55-92 years in 3 distinct socio-economic and geographic samples of the Minneapolis metropolitan area. Nearly all participants lived alone, in their usual residential area by Downtown Minneapolis and Eden Prairie. 6 participants slept in a private or communal room of a homeless shelter.	Four themes encompassing essential residential qualities: 1) safety and comfort, 2) service access, 3) social connection, 4) stimulation. Home was not necessarily an extension of the self. Ageing in place produced hazardous situations for some with sub-standard housing and lack of appropriate support.
Fjell et al. (2021), Norway	Methodology: qualitative approach applying an explorative design Methods: Data collection: focus groups	To investigate how old persons perceive their life to be, how they view the ageing process and their	n=34 Age: 69-93 years in 7 group discussions (28 women and 6 men). All resided in large municipalities. Inclusion	3 categories: embracing life, dealing with challenges and considering the future. An overall theme: 'so far so Good', meaning that growing

	to collect data via semi structured interviews.

Data analysis: inductive manifest content analysis. | need for health care and societal support | criteria: retired and residing in their own home, can read, write and speak Norwegian. | old involves enjoying life in the here and now. In regards to the future, older people felt comfortable with the thought of moving to a residential home as they did not want help from home care services. Some older people wished to remain at home as long as possible provided they were given access to home care services. Older people wanted to move to shared accommodation with facilities that contributed to them feeling secure and at the same time facilitated their social life. |
| Gould et al. (2017), Canada | Methodology: qualitative study

Methods: Data collection: structured interviews. | To explore the thinking processes involved in planning or failing to plan for the future, to observe how older adults spontaneously address issues of future planning | n=39 older adults who were experiencing disability and illness but who lived in their own home (30 women and 9 men).

Age: 65-93 years (M=81) | Three approaches to thinking about the future: 1) one day at a time, 2) reasons not to go (into a nursing home), 3) Two underlying contextual factors exert a subtle yet important influence on which and how |

	Data analysis: qualitative data analysis interviews.	when not constrained to do so		the approach is followed: a) influence of family members, b) availability of resources (financial and otherwise). The importance of physical spaces in the dwellings for family reunions may be important when designing facilities. Lack of planning leads to crises with particularly negative outcomes.
Grimmer et al. (2015), Australia	Methodology: qualitative study Methods: Data collection: semi-structured interviews and focus groups, audio-recorded and transcribed. Data analysis: thematic analysis	To explore and synthesise the experiences and perspectives of older people planning for and experiencing ageing in place	n=42 Age: 65 and over (8 were >80 years)	8 key elements for successful aging in place: health, information, practical assistance, finance, activity (physical and mental), company (family, friends, neighbours, pets), transport and safety. All participants wanted to stay in the community home of their choice as long as they could, whether this was a larger

				family home or a smaller independent living option.
Hatcher et al. (2019), Australia	Methodology: grounded theory Methods: Data collection: focus groups and in-depth semi-structured interviews. Data analysis: open coding was conducted line by line on printed transcripts using the Strauss and Corbin microanalysis.	To understand the phenomenon of older people living at home in Australia at a personal level, from the perspective both of those in living in their long-term family home and those who have adjusted to newer living conditions in older age	n=21, recruited from a local government seniors centre in Western Sydney, Australia. Age: 65 years or over, resident of Western Sydney, living in their home for at least 12 months before the study, English speaking and consented to be involved in the study.	4 main categories: 1) anchoring the self, 2) enabling freedom, 3) being comfortable, 4) staying in touch. Home represented their past, present and future, and gave the notion of anchoring the self.
Juvani et al. (2005), Finland	Methodology: qualitative study Methods: Data collection: interviews Data analysis: inductive content analysis	To describe the significance of the physical environment in supporting the well-being of the elderly aged over 65 years	n=39 Age: 65-89 years, from Northern Finland, dwelling at home, can communicate verbally, no serious memory deficits (13 men, 26 women).	The northern physical environment seems to be significant for both urban and rural elderly people living in the northern part of Finland. The different aspects of the natural environment provide opportunities to relax, meet other people and do physical exercise, all of which are

				important factors for health promotion.
Lewis and Buffel (2020), United Kingdom	Methodology: qualitative longitudinal study Methods: Data collection: longitudinal interviews. Data analysis: trajectory analysis.	To understand the interrelationship between ageing in place and places of ageing, and how these processes change over time	n=24 Age: 50 years and over	Living in a familiar environment has been identified as a crucial factor in the desire to remain at home for older people. Ageing in place policies assume that the home and surrounding neighbourhood will remain familiar and predictable for older people. This longitudinal analysis has revealed how place attachment changes over time and can be highly unpredictable.
Mackenzie et al. (2015), Australia	Methodology: qualitative study Methods: Data collection: semi-structured interviews.	To explore a relatively large sample of older people's subjective experiences, their expectations and the suitability of their home and neighbourhoods	n= 202 Age: 75-79 years This age group is considered most likely to still be in good general health and at the stage of life where they may be considering a future move	6 key themes: housing choice, attachment to place, financial issues, changes to the home over time, transport and anticipating the future. Home is both a concrete and physical concept, and intimately related to

	Data analysis: thematic analysis.		to a supportive home and environment.	attachment, physical, social and autobiographical 'insideness', security and familiarity.
Martin et al. (2019), United States	Methodology: qualitative study Methods: Data collection: surveys. Data analysis: qualitative coding of narrative surveys.	To examine the intent behind decisions to not age in place as a means of informing future initiatives	n=1680 adults who participated in an anonymous Ageing in Place Needs Assessment survey between Jan 2015 and Dec 2017. Age: 65 years and over	4 themes: need to downsize/home modification, need for assistance, family's desire to reciprocate care, and isolation. Relocation often results in loss of social relationships or personal possessions, changes in daily routines and lifestyles, and the eventual loss of independence.
Mortenson et al. (2016), Canada	Methodology: qualitative study Data collection: in-depth interviews. Data analysis: interviews transcribed verbatim and analysed with QSR	To explore how surveillance technologies change the way older people experience the home environment	n=27 Age: 60 years and over and had at least one self-reported chronic condition or mobility restriction.	3 main themes: 'safe and sound' describes how participants felt ambient assisted living (AAL) could contribute to their sense of security; 'reliance' explores how AAL would affect residents' autonomy, self-confidence and relationship

				with caregivers; and 'under the microscope' reveals how AAL-mediated surveillance might alter perceptions of home and activity participation.
	International's NVivo 8 software. Unstated type of analysis.			
Narushima and Kawabata (2020), Canada	Methodology: qualitative study Data collection: interviews. Data analysis: thematic analysis,	To explore the experience of ageing among older Canadian women with physical limitations who live by themselves	n=12 women living in 2 geographic areas in Southern Ontario, including residents of regular houses, apartments, condominiums, assisted living and community housing for seniors. All in varying states of health. Age: 65-92 years	4 overarching themes: 1) striving to continue on at home, 2) living as a strong independent woman, 3) the help needed to support their 'independence', 4) social activities to maintain participants' 'independent' lifestyles, supported by many other people in a mix of formal and informal care.
Neville et al. (2021), New Zealand	Methodology: qualitative study using interpretive description Methods: Data collection: purposive sampling. Semi-structured in-depth 45-90 minute	To explore the views of older people about their preparation for ageing well in a rural community	n=49 Age: 65-93 years. 31 females and 19 males interviewed, 15 widowed, 23 married, 2 single and 10 divorced. Lived independently in the study	3 main themes: 1) sensible planning: the right place and the right people, 2) remaining independent: its up to me, and 3) facing challenges, accepting my lot. All age groups were actively and

			area and accessed the local town for goods and services	realistically preparing for ageing well. All valued independence and believed in the importance of planning for their future. Policy makers and practitioners need to understand that older people are a heterogenous group and ageing policies should be geared towards older people's individual abilities and circumstances.
interviews were conducted. Data analysis: thematic approach, deductive or theory-driven approach. Six phases of thematic analysis as outlined by Braun and Clarke were conducted.				
Neville et al. (2016), New Zealand	Methodology: qualitative design Methods: Data collection: semi-structured interviews. Data analysis: thematic analysis.	To explore how individuals aged 95 years and older living in their own home remain socially connected	n= 10 (8 women and 2 men) Age: 96-100 years 6 people lived in small townhouses and 4 lived in family-sized houses with gardens. 9 people lived on their own and 1 person identified herself as being the primary caregiver for her son who has a disability.	3 main themes illuminating social connectedness: 'keeping company: staying connected with family and friends', 'doing things together: engaging with paid and unpaid helpers', and 'having pride and enjoyment: continuing with hobbies and interests'.

Norazizan et al. (2006), Malaysia	Methodology: not stated Methods: Data collection: interviews. Data analysis: not stated .	To describe the difficulties faced by older Malaysians in their present home environment	n= 386, randomly selected across urban areas in Malaysia, residing in 5 urban locations. They were interviewed, mostly pertaining to factors associated with problems faced in their home. Respondents chosen were generally in good health with no obvious disabilities. Age: 60 years and over	Ageing in place is one of the highest priorities of the elderly, and those who wish to do so should be enabled to remain in their own home as long as possible. An ergonomic approach to design would improve the relationship between the elderly user and their environment, thus encouraging ageing in place.
Nosraty et al. (2015), Finland	Methodology: qualitative study Methods: Data collection: interviews and short questionnaires. Data analysis: thematic analysis with an inductive approach.	To examine how 90-91 year olds view 'a good old age' and identify the dimensions of good and successful ageing	n=45 (25 women and 20 men) Age: 90> years	Theories of successful ageing such as physical, cognitive, psychological and social functioning. New themes: 'living circumstances', emphasising the importance of having one's own home and living there as long as possible, independence', in

				relation to various aspects of life, and 'good health'.
Owens et al. (2021), South Carolina, America	Methodology: Ethnography Data collection- Surveys, engaged in video diary recording and participated in in-depth follow-up interviews. Data analysis-thematic analysis thematic categories developing larger narrative themes. Transcripts using Nvivo.	To document the lived experiences among older low-income African Americans who live alone.	n= 12, (5 men, 7 women) Fluent English speakers, lived alone, no self-reported cognitive or physical impairment preventing them from participating in the study. Age: 66-80	Findings supported the the person-environment fir model interplay of belonging and agency, aging well, and the environment model which predicts that perceptions of belonging in an environment grow stronger among older adults as they age and their functional impairment declines. Compensatory strategies for overcoming barriers to person-environment included home modifications such as installation of grab bars in the bathroom.
Park and Ko (2020), South Korea, Korea	Methodology: Ethnography Data collection- in-depth interviews, field notes	To explore the sociocultural meaning of 'my place' for elderly Koreans ahead of enacting a policy for the so-called	n= 10 Age: 65 >	3 categories representing the meaning of 'my place' were emerged, 1. keeping me safe and 2. comfortable, representing my life, and 3.

	Data analysis-Spradley's ethnographic approach	'integrated community care' in South Korea, pursuant to aging in place for the elderly population.		maintaining my control and influence.
Puplampu et al. (2020), Canada	Methodology: Mixed methods Data collection-self-administered surveys, individual interviews, focus groups Data analysis- Thematic analysis	To examine the impact of cohousing on older adults' quality of life. Research question, "what is the impact of seniors' cohousing on older adults' quality of life?	n= 23 Age: 65> years	Four themes of 'belonging in a community', 'life in the community', changes associated with aging, and 'aging in place' emerged from the qualitative data to explain factors that influence older adults' quality of life. Belonging in a community describes participants' satisfactions with their quality of life in the building. Older adults in the cohousing community indicated that 1 of the reasons for choosing cohousing was because they wanted to be in a living arrangement where they felt that they belonged; they cared about each other; and

				they were engaged and felt safe.
Renaut et al. (2015), France	Methodology: qualitative study Methods: Data collection- semi-directive questionnaire, photographs Data analysis-Thematic analysis	To understand how individuals construct the space both within their own home and their immediate surroundings and how this construction is linked to their own perception of ageing and growing old.	n= 28 older people and 17 carers Age: 75> years and carers 45> years providing care to someone above 65	Old age was perceived as an inevitable decline based on the experience of their ageing parents and had begun to adapt their home environment in anticipation of poor mobility, disability and gradual illness. Hazards such as carpeting, steep stairs without banisters or cluttered living spaces were unnoticed by some frail older participants aged 80 and above. Participants would only act when the time was right due to confidence that they would have some resources to do so even if decisions would be hard to make. Participants only chose to act when the time was

				right despite age, the notion of prevention.
Shin et al. (2021), America	Methodology: qualitative study

Methods:
Data collection- 3D scanning and biomarker tracking technology with qualitative in-depth qualitative interviews.

Data analysis- Conventional content analysis used | To explore older adults' daily interactions with their home environments. | n= 23, who all received home modifications to successfully age in place. (13 female, 10 male)

Age: 62-89 | Most common strategy was to modify their behaviours by limiting or giving up certain activities (cooking, taking a shower, going out). Environmental adaptations and changes were frequently discussed with participants however they were too concerned about the high cost. Inaccessible homes pose significant barriers to participants, however modifying them became a delicate conundrum. The home modification industry is highly fragmented between health care and home assessment professionals and handyman services. |

| Sixsmith et al. (2014), Great Britain | Methodology: qualitative study | To examine the ways in which very old people perceive healthy ageing in the context of living alone at home within urban settings in five European Countries (Germany, Hungary, Latvia, Sweden and the United Kingdom. | n=190 people, (117 women, 73 men), all participants were living at home in urban settings. Age: 75-89 | The physicality and spatiality of home provided the context for establishing and evaluating the notion of healthy ageing, whilst the experienced relationship between home, life history and identity created a meaningful space within which healthy ageing was negotiated. By being able to manage at home gave older people a sense of existence. Older adults expressed the importance of maintaining a sense of control and independence in the home. Depending on how older adults understood home, their attitudes of healthy ageing and their ability to maintain active lifestyles differed. |
| | Methods: Data collection- in-depth and semi-structured interviews Data analysis- grounded theory approach | | | |

Tan et al. (2015), Finland	Methodology: descriptive qualitative study Data collection-face to face interviews with open ended questions Data analysis-thematic analysis	To explore older people's experiences of living independently or with an unrelated older person.	n= 25, in Singapore, lived alone with spouse or with an unrelated older person, and were able to communicate in Mandarin, English or Chinese dialects (Cantonese or Hokkien). Age: 65-95	5 themes emerged 1. Making own choice, participants decided to live apart from their families. 2. Contending with concerns, the availability of external resources for participants was shrinking. 3. Coping with the available assistance, depending on available external resources from the community. 4. Holding on their values, participants rely on their internal resources to manage. 5. Preparing for the inevitable, participants were planning for their final years of life and for their death.
Tanner et al. (2008), Australia	Methodology: Qualitative methodology- Methods: Data collection- Audiotapes of the interviews were transcribed verbatim into	What is the impact of home modification on the experience and meaning of home to older people living in the community?	n= 12, (4 men and 8 women) had received home modification in the previous 3 to 6 months were chosen from occupational therapy reports in public housing files to include a range of ages,	Major themes discussed: 1. What participants said about their experience and the meaning of home. Personal Home- making meaning through action - participants 'made' their

			living arrangement, level of disability, and gender, housing types, and home modifications. Mixture of people living alone (n = 5), living with a partner (n = 5), or with other family (n = 2). Age: 65> living in public housing in a metropolitan area and has had home modifications installed to their current accommodation within the previous 3-6 months.	house into a home created more of a personal meaning. 2. How modifications affected this meaning -Modifications strengthened the personal home as a place of security, safety, comfort and control - Modifications have increased independence, safety, comfort in performing daily tasks. 3. Effect of service design and delivery on the experience and meaning of home for older people -Less satisfaction on the design as they were concerned about the implication of designing for wheelchair accessibility.
written data, including observed responses, other researcher notes and memos. Data analysis: N-VIVO software was used for data and thematic analysis of the transcripts.				
Vrkljan et al. (2011), Canada	Methodology: Phenomenological approach Data collection-Respective interviews.	To explore the relationship between habitual occupations and environmental features	n= 10 Age: 65> years, lived alone or were married and had no caregivers coming into the	Habitual occupations provided a vital link their community. Participants felt the determination to maintain their level of participation by adapting the way in which

	Data analysis- Open coding process described by Hsieh and Shannon	that can support aging in place.	home to support their daily activities.	they engaged in certain habits. Participants continually highlighted the important of maintaining regular occupations to keeping them going and enabling them to stay healthy and engaged in their community.
Webber et al. (2022), United Kingdom	Methodology: Qualitative longitudinal study Methods: Data Collection- Interviews and transcribed Data analysis: NVivo, with a coding framework	How homes are made and unmade over time and to look at how experiences of home are dynamically shaped by people's potent connections inside and outside the dwelling.	n=28 Age: 50> lived in one of the 4 chosen neighbourhoods	The experience of home changed in different ways, particularly through their activities and interests within their dwellings and in the wider community. Home unmaking was more prevalent due to their dwindling social ties, decreased engagement in activities beyond the home, and the deteriorations of their physical and mental health, resulting in their sense of home becoming less porous and more isolating over time. A sense of home strengthens

				over time. A sense of belonging to home must be understood in the context belonging to place, relationships, routines, and familiarity with place.
Webber et al. (2022), New Zealand	Methodology: qualitative study Methods: Data collection- interviews in 2 case study communities, focus groups Data analysis- thematic and narrative analysis	To discuss with older people what aging in place meant to them and whether it necessarily meant staying in the same place and advantages or disadvantages of that.	n= 121 Age: 56-92 (44 men, 77 women)	Older people want choice about where and how they age in place. Aging in place was seen as an advantage in terms of a sense of attachment or connection and feelings of security and familiarity in relation to both homes and communities. Aging in place related to a sense of identity both through independence and autonomy and through caring relationships and roles in the places people live. Aging in place had a practical advantage for the security and safety of home. It was important for participants to

				in their homes as long as possible for familiarity.
Wiles et al. (2012), New Zealand	Methodology: qualitative study Methods: Data collection- interviews in 2 case study communities, focus groups Data analysis- thematic and narrative analysis	To discuss with older people what aging in place meant to them and whether it necessarily meant staying in the same place and advantages or disadvantages of that.	n= 121 Age: 56-92 (44 men, 77 women)	Older people want choice about where and how they age in place. Aging in place was seen as an advantage in terms of a sense of attachment or connection and feelings of security and familiarity in relation to both homes and communities. Aging in place related to a sense of identity both through independence and autonomy and through caring relationships and roles in the places people live. Aging in place had a practical advantage for the security and safety of home. It was important for participants to in their homes as long as possible for familiarity.

Woolrych et al. (2020), India, Brazil, United Kingdom	Methodology: Qualitative research methods Methods: Data Collection- Face to face semi-structured interviews collected across 9 cities and 27 neighbourhoods, go-along interviews, and photo diaries. Data analysis: Cross-national analysis.	How place 'insideness' is experienced amongst older adults across India, Brazil, and the United Kingdom	n=294 Age: 60-94, either residing in the neighbourhoods of India, Brazil and United Kingdom	Lower-income communities in India and Brazil was notable different from the United Kingdom, including the absence of basic physical infrastructure which created barriers to accessing key services and opportunities. Place identity is being threatened within areas of urban regeneration and rapid physical transformation which is undermining a sense of connection to place with communities.
Yu and Rosenberg (2017), Beijing, China	Methodology: qualitative study Methods: Data collection- semi structured interviews with open ended questions Data analysis- Comparative methods	To explain the spatio-temporal processes of older people with their changing places. To explain how old age and place work in the context of urban China.	n= 47 (23 men, 51 women) Age: 60> years, currently residing at home in the community, with Beijing Hukou (Household registrar system).	Older people interpreted the meanings of place and their identities in the changing environments. The past are present in current place identity construction and why among the older people, thus how they cope in society in transition and their understanding of aging in

				place. Current older generation, their place identities are deeply rooted in pre reform collectivism and shaped by pre-reform socialist ideologies (equality, standardisation, uniformity).

APPENDIX E Critical appraisal and methodological quality of included studies

Citation	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10
Almevall et al. (2022)	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Aplin et al. (2013)	U	Y	Y	Y	Y	N	N	Y	Y	Y
Aplin et al. (2015)	U	Y	Y	Y	Y	U	N	Y	Y	Y
Bailey et al. (2019)	U	U	Y	Y	Y	N	N	Y	Y	Y
Baron et al. (2020)	U	U	U	U	U	N	Y	Y	Y	Y
Bergland and Slettebø (2018)	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Bigonnesse et al. (2014)	U	U	Y	Y	Y	N	U	Y	Y	Y
Black et al. (2015)	Y	Y	Y	Y	Y	N	Y	Y	U	Y
Bosch-Farre et al. (2020)	Y	Y	Y	Y	Y	N	Y	Y	Y	Y
Brim et al. (2021)	U	Y	Y	Y	Y	N	N	N	Y	U
Burgess and Quinio (2021)	Y	U	Y	U	Y	Y	N	Y	N	Y
Coleman and Wiles (2020)	Y	Y	Y	Y	Y	N	N	Y	U	Y
Dahlin-Ivanoff et al. (2007)	U	Y	Y	Y	Y	N	U	U	Y	Y
de Jonge et al. (2011)	U	Y	Y	U	Y	N	N	Y	Y	Y
Dendle et al. (2021)	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Dupuis-Blanchard et al. (2015)	U	Y	Y	U	Y	U	U	N	Y	Y
Elo et al. (2011)	U	Y	Y	U	U	N	U	N	U	U
Fausset et al. (2009)	U	Y	Y	U	U	N	N	N	U	U

Finlay et al. (2020)	U	Y	Y	Y	Y	N	N	Y	Y	Y
Fjell et al. (2021)	Y	Y	Y	Y	Y	Y	U	U	Y	Y
Gould et al. (2017)	U	Y	Y	Y	Y	N	N	Y	Y	Y
Grimmer et al. (2015)	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Hatcher et al. (2019)	U	Y	Y	Y	Y	N	N	Y	Y	Y
Juvani et al. (2005)	U	Y	Y	Y	Y	N	N	Y	U	Y
Lewis and Buffel (2020)	U	Y	Y	Y	Y	Y	N	Y	U	Y
Mackenzie et al. (2015)	Y	Y	Y	Y	Y	N	N	Y	Y	Y
Martin et al. (2019)	U	Y	N	Y	Y	N	N	U	Y	Y
Mortenson et al. (2016)	Y	Y	Y	Y	Y	N	N	Y	U	Y
Narushima and Kawabata (2020)	U	Y	Y	Y	Y	N	N	Y	Y	Y
Neville et al. (2021)	U	Y	Y	Y	Y	Y	U	Y	Y	Y
Neville et al. (2016)	Y	Y	Y	Y	Y	Y	N	Y	Y	Y
Norazizan et al. (2006)	Y	Y	Y	U	Y	Y	U	N	N	Y
Nosraty et al. (2015)	U	Y	Y	Y	Y	N	N	Y	Y	Y
Owens et al. (2021)	U	U	U	U	U	N	N	Y	Y	Y
Park and Ko (2020)	U	Y	Y	Y	Y	Y	N	Y	Y	Y
Puplampu et al. (2020)	U	Y	Y	Y	Y	N	Y	Y	Y	Y
Renaut et al. (2015)	U	Y	Y	Y	Y	N	N	Y	U	Y
Shin et al. (2021)	U	U	U	U	U	N	N	N	Y	U
Sixsmith et al. (2014)	U	Y	Y	Y	Y	N	N	Y	Y	Y
Tan et al. (2015)	U	Y	Y	Y	Y	N	N	Y	Y	Y
Tanner et al. (2008)	Y	Y	Y	Y	Y	N	N	Y	Y	Y

Vrkljan et al. (2011)	Y	Y	Y	Y	Y	N	Y	Y	Y	Y
Webber et al. (2022)	U	U	Y	U	U	N	N	N	N	Y
Wiles et al. (2012)	U	Y	Y	Y	Y	N	N	Y	Y	Y
Woolrych et al. (2020)	U	Y	Y	Y	Y	Y	U	Y	Y	Y
Yu and Rosenberg (2017)	U	Y	Y	Y	Y	N	N	Y	Y	Y
%	32.6	84.78	91.3	78.26	86.95	26.08	19.56	78.26	76.08	91.3

Y: yes; N: no; U: unclear; JBI Critical Appraisal Checklist for Qualitative Research

Q1 = Is there congruity between the stated philosophical perspective and the research methodology?

Q2 = Is there congruity between the research methodology and the research question or objectives?

Q3 = Is there congruity between the research methodology and the methods used to collect data?

Q4 = Is there congruity between the research methodology and the representation and analysis of data?

Q5 = Is there congruity between the research methodology and the interpretation of results?

Q6 = Is there a statement locating the researcher culturally or theoretically?

Q7 = Is the influence of the researcher on the research, and vice-versa, addressed?

Q8 = Are participants, and their voices, adequately represented?

Q9 = Is the research ethical according to current criteria or, for recent studies, is there evidence of ethical approval by an appropriate body?

Q10 = Do the conclusions drawn in the research report flow from the analysis, or interpretation, of the data?

A/Prof Kate Laver
College of Medicine and Public Health

Sturt Road
Bedford Park SA 5042

GPO Box 2100
Adelaide SA 5001

Tel: +61 8 7221 8335
Kate.Laver@flinders.edu.au

CRICOS Provider No. 00114A

INFORMATION SHEET
for older adults

Title: Assessing the home environment for future planning: interviews with older people and family members

Researcher
Associate Professor Kate Laver
College of Medicine and Public Health
Flinders University
Tel: 08 7221 8335

Description of the study
This study is part of the project titled "Assessing the home environment for future planning: interviews with older people and family members" This project will investigate people's thoughts around home modifications to create a safer home environment for people who are ageing. This project is supported by Flinders University, College of Medicine and Public Health.

Purpose of the study
This project aims to find out:
- What is currently understood about home safety and ageing in the home amongst older people or their families
- To identify what knowledge people would need to be able to assess their own home for safety and their preferences

What will I be asked to do?
You are invited to participate in a telephone interview with a researcher who will ask you a few questions regarding your views about ageing, staying at home and home modifications. Participation is entirely voluntary. The interview will take 30-60 minutes. The interview will be audio recorded using a digital voice recorder to help with reviewing the results. Once recorded, the interview will be transcribed (typed-up) and stored as a computer file.

What benefit will I gain from being involved in this study?
The sharing of your experiences will be beneficial in terms of informing the development of tools and checklists to support people and their families to better modify their homes as they age and increase the safety of the home environment. You will not receive any direct benefits.

Will I be identifiable by being involved in this study?
We will collect your name and your preferred mailing address but these details will not be linked to the audiorecording and the comments that you make in the interview. Your comments will not be linked directly to you. All information and results obtained in this study will be stored in a secure way, with access restricted to relevant researchers.

inspiring
achievement

Are there any risks or discomforts if I am involved?

The researcher anticipates few risks from your involvement in this study, however, some people may be concerned about health, ageing and their home and some participants could experience emotional discomfort. If any emotional discomfort is experienced please contact Lifeline on 13 11 14 for support / counselling that may be accessed free of charge by all participants. If you have any concerns regarding anticipated or actual risks or discomforts, please raise them with the researcher.

How do I agree to participate?

Participation is voluntary. You may answer 'no comment' or refuse to answer any questions, and you are free to withdraw from the interview at any time without effect or consequences. A consent form accompanies this information sheet. If you agree to participate please indicate this over the phone at the start of the interview to provide evidence of your consent to participate.

Recognition of Contribution

If you would like to participate, in recognition of your contribution and participation time, you will be provided with a $80.00 gift voucher which can be used at Coles/Myer. This voucher will be provided to you face-to-face on completion of the interview.

How will I receive feedback?

On project completion, a one page summary of the findings of the project will be given to all participants via their preferred method of contact (email or post)

Thank you for taking the time to read this information sheet, and we hope that you will accept our invitation to be involved.

This research project has been approved by the Flinders University Social and Behavioural Research Ethics Committee in South Australia (Project number 8589). For queries regarding the ethics approval of this project please contact the Executive Officer of the Committee via telephone on +61 8 8201 3116 or email human.researchethics@flinders.edu.au

APPENDIX G   Information sheet for relatives of older adults

A/Prof Kate Laver
College of Medicine and Public Health

Sturt Road
Bedford Park SA 5042

GPO Box 2100
Adelaide SA 5001

Tel: +61 8 7221 8335
Kate.Laver@flinders.edu.au

CRICOS Provider No. 00114A

INFORMATION SHEET
for participants – children of older people

Title: Assessing the home environment for future planning: interviews with older people and family members

Researcher
Associate Professor Kate Laver
College of Medicine and Public Health
Flinders University
Tel: 08 7221 8335

Description of the study
This study is part of the project titled "Assessing the home environment for future planning: interviews with older people and family members" This project will investigate people's thoughts around home modifications to create a safer home environment for people who are ageing. This project is supported by Flinders University, College of Medicine and Public Health.

Purpose of the study
This project aims to find out:
- What is currently understood about home safety and ageing in the home amongst family members of older people
- To identify what knowledge people would need to be able to assess a family member's home for safety and their preferences for the method of assessment

What will I be asked to do?
You are invited to participate in a telephone interview with a researcher who will ask you a few questions regarding your views about older family members ageing, staying at home and home modifications. Participation is entirely voluntary. The interview will take 30-60 minutes. The interview will be audio recorded using a digital voice recorder to help with reviewing the results. Once recorded, the interview will be transcribed (typed-up) and stored as a computer file.

What benefit will I gain from being involved in this study?
The sharing of your experiences will be beneficial in terms of informing the development of tools and checklists to support people and their families to better modify their homes as they age and increase the safety of the home environment. You will not receive any direct benefits.

Will I be identifiable by being involved in this study?
We will collect your name and your preferred mailing address but these details will not be linked to the audiorecording and the comments that you make in the interview. All information and results obtained in this study will be stored in a secure way, with access restricted to relevant researchers.

inspiring achievement

Are there any risks or discomforts if I am involved?

The researcher anticipates few risks from your involvement in this study, however, some people may be concerned about their family members, health, ageing and their home and some participants could experience emotional discomfort. If any emotional discomfort is experienced, please contact Lifeline on 13 11 14 for support / counselling that may be accessed free of charge by all participants. If you have any concerns regarding anticipated or actual risks or discomforts, please raise them with the researcher.

How do I agree to participate?

Participation is voluntary. You may answer 'no comment' or refuse to answer any questions, and you are free to withdraw from the interview at any time without effect or consequences. A consent form accompanies this information sheet. If you agree to participate please indicate this over the phone at the start of the interview to provide evidence of your consent to participate.

Recognition of Contribution

If you would like to participate, in recognition of your contribution and participation time, you will be provided with a $80.00 gift voucher which can be used at Coles/Myer. This voucher will be provided to you face-to-face on completion of the interview.

How will I receive feedback?

On project completion, a one page summary of the findings of the project will be given to all participants via their preferred method of contact (email or post)

Thank you for taking the time to read this information sheet, and we hope that you will accept our invitation to be involved.

APPENDIX H   COREQ Checklist

COREQ (COnsolidated criteria for REporting Qualitative research) Checklist

A checklist of items that should be included in reports of qualitative research. You must report the page number in your manuscript where you consider each of the items listed in this checklist. If you have not included this information, either revise your manuscript accordingly before submitting or note N/A.

Topic	Item No.	Guide Questions/Description	Reported on Page No.
Domain 1: Research team and reflexivity			
Personal characteristics			
Interviewer/facilitator	1	Which author/s conducted the interview or focus group?	89
Credentials	2	What were the researcher's credentials? E.g. PhD, MD	title pg
Occupation	3	What was their occupation at the time of the study?	title pg
Gender	4	Was the researcher male or female?	Female
Experience and training	5	What experience or training did the researcher have?	n/a for thesis
Relationship with participants			
Relationship established	6	Was a relationship established prior to study commencement?	89
Participant knowledge of the interviewer	7	What did the participants know about the researcher? e.g. personal goals, reasons for doing the research	89
Interviewer characteristics	8	What characteristics were reported about the inter viewer/facilitator? e.g. Bias, assumptions, reasons and interests in the research topic	100
Domain 2: Study design			
Theoretical framework			
Methodological orientation and Theory	9	What methodological orientation was stated to underpin the study? e.g. grounded theory, discourse analysis, ethnography, phenomenology, content analysis	89
Participant selection			
Sampling	10	How were participants selected? e.g. purposive, convenience, consecutive, snowball	88-89
Method of approach	11	How were participants approached? e.g. face-to-face, telephone, mail, email	88-89
Sample size	12	How many participants were in the study?	90
Non-participation	13	How many people refused to participate or dropped out? Reasons?	N/A
Setting			
Setting of data collection	14	Where was the data collected? e.g. home, clinic, workplace	89
Presence of non-participants	15	Was anyone else present besides the participants and researchers?	N/A
Description of sample	16	What are the important characteristics of the sample? e.g. demographic data, date	90
Data collection			
Interview guide	17	Were questions, prompts, guides provided by the authors? Was it pilot tested?	appendix I
Repeat interviews	18	Were repeat inter views carried out? If yes, how many?	N/A
Audio/visual recording	19	Did the research use audio or visual recording to collect the data?	89
Field notes	20	Were field notes made during and/or after the inter view or focus group?	89
Duration	21	What was the duration of the inter views or focus group?	89
Data saturation	22	Was data saturation discussed?	89
Transcripts returned	23	Were transcripts returned to participants for comment and/or	No

Topic	Item No.	Guide Questions/Description	Reported on Page No.
		correction?	
Domain 3: analysis and findings			
Data analysis			
Number of data coders	24	How many data coders coded the data?	89-90
Description of the coding tree	25	Did authors provide a description of the coding tree?	no
Derivation of themes	26	Were themes identified in advance or derived from the data?	89,90,91
Software	27	What software, if applicable, was used to manage the data?	89
Participant checking	28	Did participants provide feedback on the findings?	no
Reporting			
Quotations presented	29	Were participant quotations presented to illustrate the themes/findings? Was each quotation identified? e.g. participant number	91-98
Data and findings consistent	30	Was there consistency between the data presented and the findings?	98-100
Clarity of major themes	31	Were major themes clearly presented in the findings?	91-98
Clarity of minor themes	32	Is there a description of diverse cases or discussion of minor themes?	only major

Once you have completed this checklist, please save a copy and upload it as part of your submission. DO NOT include this checklist as part of the main manuscript document. It must be uploaded as a separate file.

APPENDIX I   Interview questions for qualitative study

Interview questions designed for group of older people with slight modification to wording for the second group who represent children of older people.

Introduction: "Research shows that most people want to remain in their own homes for as long as possible. But over time people might need some modifications to help with safety"

What are your main concerns about staying in your own home environment as you age?

Are you familiar with modifications that may be made to the home?

Have you had any modifications to your own home? What type and who made them?

Where have you received information about the types of modifications that are available? And do you know much about the costs of modifications?

What are your thoughts about having a professional assess for these and make recommendations? Or is it something you think you could do yourself (ie common sense)?

What do you think about having a professional make the modifications? Or would you ask a family member to help with this type of thing Information sharing: We are looking at designing a type of checklist which would help people (or their family members) to review their own home and identify the types of things that might be helpful to do in advance.

What are your thoughts about doing a self assessment? Would you like to do this or do you lack confidence in your knowledge and skills

What format might suit best? (eg online, mobile app, written)

Who would be the best person to distribute this? (eg local council, COTA, health department, GP)

Do you have any examples of good 'self assessments' that you've used before?

Is there any other information that you think would be helpful related to this topic?

APPENDIX J   Hard copy of self-assessment checklist

GENERAL

1. Is it possible to safely check who is at the door?

○ Yes

○ No

○ Not applicable

TIP: Consider installation of screen door, peephole or doorbell with camera

2. Are there telephones in multiple locations in the house or a mobile phone?

○ Yes

○ No

○ Not applicable

TIP: Use a mobile phone or consider phone placement

3. Are smoke alarms in place and in working order?

○ Yes

○ No

○ Not applicable

TIP: Replace or install smoke alarms

4. Are sensor lights in place to assist walking indoors and outdoors overnight?

○ Yes

○ No

○ Not applicable

TIP: Install sensor lights where needed

5. Is an electrical safety switch installed?

○ Yes

○ No

○ Not applicable

TIP: Arrange installation of electrical safety switch

6. Is there a small fire hydrant and fire blanket in the house?

○ Yes

○ No

○ Not applicable

TIP: Consider purchase of small fire hydrant and fire blanket

7. **Are there spare keys to access the house? Either hidden outside, in a locked key box or with a trusted family member or friend.**

○ Yes

○ No

○ Not applicable

TIP: Consider best option for spare keys including a locked key box with code entry installed outside the home.

8. **Are there torches accessible and working in case of a blackout?**

○ Yes

○ No

○ Not applicable

TIP: Place torches in good working order in an accessible spot

9. **Is there a well stocked first aid kit which is regularly checked for out-of-date medications?**

○ Yes

○ No

○ Not applicable

TIP: Update your first aid kit and clean out yearly

CLEANING AND MAINTENANCE

10. Are clotheslines easy to access (height? Location?)

○ Yes

○ No

○ Not applicable

TIP: Consider lowering or relocating clothesline or installing an alternative line for small amounts of washing

11. Is there an irrigation system in place to assist with ease of watering?

○ Yes

○ No

○ Not applicable

TIP: Consider having an irrigation system installed

12. Are there strategies to change lightbulbs, access high cupboards and clean gutters which don't require use of a ladder?

○ Yes

○ No

○ Not applicable

TIP: Consider purchase of a supportive step stool. Investigate options to assist with home maintenance such as the local council services

13. Are long lasting lightbulbs (LED) installed to reduce the need for frequent changing?

○ Yes

○ No

○ Not applicable

TIP: Consider organising an electrician to change over to LED lightbulbs

14. Is the home largely clutter free?

○ Yes

○ No

○ Not applicable

TIP: Have a large clean out where you donate or dispose of unwanted or unnecessary belongings. If you need help, organise a decluttering service to do so.

15. Is there a supportive stepstool available to access items which are just out of reach?

○ Yes

○ No

○ Not applicable

FRONT GARDEN AND ENTRY

16. Are paths relatively flat and approximately 1000mm wide?

○ Yes

○ No

○ Not applicable

TIP: Consider landscaping to improve path gradient and width

17. Do paths and driveways have a non-slip texture and are they free of moss?

○ Yes

○ No

○ Not applicable

TIP: Maintain paths and consider resurfacing if slippery

18. Is the gate easy to open?

○ Yes

○ No

○ Not applicable

TIP: Replace, remove or fix gate

19. Are steps a suitable height (115-190mm) and depth (240-355mm), and stable?

○ Yes

○ No

○ Not applicable

TIP: Arrange modification of steps with help from a tradesperson if needed

20. Is it easy to unlock the front door and use the door handle?

○ Yes

○ No

○ Not applicable

TIP: Replace or fix the lock and handle

21. Is a lockable screen door in place to enable access to fresh air and maintain security?

○ Yes

○ No

○ Not applicable

TIP: Install lockable screen door

22. Is there space within the garage or carport to easily open the car door and get out?

○ Yes

○ No

○ Not applicable

TIP: Clear space or consider an alternative place to park

23. Is the letterbox easy to access and open?

○ Yes

○ No

○ Not applicable

TIP: Replace, relocate or fix the letterbox

24. Is there at least one way to access the home without a step?

○ Yes

○ No

○ Not applicable

HALLWAYS

25. Are hallways free of clutter and unnecessary furniture?

○ Yes

○ No

○ Not applicable

TIP: Remove unnecessary clutter and furniture

26. Are floor coverings secure and in good condition?

○ Yes

○ No

○ Not applicable

TIP: Remove or repair floor coverings

27. Is the house free of internal steps?

○ Yes

○ No

○ Not applicable

KITCHEN

28. Is there room within the kitchen to easily manoeuvre?

○ Yes

○ No

○ Not applicable

TIP: Consider reorganising the space and removing unnecessary items

29. Are benches clear?

○ Yes

○ No

○ Not applicable

TIP: Clear benchtops of unnecessary objects

30. Are rugs or floor coverings secure and in good condition?

○ Yes

○ No

○ Not applicable

TIP: Remove or repair floor coverings

31. Are you able to easily reach commonly used items without tiptoes, a stepladder, or bending too low

○ Yes

○ No

○ Not applicable

TIP: Move commonly used items to between knee and shoulder height

32. Are taps easy to turn on, off and adjust?

○ Yes

○ No

○ Not applicable

TIP: Consider repairing or replacing with lever taps

33. Can appliance controls easily be accessed?

○ Yes

○ No

○ Not applicable

TIP: Move objects or controls so that they are easily accessible

34. Is there space next to the microwave, oven and stove top to place hot food?

○ Yes

○ No

○ Not applicable

TIP: Clear or create a space to place hot food

35. Is there a carbon monoxide detector installed to detect carbon monixide and prevent poisoning?

○ Yes

○ No

○ Not applicable

TIP: Consider installation of carbon monoxide detector

36. Is there a space in the kitchen area where you could sit if needed to prepare food?

○ Yes

○ No

○ Not applicable

TIP: Create a space in the kitchen or dining room that could be used for sitting to prepare food

37. Are stools a comfortable height and stable?

○ Yes

○ No

○ Not applicable

TIP: Replace with stools that are easy to get on and off

38. Are the oven and microwave located at a suitable height? With access between knee and shoulder height?

○ Yes

○ No

○ Not applicable

TIP: Relocate to height between shoulders and knees.

39. Are bench tops a suitable height (850mm to 1050mm)

○ Yes

○ No

○ Not applicable

BATHROOM

40. Is there room within the bathroom to easily manoeuvre?

○ Yes

○ No

○ Not applicable

TIP: Consider rearranging items within the bathroom to create space

41. Are rugs or mats secure and in good condition?

○ Yes

○ No

○ Not applicable

TIP: Remove or repair floor coverings

42. Is there adequate ventilation with presence of a fan or easily opened window?

○ Yes

○ No

○ Not applicable

TIP: Consider installing fan or repairing window

43. Is the transition between the floor and shower flat?

○ Yes

○ No

○ Not applicable

TIP: Consider whether a rail in the shower would be helpful to hold when stepping over the step or lip

44. Is a shower hose in place?

○ Yes

○ No

○ Not applicable

TIP: Consider installation of shower hose

45. Are taps easy to turn on, off and adjust?

○ Yes

○ No

○ Not applicable

TIP: Consider repairing or replacing with lever taps

46. Is water thermostatically controlled to a delivery temperature of 45 degrees?

○ Yes

○ No

○ Not applicable
TIP: Adjust thermostat to deliver temperature of 45 degrees

47. Is the floor surface non-slip?

○ Yes

○ No

○ Not applicable
TIP: Consider modifying flooring or adding non-slip coating

48. Is the shower cubicle a minimum of 900mm x 900mm?

○ Yes

○ No

○ Not applicable
TIP: Consider modifying shower cubicle to increase size

TOILET

49. Is the toilet a suitable height? (460-480mm)

○ Yes

○ No

○ Not applicable

TIP: Consider installation of a rail next to the toilet or replacing the toilet to one with a higher seat

50. Are rugs or mats secure and in good condition and necessary?

○ Yes

○ No

○ Not applicable

TIP: Remove or repair floor coverings

51. Does the door swing outwards?

○ Yes

○ No

○ Not applicable

BEDROOM

52. Is the bed a comfortable height to access and rise from?

○ Yes

○ No

○ Not applicable

TIP: Consider raising the height of the bed

53. Is there space to easily manoeuvre within the bedroom?

○ Yes

○ No

○ Not applicable

TIP: Rearrange furniture to improve access

54. Is there access to a light and phone next to the bed?

○ Yes

○ No

○ Not applicable

TIP: Ensure light and phone is next to bed

55. Are floor covering secure and in good condition?

○ Yes

○ No

○ Not applicable

TIP: Remove or repair floor coverings

56. Is there somewhere to sit while dressing and putting on shoes?

○ Yes

○ No

○ Not applicable

TIP: Consider placing a chair in the bedroom

57. Is it easy to access clothing and shoes without excessive reaching or bending?

○ Yes

○ No

○ Not applicable

TIP: Rearrange clothes and shoes so that they can be easily accessed

58. Is it easy to open and close windows and blinds?

○ Yes

○ No

○ Not applicable
TIP: Move furniture if required or modify windows and blinds

59. Can the temperature in the bedroom be easily adjusted?

○ Yes

○ No

○ Not applicable

LIVING AREA

60. Is there space to easily manoeuvre within the living area?

○ Yes

○ No

○ Not applicable

TIP: rearrange furniture to create space

61. Are floor covering secure and in good condition?

○ Yes

○ No

○ Not applicable

TIP: Remove or repair floor coverings

62. Is there good storage so that all items have a spot?

○ Yes

○ No

○ Not applicable

TIP: Clean out area, reorganise items and consider improving storage options

63. Is the room free of cords in walkways which may cause trips?

○ Yes

○ No

○ Not applicable

TIP: Rearrange cords and furniture. Consider installation of new power points

64. Is it easy to access heating and cooling controls?

○ Yes

○ No

○ Not applicable

TIP: Move controls if required

65. Is it easy to open and close windows and blinds?

○ Yes

○ No

○ Not applicable

TIP: Move furniture if required or modify windows and blinds

66. Are chairs in the room easy to get in and out of?

○ Yes

○ No

○ Not applicable

LAUNDRY

67. Is there adequate benchspace in the laundry?

○ Yes

○ No

○ Not applicable

TIP: Clear benches and consider adding more benchspace if required

68. Can all appliances be easily access and plugged in when needed?

○ Yes

○ No

○ Not applicable

TIP: rearrange items so that they can be easily accessed

69. Is there room in the house to hang small items of laundry to dry when needed?

○ Yes

○ No

○ Not applicable

TIP: Use a clothes horse or install hooks where a washing line could be assembled if required

70. Is the washing machine front loading?

○ Yes

○ No

○ Not applicable

TIP: Consider purchasing front loading washing machine in future

BACK GARDEN

71. Are paths relatively flat and approxmately 1000mm wide?

○ Yes

○ No

○ Not applicable

TIP: Modify landscaping so that paths are relatively flat and widen as needed

72. Are doorways a minimum of 850mm wide?

○ Yes

○ No

○ Not applicable

TIP: Consider having narrow doorways widened

73. Is it possible to access the clothesline without excessive reaching?

○ Yes

○ No

○ Not applicable

TIP: Consider moving or lowering the clothesline

74. Is the garden low maintenance in terms of watering requirements, lawn mowing and management of autumn leaves?

○ Yes

○ No

○ Not applicable

TIP: Consider landscaping options to reduce maintenance required in garden

75. Are there shady areas outside to sit?

○ Yes

○ No

○ Not applicable

TIP: Consider creating shady outside areas in the garden for sitting

76. Is outdoor furniture sturdy, comfortable and easy to get on/off?

○ Yes

○ No

○ Not applicable

TIP: Consider repairing or replacing outdoor furniture

NEIGHBOURHOOD

77. Is there access to public transport nearby

○ Yes

○ No

○ Not applicable

TIP: Investigate best transport options

78. Are there shops nearby?

○ Yes

○ No

○ Not applicable

TIP: Investigate best local shopping options

79. Are there local parks or pleasant walking areas nearby?

○ Yes

○ No

○ Not applicable

TIP: Explore area for local parks or walks

80. Is there a medical clinic and pharmacy nearby?

○ Yes

○ No

○ Not applicable

TIP: Investigate best clinic and/or pharmacy nearby

81. Are there local council facilities nearby that are of interest?

○ Yes

○ No

○ Not applicable

TIP: Explore what the local council offers

82. Are there cafes and restaurants nearby?

○ Yes

○ No

○ Not applicable

TIP: Explore area for local cafes and restaurants

83. Are neighbourhood footpaths present and in good condition?

○ Yes

○ No

○ Not applicable

TIP: Inform local council of footpaths in need of repair

84. Is it possible to safely cross main roads nearby?

○ Yes

○ No

○ Not applicable

TIP: Investigate best options for crossing main roads

INTERNAL STAIRS

85. Do internal stairs have a sturdy rail in place?

○ Yes

○ No

○ Not applicable

TIP: Repair, replace or install a handrail

86. Are doorways a minimum of 850mm wide?

○ Yes

○ No

○ Not applicable

TIP: Consider having narrow doorways widened

87. Are door handles lever style?

○ Yes

○ No

○ Not applicable

TIP: Consider replacing knob style handles with levers

88. Can doors and windows be easily opened to allow for fresh air?

○ Yes

○ No

○ Not applicable

TIP: Repair or upgrade windows so that they can be easily opened and allow fresh air inside

89. Have Smart Home options been considered?

○ Yes

○ No

○ Not applicable

PARTICIPANT INFORMATION SHEET AND CONSENT FORM

Title: What modifications could be made to your home to support healthy ageing?

Chief Investigator
Ms Roslyn Dalistan
PhD Candidate
College of Medicine and Public Health, Flinders University
Email: dali0009@flinders.edu.au
Responsibilities: Contributor to design, data collection, analysis and reporting of results. This research will form part of Roslyn's PhD

Co-Investigator
A/Prof Kate Laver
College of Medicine and Public Health, Flinders University
Ph 08 7221 83335
Responsibilities: Project design, project management, overseeing data collection, storage, analysis and reporting of results.

Associate Investigator
Professor Stacey George
College of Nursing and Health Sciences, Flinders University

Description and purpose of the study
Our research group has designed a website (electronic health tool) which contains questions to help you assess your own home and understand what changes may be needed over time (e.g., rearranging furniture to clear walkways or fixing steep or uneven steps). We are interested in testing the website with a range of people to see whether it is easy to use and provides useful information. We will be testing whether participants and occupational therapists get the same results when using the website to assess the home. This project is supported by Flinders University, College of Medicine and Public Health.

Benefits of the study
The project aims to work with older adults to understand
- How electronic health tools can be used for self-assessments within the home and whether this can reach similar findings to an occupational therapy assessment.
- How the electronic health tool works in terms of ease and usefulness to identify home hazards
- If the tool is easy to use, useful and provides accurate information it can be shared widely to members of the general public and used to help with future planning.

inspiring achievement

Participant involvement and potential risks

If you agree to participate in the research study, you will be:

- Visited by a research occupational therapist.
- Asked to complete an assessment of your own home environment on a study iPad whilst walking around your own home with the occupational therapist. This is expected to take 60 minutes. You will be observed completing the tool.
- At the same time, an Occupational Therapist will also be walking through your home to evaluate the home environment from an Occupational Therapist's perspective.
- You and the Occupational Therapist will not discuss the content of the assessment, but instead, complete the assessment independently.

Please note that two staff members will be sent to your home (one to assess the home and one to assist you as needed).

Potential risks

The researchers do not expect the questions to cause any harm or discomfort to you. However, if you experience feelings of distress as a result of participation in this study, please let the research team know immediately. You can also contact the following services for support:

- Lifeline – 13 11 14, www.lifeline.org.au
- Beyond Blue – 1300 22 4636, www.beyondblue.org.au

Withdrawal Rights

You may, without any penalty, decline to take part at any time in this research study. You may decline after initially agreeing, or at the commencement or during the assessment of the home environment. You may withdraw at any time without providing an explanation. To withdraw, you may either contact the Chief Investigator, inform the research team during your home assessment or refuse to answer any further questions. Any data collected up to the point of your withdrawal will be securely destroyed.

Confidentiality and Privacy

Only researchers listed on this form have access to the individual information provided by you. Privacy and confidentiality will be assured at all times. The research outcomes may be presented at conferences, presented in journal articles or used for other research purposes as described in this information form. However, the privacy and confidentiality of individuals will be protected at all times. You will not be named, and your individual information will not be identifiable in any research products without your explicit consent. We may use your data (without your personal details) in future research projects without contacting you again to gain explicit consent.

How do I agree to participate?

Participation is voluntary. You may answer 'no comment' or refuse to answer any questions, and you are free to withdraw from the study at any time without effect or consequences. A consent form accompanies this information sheet. If you agree to participate, please indicate this over the phone or sign your name to provide evidence of your consent to participate.

Data Storage

The information collected may be stored securely on a password protected computer and/or Flinders University server throughout the study. Any identifiable data will be de-identified for data storage purposes unless indicated otherwise. All data will be securely transferred to and stored at Flinders University for five years after publication of the results. Following the required data storage period, all data will be securely destroyed according to university protocols.

CONSENT FORM

Consent Statement

☐ I have read and understood the information about the research, and I understand I am being asked to provide informed consent to participate in this research study. I understand that I can contact the research team if I have further questions about this research study.

☐ I am not aware of any condition that would prevent my participation, and I agree to participate in this project.

☐ I understand that I am free to withdraw at any time during the study.

☐ I understand that I can contact Flinders University's Research Ethics & Compliance Office if I have any complaints or reservations about the ethical conduct of this study.

☐ I understand that my involvement is confidential, and that the information collected may be published. I understand that I will not be identified in any research products.

I further consent to:

☐ my data and information being used in this project and other related projects for an extended period of time (no more than 10 years after publication of the data)

Signed:

Name:

Date:

Recognition of Contribution / Time / Travel costs
If you would like to participate, in recognition of your contribution and participation time, you will be provided with a $20.00 voucher issued through GiftPay (which can be used at a range of retailers). This voucher will be emailed to you on completion of the interview.

How will I receive feedback?
On project completion, a short summary of the outcomes will be provided to all participants via email or post. An individual summary of your own home environment assessment will also be emailed or posted.

Ethics Committee Approval
The project has been approved by Flinders University's Human Research Ethics Committee Project ID 5303.

Queries and Concerns
Queries or concerns regarding the research can be directed to the research team. If you have any complaints or reservations about the ethical conduct of this study, you may contact the Flinders University's Research Ethics & Compliance Office team via telephone 08 8201 2543 or email human.researchethics@flinders.edu.au.

Thank you for taking the time to read this information sheet which is yours to keep. If you accept our invitation to be involved, please sign the enclosed Consent Form.

APPENDIX L   Ethics approval

![Flinders University logo]

HUMAN ETHICS LOW RISK PANEL
APPROVAL NOTICE

Dear Miss Roslyn Dalistan,

The below proposed project has been **approved** on the basis of the information contained in the application and its attachments.

Project No:	5303
Project Title:	Validation of a digital tool for self-assessment of the home environment
Primary Researcher:	Miss Roslyn Dalistan
Approval Date:	29/04/2022
Expiry Date:	01/06/2023
Conditions of Approval:	None

Please note: Due to the current COVID-19 situation, researchers are strongly advised to develop a research design that aligns with the University's COVID-19 research protocol involving human studies. Where possible, avoid face-to-face testing and consider rescheduling face-to-face testing or undertaking alternative distance/online data or interview collection means. For further information, please go to https://staff.flinders.edu.au/coronavirus-information/research-updates.

RESPONSIBILITIES OF RESEARCHERS AND SUPERVISORS

1. Participant Documentation

Please note that it is the responsibility of researchers and supervisors, in the case of student projects, to ensure that:

- all participant documents are checked for spelling, grammatical, numbering and formatting errors. The Committee does not accept any responsibility for the above mentioned errors.

- the Flinders University logo is included on all participant documentation (e.g., letters of Introduction, information Sheets, consent forms, debriefing information and questionnaires – with the exception of purchased research tools) and the current Flinders University letterhead is included in the header of all letters of introduction. The Flinders University international logo/letterhead should be used and documentation should contain international dialing codes for all telephone and fax numbers listed for all research to be conducted overseas.

2. Annual Progress / Final Reports

In order to comply with the monitoring requirements of the *National Statement on Ethical Conduct in Human Research 2007 (updated 2018)* an annual progress report must be submitted each year on the approval anniversary date for the duration of the ethics approval using the HREC Annual/Final Report Form available online via the ResearchNow Ethics & Biosafety system.

<u>Please note</u> that no data collection can be undertaken after the ethics approval expiry date listed at the top of this notice. If data is collected after expiry, it will not be covered in terms of ethics. It is the responsibility of the researcher to ensure that annual progress reports are submitted on time; and that no data is collected after ethics has expired.

If the project is completed *before* ethics approval has expired please ensure a final report is submitted immediately. If ethics approval for your project expires please <u>either</u> submit (1) a final report; <u>or</u> (2) an extension of time request (using the HREC Modification Form).

For <u>student projects</u>, the Low Risk Panel recommends that current ethics approval is maintained until a student's thesis has been submitted, assessed and finalised. This is to protect the student in the event that reviewers recommend that additional data be collected from participants.

3. Modifications to Project

Modifications to the project must not proceed until approval has been obtained from the Ethics Committee. Such proposed changes / modifications include:

- change of project title;
- change to research team (e.g., additions, removals, researchers and supervisors)
- changes to research objectives;
- changes to research protocol;
- changes to participant recruitment methods;
- changes / additions to source(s) of participants;
- changes of procedures used to seek informed consent;
- changes to reimbursements provided to participants;
- changes to information / documents to be given to potential participants;
- changes to research tools (e.g., survey, interview questions, focus group questions etc);
- extensions of time (i.e. to extend the period of ethics approval past current expiry date).

To notify the Committee of any proposed modifications to the project please submit a Modification Request Form available online via the ResearchNow Ethics & Biosafety system. Please note that extension of time requests should be submitted prior to the Ethics Approval Expiry Date listed on this notice.

4. Adverse Events and/or Complaints

Researchers should advise the Executive Officer of the Human Research Ethics Committee on at human.researchethics@flinders.edu.au immediately if:

- any complaints regarding the research are received;
- a serious or unexpected adverse event occurs that effects participants;
- an unforeseen event occurs that may affect the ethical acceptability of the project.

Yours sincerely,

Camilla Dorian

on behalf of

Human Ethics Low Risk Panel
Research Development and Support
human.researchethics@flinders.edu.au

Flinders University
Sturt Road, Bedford Park, South Australia, 5042
GPO Box 2100, Adelaide, South Australia, 5001

http://www.flinders.edu.au/research/researcher-support/ebi/human-ethics/human-ethics_home.cfm

ResearchNow
Ethics & Biosafety

Proactively supporting our Research

APPENDIX M   Demographics data collection sheet

What modifications could be made to your home to support healthy ageing?
Sociodemographic information

Date Screened: **ID:**

Screening questions:

	Response	
Aged 50 or older	YES	NO
Living in own home	YES	NO
Modified Rankin Score*	0= No symptoms at all 1= No significant disability despite symptoms; able to carry out all usual duties and activities 2= Slight disability, unable to carry out all previous activities, but able to look after own affairs without assistance 3 = Moderate disability requiring some help, but able to walk without assistance 4 = Moderate severe disability; unable to walk without assistance and unable to attend to own bodily needs without assistance 5 = Severe disability; bedridden, incontinent, and requiring constant nursing care and attention	
Pre-offsite visit risk assessment		
a. **Location-** Easy access available?	YES	NO
b. **Person/s present-** Who is likely to be present?	YES	NO
c. **Client details-** Confirm consent to participate and attendance of the second person. Consent for other family for the visit to occur.	YES	NO

*van Swieten, J. C., Koudstaal, P. J., Visser, M. C., Schouten, H. J., van Gijn, J. (1988). Interobserver agreement for the assessment of handicap in stroke patients. Stroke, 19, 604607.

d.	Does the client have any pets?	YES	NO	
Covid screening questions				
a.	Have you tested positive for COVID-19; or	YES	NO	
b.	Are you awaiting COVID-19 test results?;	YES	NO	
c.	Have you been identified as a primary close contact or secondary close contact of someone who has COVID-19 within the last 14 days?;	YES	NO	
d.	Have you got a temperature higher than 37.5°C or	YES	NO	
e.	Have you got symptoms of a cold or a cough such as: breathing difficulties such as breathlessness, cough, sore throat, runny nose, fatigue or tiredness, loss of taste or smell?	YES	NO	

Date completed:

PERSON	Age	
	Gender	☐ Male ☐ Female ☐ Other
	Postcode	
	Marital status	☐ Married ☐ Divorced ☐ Separated ☐ Single ☐ Widowed ☐ Other

2

inspiring
achievement

	Highest level of education	☐ None ☐ Primary school ☐ Secondary school ☐ High school ☐ Higher education ☐ Other
	Main occupation (in working years)	
LIVING SITUATION	Living status	☐ Lives alone ☐ Lives with spouse only ☐ Live with family members ☐ Live with friends ☐ Other: _____
	Type of housing	☐ Private ownership ☐ Private rental home ☐ Public housing (i.e. SA Housing Trust) ☐ Supported housing ☐ Other: _____
	Home structure	☐ House ☐ Unit ☐ Townhouse ☐ Retirement village ☐ Other: _____
	Does the person have any immediate intentions to move or relocate?	
	Social situation *(community services, informal services, dependents)*	
	Current equipment used	

inspiring
achievement

276

OBSERVATIONS	How long did it take to complete the self-assessment?	
	Was the self-assessment easy to use?	Comments Score 1-10 (1 hard, 10 easy)
	Was there any technical difficulties?	Comments
	Other observations:	

inspiring achievement

APPENDIX N   Timeline of PhD studies

2021

Commenced PhD studies & enrolled in Masters by Research

2022
-Upgraded to PhD and gained ethics approval for agreement (validity) study
-Completed study 1: qualitative meta-analysis-
-Completed study 2: qualitative study data analysis

2023
-Data collection completed for study 4: prospective cohort study & study 5: agreement (validity) study-
-Completed study 4 & 5-
-Thesis write up

2024
Completion of thesis write up and PhD submission

APPENDIX O   Published paper: qualitative meta-analysis

Aclan, R., George, S., Block, H., Lane, R., & Laver, K. (2023). Middle aged and older adult's perspectives of their own home environment: a review of qualitative studies and meta-synthesis. BMC Geriatrics, 23(1), 707. https://doi.org/10.1186/s12877-023-04279-1

RESEARCH   **Open Access**

Middle aged and older adult's perspectives of their own home environment: a review of qualitative studies and meta-synthesis

Roslyn Aclan[1*], Stacey George[2], Heather Block[3], Rachel Lane[1] and Kate Laver[4*]

Abstract

Background Most people prefer to remain in their homes and communities as long as possible. Staying at home is widely beneficial as ageing within the home promotes independence and costs less than residential aged care. Understanding meanings and drivers of remaining at home is an area of importance.

Objective The objective of this systematic review of qualitative studies was to synthesise middle and older aged adult's perspective of their home environment and determine the factors that are important when making decisions about future housing.

Methods This review and meta-synthesis was conducted in accordance with JBI (formally known as the Joanna Briggs Institute) methodology for systematic reviews of qualitative evidence. Meta-aggregation was used as the method of synthesis. Included qualitative studies involved middle and older aged adults and their views about ageing and housing. Published studies were identified in four electronic databases and grey literature. Critical appraisal and extraction were conducted using JBI tools and findings were categorised and synthesised into findings.

Results A total of 46 papers with 5183 participants on the concept of home were included. Most of the participants were older (> 65 years old) and the perspectives of middle-aged people were largely absent. Factors impacting on future housing decisions among individuals were identified. Seven synthesized findings emerged—independence, finances, stigma, attitudes towards ageing, attachments with home, aesthetics, and family connection.

Conclusion Older people have a greater sense of independence and autonomy if they remain in their own home. Multiple external factors impacted on their perspectives including a sense of stigma about ageing, fear of being a burden to others and their own financial position which in some cases restricted their options. This review provides a comprehensive description of the different factors that need to be considered when planning future housing needs; both for individuals and for communities.

Keywords Age-in-place, Housing, Views, Meta-synthesis

*Correspondence:
Roslyn Aclan
roslyn.dalistan@flinders.edu.au
Kate Laver
kate.laver@flinders.edu.au
Full list of author information is available at the end of the article

Aclan et al. BMC Geriatrics   (2023) 23:707

Page 2 of 12

Background

Globally, there are an estimated 1 billion older people aged 60 years and older [1]. This number is expected to rise and nearly double from 12% of the population to 22%, due to continued decline in fertility rates and increased life expectancy [2]. Functional ability is determined based on the intrinsic capacity of the individual, the environment a person lives in and how they interact within their environment [3]. Ageing can reduce a person's intrinsic capacity thereby reducing their functional ability [4]. As a result, their ability to live independently may be compromised. When this occurs, support may be needed to help the person 'age in place' through modification of the home (e.g., with ramps or rails).

A review by Pani-Harreman et al. [5] found that 'Ageing in place' refers not only to the characteristics of the home but also to social and support networks that surround the person. Most people prefer to remain in their homes for as long as possible and supporting ageing in place (within the home) is much less expensive for governments than funding residential care places [6–10]. Research suggests that formal support or home is an effective method of enabling the ageing population to remain at home [11, 12]. Many countries are now attempting to improve the provision of home care to support ageing in place, rather than investing in residential care facilities [13]. Worldwide, the expenditure on long term care is expected to increase from 1.5% in 2010 to more than 3% in 2050 [11]. For example, in Australia, it costs $85,818 total operational costs per residential aged care bed per annum, versus $26,382per annum for the cost of home care packages [14, 15]. Other research shows, in Germany, the average cost of nursing home care is $49,219 per annum, whilst long term care costs an average of $43,997 per annum [16]. Similarly, in America, the average cost of home care per month is approximately $3500 per month versus $7000 per month for the cost of care in a nursing home [17]. Previous studies show that older adults have a strong emotional attachment to their home and the home is not just a building but a place of meaning [18, 19]. Qualitative research has described a clear relationship between older people, their physical environment, and their personal views about ageing [20, 21]. Home is usually considered a place of comfort and freedom, independence, and safety [7, 10, 20, 21]. Living at home provides older adults with a sense of being anchored to their living environment and a sense of individuality where they are able to decorate/alter their home or fulfil valued roles and activities [10]. Possessions within the home provoke memories and create opportunities for self-reflection [21]. Being close to family, friends, neighbours, social activities, and local shops contributes towards a positive ageing process [8–10].

In contrast, Aplin, Canagasuriam [20], reported that for younger adults (aged 39–40 years old), home is a place for functionality and comfort.

Most of the research in this field has been conducted with older people who may already be experiencing disability and loss of function due to ageing. Less is known about the views that older adults have about ageing at home prior to the onset of illness or disability. This is important in order to inform healthy ageing interventions and help older people to maintain independence and participation in the community. Furthermore, there is a dearth of research regarding the perspectives of middle-aged people and their longer-term plans for housing. Adults are unlikely to be considering home modifications (such as ramps or rails) in middle age however, they may be considering longer term needs when planning renovations or considering downsizing once children leave home. Understanding the value of and meanings of home in both middle aged and older adults is an area of critical importance, and the synthesis of existing literature has not yet been done. This review seeks to explore what home means to middle and older aged adults. The aim of this qualitative meta-synthesis systematic review is to synthesize and understand middle and older adult's perspective of their home environment and concept of home to determine the factors that are important when making decisions about their future housing.

Methods

This review followed the JBI methodology for systematics review of qualitative evidence [22]. The protocol for this review was developed 'a priori' and stored in an institutional repository, see 'availability of data and materials' [23]. The preferred reporting items for Systematic reviews and Meta-Analyses (PRISMA) statement adhered, see supplementary material, Additional file 1 [24].

Inclusion criteria

Articles were included if a) they included middle (aged over 50) and older aged adults (aged over 65) (either within the metropolitan or rural area) in any country, b) explored personal experiences, beliefs, and attitudes towards ageing within the home, c) used qualitative methodologies, d) in any community setting, e) were published from 2005 to 2022 to represent contemporary literature. Studies which focused on specific diagnostic populations (e.g., post hip fracture) were excluded. Studies were excluded if they were not in English. Mixed method studies were only considered if data from the qualitative components could be extracted.

Aclan et al. BMC Geriatrics (2023) 23:707

Page 3 of 12

Search strategy and study selection

The search aimed to find both published and unpublished studies. Full search strategies are detailed in the supplementary material, Additional file 2. The reference lists of all eligible studies were screened for additional studies. Initial database searches occurred on 19 May 2021 and 12 July 2022. The search strategy was verified by an experienced academic librarian and translated each database. Databases searched were Medline, PyscInfo (Ovid), Scopus (Elsevier) and CINAHL (EBSCOhost). Sources of unpublished studies and grey literature searched were Google Scholar and Council on the Ageing (COTA), ProQuest Dissertations and Theses and WorldWideScience.org. All identified citations were collated and uploaded into Endnote X9.3 [25] then transferred to Covidence where duplicates were removed.

Quality appraisal

Studies were assessed by two reviewers independently to rate the methodological quality of the studies using the standardised JBI Critical Appraisal Checklist for Qualitative Research located in JBI SUMARI [26]. All included studies underwent data extraction and synthesis, where possible, in order to employ an inclusive approach with diverse studies and datasets [27].

Data screening and extraction

Two reviewers (RD and KL) independently screened titles and abstracts and selected those that appeared to meet the inclusion criteria for full text review. The same process involving two reviewers was conducted for review of full text. Any disagreements between the two reviewers were resolved by discussion and/or consultation with a third reviewer to arrive at a consensus. Included studies were imported into the JBI System for Unified Management, Assessment and Review of Information (JBI SUMARI) for extraction and synthesis [26]. Qualitative data were extracted by one author (RD) using the standardised JBI data extraction tool. Data extracted included specific details about the populations, context, culture, geographical location, study methods and the phenomena of interest relevant to the review question and specific objectives (supplementary material, Additional file 3). Findings (a verbatim extract of the author's interpretation of results) and illustrations (direct participant quotes) were extracted from the included studies into JBI SUMARI. Findings and illustrations were extracted by the primary reviewer (RD) and confirmed by the secondary reviewer (KL) after thorough review of the papers.

Meta-synthesis

Extracted findings were categorised based on meaning Findings were aggregated into categories and grouped into synthesised findings using the JBI meta-aggregative approach [26–28]. In a meta-aggregation, the author does not re-interpret the findings of included studies but instead synthesizes and accurately presents the findings as reported by the original authors [29]. Once findings are extracted and allocated a level of credibility, they are grouped (on the basis of having similar meaning or concept) and then combined into synthesized findings (where each synthesized finding contains at least two categories) [28]. The final categories and synthesised findings were discussed by three reviewers (RD, KL and HB) and revised until consensus was reached.

Results

Characteristics of included studies

The search yielded 14,093 studies. In total, 4653 duplicates were removed, 9440 titles and abstracts were screened. Of these, 86 studies were reviewed in full text and 46 studies were included in the review. See PRISMA Fig. 1 [24]. Included studies were published between 2006–2022 in 15 countries: Australia, Canada, United States, Norway, Spain, Sweden, Finland, United Kingdom, Malaysia, Korea, New Zealand, France, India, Brazil, and China. The number of participants in the studies ranged from 10–1680. All studies collected data through focus groups, semi-structured/in-depth interviews, surveys, photo diaries and field notes. Overall, the findings comprised the data for 5183 middle or older aged adults. Twelve studies included participant groups comprising both middle aged and older adults [30–41]. However, middle aged adults were in the minority and their data were not analysed or presented separately. Of the 12 studies that included middle aged participants, these studies included a large age range, varying from 50–92 years old.

Methodological quality

The methodological quality of the 46 studies is summarised in the supplementary material, Additional file 4 [42]. Four studies met the criteria 100% of the time and the remaining 42 met the criteria 80% of the time. Overall, the methodological quality of the 46 eligible studies was considered good and no studies were excluded following critical appraisal.

Data extraction and meta-synthesis

A total of 429 findings were extracted and categorised into 17 categories (see Supplementary table 1–7, Additional file 5). The 17 categories were synthesised into seven synthesized findings (see Table 1 for full details). A total of 12 out of 46 studies included perspectives of middle-aged participants over the aged of 50.
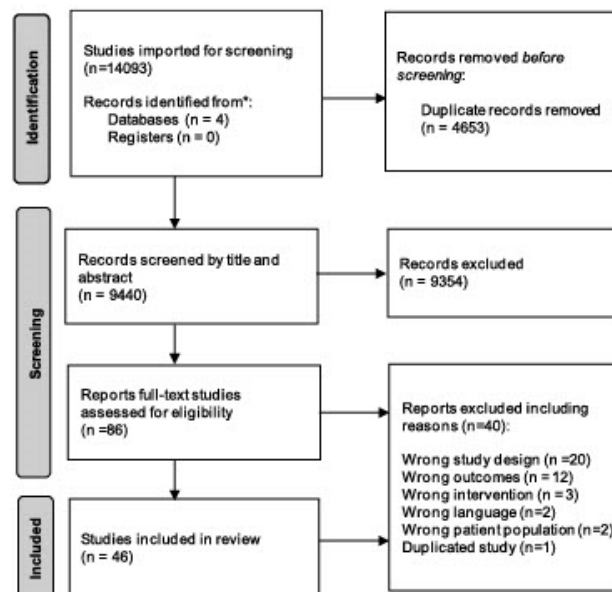
Fig. 1 PRISMA flow chart [24]

Table 1 Summary of synthesized findings

Synthesized finding 1: People value independence, autonomy and housing that fits with their functional abilities	Category 1.1- Individuals perceived themselves as "independent" if they remained in their own home Category 1.2- The need for the "right fit" between an older person's abilities and the environment
Synthesized finding 2: Finances and costs constrained decisions about future housing decisions	Category 2.1- Financial resources were a factor when making housing decisions
Synthesized finding 3: People experienced feelings of stigma regarding ageing and were concerned about being a burden	Category 3.1- Negative views associated with moving house Category 3.2- Individuals did not want to be a burden Category 3.3- Stigma Category 3.4- Acceptance of ageing impacted housing decisions
Synthesized finding 4: People experienced both positive and negative attitudes to future housing	Category 4.1- Individuals with positive attitudes to future housing Category 4.2- Some individuals avoid thinking about future housing
Synthesized finding 5: Emotions, meaningful activities and attachments to the home played a part in housing decisions	Category 5.1- Emotions related to home Category 5.2- Meaningful activities within the home Category 5.3- Strong sense of attachment to the home
Synthesized finding 6: Safety, accessibility, and aesthetics in the home were important	Category 6.1- Individuals value safety and accessibility for their homes Category 6.2- Individuals valued the aesthetics of their home
Synthesized finding 7: Family, community support and connection were essential to support remaining at home	Category 7.1- The importance of access to essential community services Category 7.2- The importance of being close or connected to family Category 7.3- Individuals felt a sense of connection towards their community

Aclan et al. BMC Geriatrics   (2023) 23:707

Page 5 of 12

Synthesized finding 1: People value independence, autonomy and housing that fits with their functional abilities

This synthesized finding comprised two categories as below in the Supplementary table 1, Additional file 5.

Category 1.1- Individuals perceived themselves as "independent" if they remained in their own home

Participants reported a strong desire to remain independent and in their own home. They believed that if they were "independent", they would be able to remain in their home. They appeared to take pride in being independent in daily activities and not requiring help. Having choice over when and where to go was valued; being 'forced' into housing decisions made some participants feel trapped. In their daily lives, participants spoke of the importance of being able to choose what they did, where they spent their time and being in control of their own routines. Having a home with a garden was also described as giving the person a sense of freedom. Some participants did acknowledge that home modifications enabled them to remain independent at home.

"A home is your own, of course, and you can close your door and be by yourself when you want, and then it's great fun to open up and be able to receive your friends and enjoy being at home" [43].

Category 1.2- The need for the "right fit" between an older person's abilities and the environment

Participants acknowledged that as they aged their ability to manage different activities (such as home maintenance) declined. In some cases, changes in health status or ability resulted in the need to relocate. Homes that were well designed (such as having flat entry from the carport to the front door) made life easier as did homes that were specifically designed to be low maintenance. Participants were happy when there was a good fit between their abilities and the design of the home.

"I like the thought of having a garden that I'm in control of, rather than it being in control of me." pg. 1187 [38]

Synthesized finding 2: Finances and costs constrained decisions about future housing

This synthesized finding comprised one category as presented in the Supplementary material, table 2, Additional file 5.

Category 2.1- Financial resources were a factor when making housing decisions

Financial constraints impacted on people in a variety of ways. Some participants were in rental properties where the owners refused to fund home modifications which would have improved safety and access. Some participants felt that if they had to relocate, they had very few options (if any) that would be affordable. One person commented that they hadn't expected to live as long as they were living. Factors such as leaving an inheritance for family members and deciding to invest in the housing market were also part of decision making.

"Wondering where I will be able to live when my money and health require another place . . .," and "The economy has affected all of us. It's harder and harder to survive financially . . . didn't expect us to live as long as we're living . . ." [44]

Synthesized finding 3: People experienced feelings of stigma regarding ageing and were concerned about being a burden

This synthesized finding comprised four categories in the Supplementary table 3, Additional file 5.

Category 3.1- Negative views associated with moving house

Several participants indicated that they wanted to die in their own home and that they would rather die than move to a nursing home. Nursing homes were considered to have extensive rules and regulations (like a 'prison') where residents had poor quality of life. For some, this was tempered with a fear of being isolated and living (and dying) alone. Some participants acknowledged that their home possessed safety hazards but moving out of home would mean compromising on quality of life.

"Going into a home? That's be the end of me. And I mean it." [45]

Category 3.2- Individuals did not want to be a burden

Concern about being a burden on others, and particularly family members, was a theme present in multiple participants and studies. Participants preferred to remain in their own homes rather than become a 'burden' to their family and others. Some participants indicated that their family had their own responsibilities and commitments and therefore it would be onerous for them to also provide care.

"I don't want to be a burden on my children, and I am willing to go to a nursing care facility, but my children say I should live with one of them." [46]

Category 3.3- Stigma

For some, there was stigma associated with the installation of home modifications and relocation to residential care homes. The stigma associated with these objects or behaviours led to negative stereotypes of ageing and

283

Aclan *et al. BMC Geriatrics*   (2023) 23:707

Page 6 of 12

feelings of vulnerability among the participants. For instance, residential care homes and assisted living were considered to be an indication of loss of quality of life and dependency.

> "When the ramp was finished, this workman with a really loud voice called out "this is now a disability house!" really loudly—the whole street would have heard." [7]

Category 3.4- Acceptance of ageing impacted housing decisions

In contrast, participants who were more accepting of ageing, appeared to be more comfortable with the changes they experienced due to ageing. This acceptance enabled greater acceptance of home modifications and changed abilities. For some, acceptance enabled them to make proactive housing decisions.

> "I will accept being admitted to the nursing home when I need to go there – I hope." [47]

Synthesized finding 4: People experienced both positive and negative attitudes to future housing

This synthesized finding comprised two categories in the Supplementary table 4, Additional file 5.

Category 4.1: Individuals with positive attitudes to future housing

Many participants had considered steps they would need to take to ensure their future housing was age friendly. They spoke of seeking out or modifying their homes to ensure accessibility. Modifications and equipment were considered acceptable steps in terms of improving the age-friendliness of the home. Some participants mentioned that they would be willing to consider use of smart technologies (such as ambient assisted living) if it helped them to stay in their own home safely for longer. Others mentioned that they planned to move closer to family. Seeing others make housing decisions or speaking with others about their experience was considered helpful. One participant described how a move to residential care would be the best solution as they had limited family and would not be independent forever.

> "I have already thought about it, if I can't manage to do things on my own anymore, then they should put me in a home. I don't have any children, and well, you have to be realistic, this would be the best solution." [48]

Category 4.2: Some individuals avoid thinking about future housing

In contrast, there were older adults who chose to avoid or make no firm plans about future housing, including taking a 'wait and see' approach. Participants who felt this way were either unconcerned about the future, didn't want to consider the future, or were unaware of steps that could be taken to safely age in place. One study described participants who were unsure of where, or how, to access home modification services.

> "People actually don't know that these services are out there. And also how to access them. You don't get taught, at any point in your life, how to become an older person. It just sort of happens, [. . .] You know, if you have a child,... you've got your health visitor and they explain what you're supposed to do. You become old and no-one is there telling you." [49]

Synthesized finding 5: Emotions, meaningful activities, and attachments to the home played a part in housing decisions

This synthesized finding comprised three categories in Supplementary table 5, Additional file 5.

Category 5.1: Emotions related to home

Several participants discussed how they achieved great satisfaction which stemmed from caring for their own home, garden and pets. Others spoke about how keeping busy within the home provided them with a reason to get up in the morning. Beyond the home, participants spoke about the sense of community they experienced and being able to trust others within their community. Home was described as a place of comfort where restoration occurred. Many participants described the feeling of being safe and secure in their own home and contrasted the freedom and privacy they experienced in their own home to the lack of privacy they would have in residential care homes. For some participants, home was described as place where they longed to escape due to marital breakdown or noisy neighbours. This experience exacerbated their desire to move sooner than later in life.

> "The garden, front garden and looking up at the sky and the back garden with the lovely birds . . . just sitting at the kitchen table and looking out at the garden at the birds." [33]

Category 5.2: Meaningful activities within the home

Being able to have the 'space' for meaningful activities was important. Participants mentioned activities such as gardening, using a backyard workshop for hobbies, an office and an area for art and crafts.

> "See, we've got the front bedroom as our main bedroom, the second bedroom is Lara's artist room, the third bedroom is my office . . . We're using the whole house . . . It's a seven-room house and we're using them all." [33]

Aclan et al. BMC Geriatrics   (2023) 23:707

Page 7 of 12

Category 5.3: Strong sense of attachment to the home

Many participants felt strongly attached to their home and couldn't imagine living elsewhere. They described wanting to remain in their own home until death in which case they would be leaving 'in a box'. Participants, in some cases, were still living in the family home and were reluctant to leave. Home was filled with important possessions accumulated over their lifetime. The home and the possessions within often triggered memories; bringing feelings of joy and gratitude.

"Would rather leave in a box or we'll stay here till the last day I'm sure of it". (pg. 1701 [50])

Synthesized finding 6: Safety, accessibility, and aesthetics in the home were important

This synthesized finding comprised two categories in Supplementary table 6, Additional file 5.

Category 6.1: Individuals value safety and accessible homes

Many participants valued safety as an important feature of their home. Safety was linked to having flat, hazard free spaces or having modifications which improved access and safety. For example, stairs were seen as unsafe. Some participants wanted to be connected; either through being able to summons assistance in an emergency or having other people check in. Some participants mentioned that it was important to know and be able to trust their neighbours. One study described how night lights, safety guards and security systems contributed to a greater sense of safety.

"I wanted an apartment where I could feel safe, [a place where] if people want to come to my place they must buzz downstairs. Then I can answer directly and know that my door is locked. But it's not everywhere you can find a building with this type of security. I will stay there for a long time!" (pg.365 [51])

Category 6.2: Individuals valued the aesthetics of their home

Natural, bright lighting and open spaces appealed to middle aged and older adults. They spoke of how a house feels like a home depending on the decorations and possessions within. Personal possessions and mementos added to the appeal of the home. While home modifications were sometimes viewed as improving the appearance of the house, more commonly they were seen as visually unappealing and contributed to the house feeling like a clinical environment instead of a home.

"With the best will in the world, adaptations can, you know, provide a very clinical... a more clinical environment, as assessed by need. And it's trying to

have that.... That, sort of, conversation with them about what is in their best interest, really. To keep them in the home, safe. And I think you have to be very sensitive to that. (pg.7 [49])

Synthesized finding 7: Family, community support and connection were essential to support remaining at home

This synthesized finding comprised three categories in the Supplementary table 7, Additional file 5.

Category 7.1: The importance of access to essential community services

Health care services, alternative housing options, meals and home cleaning were all essential services deemed to be important to support older adults to remain in their own home. It was further highlighted that these needed to be culturally appropriate services. One participant mentioned the lack of housing options that can meet older people's housing needs. Some older adults identified the importance of having good access to public transport nearby their homes as this linked them beyond their own home and was especially needed after cessation of driving.

"Everybody worries about it (transportation). My neighbor across the street is 77 and she might not be able to drive in a couple of years, and she says 'as soon as I can't drive, I've got to move." (pg. 153 [52])

Category 7.2: The importance of being close or connected to family

Participants felt it was important for their homes to be nearby family. Being close to others within their social networks strengthened connection to family, prevented isolation and provided them with regular 'check-in visits'. Families helped with practical tasks such as transport and home maintenance in order to help them remain in their own homes. In some cases, children of ageing adults were involved in housing decisions (for example, inviting older relatives to live with them or moving closer). Participants valued having family visit or stay with them and enjoyed using their home to entertain. Otherwise, one participant felt dwindling visits from family and friends made home more isolating.

"When she (neighbour) look up (from her apartment) she can see me. When she notices I do not open my window she will telephone me. I advised my son (adopted son in law), 'you call me on the phone in the morning and in the evening. If something happens to me at night, you will know in the morning. This way it is fine. If something happens to me in the day, when you call at night, you will also know' ... I fell very at ease." (pg. 530 [53])

285

Aclan et al. BMC Geriatrics   (2023) 23:707

Page 8 of 12

Category 7.3: Individuals felt a sense of connection towards their community

Older adults felt strongly connected to their communities. Family and friends often lived nearby, and, in some cases, participants considered their neighbours to be like family or friends. In that way, the community contributed towards the person's social network. Furthermore, they appreciated knowing the people who worked in the local shops. The person's community contributed towards their sense of identity. Participants mentioned the value of having community services, local amenities, and public transport nearby as well as green spaces open to public use. One participant voiced concerns about segregating middle aged and older adults from younger communities (such as in retirement villages or communities).

"I have very good friends. I've been widowed since 1978, and had I not had those friends, it would have been very difficult for me. And then they're like family ... very close good friends that care about you." (pg. 774 [54])

Discussion

This review included the findings of qualitative research studies regarding the perspectives of middle aged and older adults of their home environments and identified several key themes. Factors deemed important when making decisions about future housing were: (a) independence, abilities, and autonomy; (b) finances and costs; (c) feelings of stigma regarding ageing and concerns about being a burden; (d) positive and negative attitudes to ageing; (e) emotions, meaningful activities, and attachments with the home; (f) safety, accessibility, and aesthetics in the home; (g) family, community support and connection whilst remaining at home. Having an understanding of these perspectives allows professionals working in home and community design, health and social care to support ageing in place [55]. These factors should be considered when planning and designing communities which support ageing adults. This study synthesizes the views of middle aged and older adults from an international context (from Australia to Finland) to understand future housing decision-making internationally.

This systematic review of qualitative studies and meta-aggregation builds on the findings of individual studies and provides up-to-date evidence regarding middle aged and older adult's experience of their home. Systematic reviews advance knowledge through identifying and analysing multiple studies, identifying gaps in the literature, understanding deficiencies in current studies and helping to guide delivery of care and policy development

[56]. We identified a total of 46 studies published over the last 15 years demonstrating the strong interest and importance of this topic area. We were interested in the views of middle-aged adults as they may be considering their future needs when planning renovations, relocation and/or downsizing. However, only twelve of the studies included people considered to be middle aged (as part of a larger participant group including older people) and their views were not presented separately. More research should be conducted specifically with this population group as decisions made during this time may lead to long term benefits. For example, someone who is 50 years old and renovating their bathroom could ensure that there is flat entry to the shower alcove and could avoid installing a low toilet seat.

Older adults tended to have negative views related to relocation and residential care; this finding was not unexpected. Consistent with the findings from, Gillsjö, Schwartz-Barcott [57] and Corcoran, Bernard [58], most middle aged and older adults want to remain in their homes for as long as possible. It is possible that perceptions of living in residential care are currently poor due to media reports in the last few years portraying residential care as being an environment of neglect [59]. Work is needed in the residential care sector to demonstrate that high quality care can be offered and that autonomy can be preserved. A recent integrative review regarding autonomy in residential care showed that autonomy was a critical contributor to health and quality of life. Moilanen, Kangasniemi [60] also found that autonomy could be preserved in residential care, but this depended on staff skill and family support. Simple things such as being listened to and decorating one's own room contributed to autonomy [61].

It is also evident that people become more reluctant to consider moving as they age and moving appears to be more difficult as time passes. Despite peoples' intentions to remain at home for as long as possible there are currently a number of barriers in place that need to be addressed at a policy level. In terms of care, more investment in home care services is required. For example, data from 2021 showed that older Australians spent an average of 28 months on a wait list for home care [62]. Other research suggests, home care packages for people in small communities in Portugal are in limited supply [63]. Similarly, whilst individuals within Europe such as England, Austria and France have access to a large variety of home care services, long-term funding continues to be a problem [63]. Therefore, by the time middle aged and older adults gain access to funding for care, they will receive less care than they need and face the risk of further decline, preventable hospitalisation, and premature entry to residential aged care [59]. Furthermore,

Aclan *et al. BMC Geriatrics*   (2023) 23:707

Page 9 of 12

dedicated funding for home modifications is not currently available. Our review showed that financial constraints play a part in decision making around future housing; new solutions are required so that older adults can access funds for home modification without needing to use their home care services budget.

Aside from the physical features of the home, this review showed similar results to Tanner, Tilse [7] that many participants described their home as a place of security, autonomy, and comfort. These emotions are not easily created and continue to take time to develop in their homes. As adults age, homes trigger these emotions and begin to tie into everyday routines [64]. Similar to studies by Sherman and Dacher [18] and Oswald, Wahl [65], those who wanted to stay in their home became emotionally attached to their property. Moving therefore is not simply a transaction in space and planners and designers need to look beyond the physical barriers at home, but also their individual meaning of home. This confirms findings by Coleman and Wiles [21] regarding the relationship between ageing, the physical environment, and personal views about ageing.

The ageing population's changing demographics will continue to create demand for affordable age-friendly housing. The affordability of age friendly housing is an important consideration for planners and policy makers. In America, Li, Hu [66] suggested the need to increase rental assistance funding for ageing adults to promote affordable housing. Possible solutions include, either densifying housing units to build smaller units or transforming single-family houses such as garages and basements, into smaller housing units [66]. Similarly, Riedy, Wynne [67] suggested that co-housing may have the potential to address the challenges older adults face with regards to affordability, accessibility and isolation. However, their research also showed there were negative perceptions of cohousing amongst the ageing population, due to the lack of familiarity with shared living arrangements [67]. Jolanki [68] recommends the need for more 'in-between' housing options for all stages of ageing and housing policies to meet the rapid growth of older adults.

Results also agreed with studies by Stones and Gullifer [8], Kramer and Pfaffenbach [9], Hatcher, Chang [10], where living near family, friends and acquaintances was described as being important. Feelings of loneliness and social isolation is common in older people and is expected to increase as the ageing population increases [69]. Depending on the country the estimates of social isolation and loneliness can vary. Literature indicates between 12 to 30% experience loneliness and between 5 to 17% of older people are socially isolated [70–72]. Older adults experience a decline in economic and social resources, continued functional limitations

and changes in family structure [73]. Social isolation and loneliness can place older people in greater risk of mortality and comorbidities [74]. To address this, the World Health Organisation [74] recommends connecting older adults to services and maintaining/building relationships. Remaining socially connected to others who live nearby enables ageing adults to feel safer and less anxious [75]. Luciano, Pascale [76] developed a framework for age-friendly housing including nine domains, which includes 'community connection'. Hence, living near family, friends and neighbours are an important aspect of ensuring older adults are not socially isolated, but a part of a locally integrated network.

Strengths and limitations

This review showed the importance of consulting with middle aged and older adults and understanding their perspectives when planning communities and designing housing for older adults. The included studies contained rich information from a diverse range of journals, however, the review is subject to some limitations. It is possible that as the topic was so broad some relevant studies may have been missed using the selected search strategies. This review also did not source non-English studies, lacking the perspectives of middle aged and older adults from countries where English is not the primary language. Though qualitative methods assisted in the understanding of perceptions about home among middle aged and older adults, we were not able to understand which characteristics were most important. For example, participants may have spoken about the importance of living near family however in real life this may be less important than other features, such as housing affordability. Another limitation is that the experiences of participants may have been influenced by other factors, such as cognitive impairment or other chronic conditions.

Conclusion

In summary, this review provides a guide to assist with consideration of future housing needs that should incorporate middle aged and older adult's values around their home, rather than focusing only on the physical characteristics of the home. Working with middle aged and older adults to develop age friendly communities and buildings may promote autonomy and independence, reduce isolation and loneliness and result in people staying at home for longer which also results in reduced government spending. Changes to funding are required so that older adults can access funding specifically for appropriate home modification. Given that it may not always be possible to stay at home, alternatives to residential care (such as co-housing) should be trialled. Older adults and their families who are contemplating

Aclan et al. BMC Geriatrics   (2023) 23:707

Page 10 of 12

relocation should consider how the move can be a positive experience through ensuring new housing feels safe and aesthetically pleasing. They should also consider how the person can maintain connection to their previous community while forming connections with their new community.

Supplementary Information

The online version contains supplementary material available at https://doi.org/10.1186/s12877-023-04279-1.

> **Additional file 1.** Prisma 2020 Checklist.
>
> **Additional file 2.** Search strategies.
>
> **Additional file 3.** Characteristics of included studies.
>
> **Additional file 4.** Characteristics of studies.
>
> **Additional file 5.** Summary of synthesised findings and categories. **Table S1.** Synthesized finding 1 - Independence, abilities, and autonomy. **Table S2.** Synthesized finding 2- Finances and costs constrained decisions about housing. **Table S3.** Synthesized finding 3- Feelings of stigma regarding ageing and concern about being a burden. **Table S4.** Synthesized finding 4- Positive and negative attitudes to future housing. **Table S5.** Synthesized finding 5- Emotions, meaningful activities, and attachments with the home. **Table S6.** Synthesized finding 6- Safety, accessibility, and aesthetics in the home. **Table S7.** Synthesized finding 7- Family, community support whilst remaining at home.

Declarations

Ethics approval and consent to participate
Not applicable.

Consent for publication
Not applicable.

Competing interests
The authors declare no competing interests.

Author details
[1]College of Medicine and Public Health, Flinders University, Adelaide, Australia. [2]Occupational Therapy, Academic Lead and Research Lead, Allied Health Chair, Northern Adelaide Local Health Network, College of Nursing and Health Sciences, Flinders University, Adelaide, Australia. [3]College of Nursing and Health Sciences, Flinders University, Adelaide, Australia. [4]Department of Rehabilitation, Aged and Extended Care, College of Medicine and Public Health, Flinders University, Adelaide, Australia.

References
1. World Health Organisation. Ageing 2021 [cited 2021 3/8]. Available from: https://www.who.int/health-topics/ageing#tab=tab_1.
2. World Health Organisation. Ageing: Global Population 2010 [cited 2021 3/8]. Available from: https://www.who.int/news-room/q-a-detail/population-ageing.
3. World Health Organisation. Ageing and Health 2022 [cited 2021 3/8]. Available from: https://www.who.int/news-room/fact-sheets/detail/ageing-and-health.
4. World Health Organisation. Decade of healthy ageing: baseline report. 2021. https://www.who.int/publications/i/item/9789240017900.
5. Pani-Harreman KE, Bours GJJW, Zander I, Kempen GIJM, van Duren JMA. Definitions, key themes and aspects of 'ageing in place': a scoping review. Ageing Soc. 2021;41(9):2026–59.
6. Productivity Commission. An Ageing Australia: Preparing for the Future. 2013. https://www.pc.gov.au/research/completed/ageing-australia/ageing-australia-overview.pdf.
7. Tanner B, Tilse C, de Jonge D. Restoring and Sustaining Home: The Impact of Home Modifications on the Meaning of Home for Older People. J Hous Elder. 2008;22(3):195–215.
8. Stones D, Gullifer J. 'At home it's just so much easier to be yourself': older adults' perceptions of ageing in place. Ageing Soc. 2014;36(3):449–81.
9. Kramer C, Pfaffenbach C. Should I stay or should I go? Housing preferences upon retirement in Germany. J Housing Built Environ. 2015;31(2):239–56.
10. Hatcher D, Chang E, Schmied V, Garrido S. Exploring the Perspectives of Older People on the Concept of Home. J Aging Res. 2019;2019:2679680.
11. Kok L, Berden C, Sadiraj K. Costs and benefits of home care for the elderly versus residential care: a comparison using propensity scores. Eur J Health Econ. 2015;16(2):119–31.
12. Potter JF. Aging in America: essential considerations in shaping senior care policy. Aging Health. 2010;6(3):289–99.
13. Mah JC, Stevens SJ, Keefe JM, Rockwood K, Andrew MK. Social factors influencing utilization of home care in community-dwelling older adults: a scoping review. BMC Geriatr. 2021;21(1):145.
14. Productivity Commission. Housing Decisions of Older Australians. Canberra. 2015. https://www.pc.gov.au/research/completed/housing-decisions-older-australians/housing-decisions-older-australians.pdf.
15. Standfield LB, Comans T, Scuffham P. A simulation of dementia epidemiology and resource use in Australia. Aust N Z J Public Health. 2018;42(3):291–5.
16. König H-H, Leicht H, Brettschneider C, Bachmann C, Bickel H, Fuchs A, et al. The Costs of Dementia From the Societal Perspective: Is Care Provided in the Community Really Cheaper than Nursing Home Care? J Am Med Dir Assoc. 2014;15(2):117–26.
17. Cox C, Pardasani M. Aging and Human Rights: a Rights-Based Approach to Social Work with Older Adults. J Hum Rights Soc Work. 2017;2(3):98–106.
18. Rowles GD. Home and identity in late life: International perspectives. Springer Publishing Company. 2005.
19. Oswald F, Wahl HW. Dimensions of the meaning of home in later life. Home and identity in late life: International perspectives. 2005. p. 21–45.
20. Aplin T, Canagasuriam S, Petersen M, Gustafsson L. The experience of home for social housing tenants with a disability: security and connection but limited control. Housing and Society. 2020;47(1):63–79.
21. Coleman T, Wiles J. Being With Objects of Meaning: Cherished Possessions and Opportunities to Maintain Aging in Place. Gerontologist. 2020;60(1):41–9.
22. Lockwood C, Porrit K, Munn Z, Rittenmeyer L, Salmond S, Bjerrum M, et al. Chapter 2: Systematic reviews of qualitative evidence. In: Aromataris E, Munn Z (Editors). JBI Man Evid Synth, JBI 2020. Available from: https://synthesismanual.jbi.global. https://doi.org/10.46658/JBIMES-20-03.

Aclan et al. BMC Geriatrics   (2023) 23:707

Page 11 of 12

23. Tufanaru C, Munn Z, Aromataris E, Campbell J, Hopp L. Chapter 3: Systematic reviews of effectiveness. In: Aromataris E, Munn Z (Editors). JBI Manual for Evidence Synthesis: JBI; 2020. Available from: https://synthesismanual.jbi.global https://doi.org/10.46658/JBIMES-20-04.
24. Page MJ, McKenzie JE, Bossuyt PM, Boutron I, Hoffmann TC, Mulrow CD, et al. The PRISMA 2020 statement: an updated guideline for reporting systematic reviews. Syst Rev. 2021;10(1):89.
25. Clarivate Analytics. Endnote X9.3.3. PA, USA,2021 [cited 2021 22/4/2021]. Available from: https://endnote.com/?_ga=2.268551096.890425446.1619582231-1605498152.1619582231.
26. The Joanna Briggs Institute. The System for the Unified Management, Assessment and Review of Information (SUMARI). 2019 [cited 2021 5/5/2021]. Available from: https://www.jbisumari.org/.
27. Drisko JW. Qualitative research synthesis: An appreciative and critical introduction. Qual Soc Work. 2020;19(4):736–53.
28. Lockwood C, Munn Z, Porritt K. Qualitative research synthesis: methodological guidance for systematic reviewers utilizing meta-aggregation. Int J Evid Based Healthc. 2015;13(3):179–87.
29. Lockwood C, Munn Z, Porritt K. Qualitative research synthesis: methodological guidance for systematic reviewers utilizing meta-aggregation. JBI Evid Implement. 2015;13(3):179–87.
30. Aplin T, de Jonge D, Gustafsson L. Understanding the dimensions of home that impact on home modification decision making. Aust Occup Ther J. 2013;60(2):101–9.
31. Baron M, Fletcher C, Riva M. Aging, health and place from the perspective of elders in an Inuit community. J Cross Cult Gerontol. 2020;35:133–53.
32. Brim B, Fromhold S, Blaney S. Older adults' self-reported barriers to aging in place. J Appl Gerontol. 2021;40(12):1678–86.
33. de Jonge DM, Jones A, Phillips R, Chung M. Understanding the essence of home: Older people's experience of home in Australia. Occup Ther Int. 2011;18(1):39–47.
34. Finlay JM, Gaugler JE, Kane RL. Ageing in the margins: expectations of and struggles for "a good place to grow old" among low-income older Minnesotans. Ageing Soc. 2020;40(4):759–83.
35. Lewis C, Buffel T. Aging in place and the places of aging: A longitudinal study. Journal of Aging Studies. 2020;54: 100870.
36. Wiles JL, Leibing A, Guberman N, Reeve J, Allen RE. The meaning of "aging in place" to older people. Gerontologist. 2012;52(3):357–66.
37. Yu J, Rosenberg MW. "No place like home": Aging in post-reform Beijing. Health Place. 2017;46:192–200.
38. Burgess G, Quinio V. Unpicking the downsizing discourse: understanding the housing moves made by older people in England. Hous Stud. 2021;36(8):1177–92.
39. Dendle K, Miller E, Buys L, Vine D. My home in later life: A phenomenographic study of older adults' experience of home. J Aging Stud. 2021;57: 100935.
40. Webber R, May V, Lewis C. Ageing in place over time: the making and unmaking of home. Sociol Res Online. 2023;28(3):759–74.
41. Woolrych R, Duvurru J, Portella A, Sixsmith J, Menezes D, Fisher J, et al. Ageing in Urban Neighbourhoods: Exploring Place Insideness Amongst Older Adults in India, Brazil and the United Kingdom. Psychol Dev Soc. 2020;32(2):201–23.
42. Aromataris E, Munn Z, (Editors). JBI Manual for Evidence Synthesis 2020. Available from: https://synthesismanualjbi.global. https://doi.org/10.46658/JBIMES-20-01
43. Dahlin-Ivanoff S, Haak M, Fänge A, Iwarsson S. The multiple meaning of home as experienced by very old Swedish people. Scandinavian Journal of Occupational Therapy. 2007;14(1):25–32.
44. Black K, Dobbs D, Young TL. Aging in community: mobilizing a new paradigm of older adults as a core social resource. J Appl Gerontol. 2015;34(2):219–43.
45. Grimmer K, Kay D, Foot J, Pastakia K. Consumer views about aging-in-place. Clin Interv Aging. 2015;10:1803–11.
46. Martin D, Long O, Kessler L. Planning for Aging in Place: Incorporating the Voice of Elders to Promote Quality of Life. J Hous Elder. 2019;33(4):382–92.
47. Bergland A, Slettebø Å. Older Women's Experience Of Everyday Life In Old Age: Past, Present And Future. Physical & Occupational Therapy in Geriatrics. 2018;36(2/3):279–96.
48. Renaut S, Ogg J, Petite S, Chamahian A. Home environments and adaptations in the context of ageing. Ageing Soc. 2015;35(6):1278–303.

49. Bailey C, Aitken D, Wilson G, Hodgson P, Douglas B, Docking R. "What? That's for old people, that." Home adaptations, ageing and stigmatisation: A qualitative inquiry. Int J Environ Res Public Health. 2019;16(24):4989.
50. Mackenzie L, Curryer C, Byles JE. Narratives of home and place: Findings from the Housing and Independent Living Study. Ageing Soc. 2015;35(8):1684–712.
51. Bigonnesse C, Beaulieu M, Garon S. 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. J Hous Elder. 2014;28(4):357–82.
52. Vrkljan BH, Leuty V, Law M. Aging-in-place: Exploring the transactional relationship between habits and participation in a community context. OTJR: Occup Participation Health. 2011;31(3):151–9.
53. Tan KK, He HG, Chan SW, Vehvilainen-Julkunen K. The experience of older people living independently in Singapore. Int Nurs Rev. 2015;62(4):525–35.
54. Fjell A, Eriksen KA, Hermann M, Bostrom AM, Cronfalk SB. Older people living at home: experiences of healthy ageing. Primary Health Care Research & Development. 2021;22: e6.
55. Fausset CB, Kelly AJ, Rogers WA. Fisk ADJJoHftE. Challenges to aging in place: Understanding home maintenance difficulties. 2011;25(2):125–41.
56. Munn Z, Peters MDJ, Stern C, Tufanaru C, McArthur A, Aromataris E. Systematic review or scoping review? Guidance for authors when choosing between a systematic or scoping review approach. BMC Med Res Methodol. 2018;18(1):143.
57. Gillsjö C, Schwartz-Barcott D, von Post I. Home: The place the older adult can not imagine living without. BMC Geriatr. 2011;11(1):10.
58. Corcoran G, Bernard P, Kenna L, Malone A, Horgan F, O'Brien C, et al. "Older People Want to Be in Their Own Homes": A Service Evaluation of Patient and Carer Feedback after Pathfinder Responded to Their Emergency Calls. Prehosp Emerg Care. 2023;1–9.
59. Royal Commission into Aged Care Quality and Safety. What Australians think of ageing and aged care. 2020. https://agedcare.royalcommission.gov.au/sites/default/files/2020-07/research_paper_4_-_what_australians_think_of_ageing_and_aged_care.pdf.
60. Moilanen T, Kangasniemi M, Papinaho O, Mynttinen M, Siipi H, Suominen S, et al. Older people's perceived autonomy in residential care: An integrative review. Nurs Ethics. 2021;28(3):414–34.
61. Nord C. Free choice in residential care for older people — A philosophical reflection. Journal of Aging Studies. 2016;37:59–68.
62. Atkin M. Home care package waiting lists slammed as a 'critical failure' as families forced to wait: Australian Broadcasting Corporation; 2021 [cited 2022. Available from: https://www.abc.net.au/news/2021-02-02/home-care-package-wait-list-funding-aged-care-royal-commission/13100080#:~:text=In%20Australia%2C%20there%20are%20almost,of%20care%20is%2028%20months.
63. Genet N, Boerma W, Kroneman M, Hutchinson A, Saltman RB, World Health Organization. Home care across Europe: current structure and future challenges. World Health Organization. Regional Office for Europe. 2012.
64. Gillsjö C, Schwartz-Barcott D. A concept analysis of home and its meaning in the lives of three older adults. Int J Older People Nurs. 2011;6(1):4–12.
65. Oswald F, Wahl H-W, Schilling O, Nygren C, Fänge A, Sixsmith A, et al. Relationships between housing and healthy aging in very old age. Gerontologist. 2007;47(1):96–107.
66. Li S, Hu W, Guo F. Recent Relocation Patterns Among Older Adults in the United States. J Am Plann Assoc. 2022;88(1):15–29.
67. Riedy C, Wynne L, McKenna K, Daly M. "It's a Great Idea for Other People": Cohousing as a Housing Option for Older Australians. Urban Policy and Research. 2019;37(2):227–42.
68. Jolanki OH. Senior housing as a living environment that supports well-being in old age. Front Public Health. 2021;8:914.
69. Alpert PT. Self-perception of social isolation and loneliness in older adults. Home Health Care Manag Pract. 2017;29(4):249–52.
70. Tornstad S, Dale B, Sundsli K, Sævareid HI, Söderhamn U. Who often feels lonely? A cross-sectional study about loneliness and its related factors among older home-dwelling people. Int J Older People Nurs. 2017;12(4): e12162.
71. Shankar A, Hamer M, McMunn A, Steptoe A. Social isolation and loneliness: relationships with cognitive function during 4 years of

Aclan et al. BMC Geriatrics   (2023) 23:707

Page 12 of 12

follow-up in the English Longitudinal Study of Ageing. Psychosom Med. 2013;75(2):161–70.
72. Ong AD, Uchino BN, Wethington E. Loneliness and Health in Older Adults: A Mini-Review and Synthesis. Gerontology. 2016;62(4):443–9.
73. Courtin E, Knapp M. Social isolation, loneliness and health in old age: a scoping review. Health and Social care. 2017;25(3):799–812.
74. World Health Organisation. Social isolation and loneliness among older people: advocacy brief 2021 [cited 2022. Available from: https://www. who.int/publications/i/item/9789240030749.
75. Glass AP, Vander Plaats RS. A conceptual model for aging better together intentionally. Journal of Aging Studies. 2013;27(4):428–42.
76. Luciano A, Pascale F, Polverino F, Pooley A. Measuring age-friendly housing: A framework. Sustainability. 2020;12(3):848.

Publisher's Note

Springer Nature remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.

APPENDIX P　　　　Published paper: qualitative study

Aclan, R., George, S., & Laver, K. (2023). Considering the home environment and planning for the future: A qualitative exploration of the views of older adults and individuals with older relatives. Scandinavian Journal of Occupational Therapy, 1-13. https://doi.org/10.1080/11038128.2023.2192027

RESEARCH ARTICLE

Considering the home environment and planning for the future: A qualitative exploration of the views of older adults and individuals with older relatives

Roslyn Dalistan[a], Stacey George[b] and Kate Laver[a]

[a]Flinders Health and Medical Research Institute, Flinders University, Adelaide, Australia; [b]Caring Futures Institute, College of Nursing and Health Sciences, Flinders University, Adelaide, Australia

ABSTRACT

Background: Successful ageing-in-place is dependent on the design and features of the home. In some cases, home modifications or relocation may be required. Accessible, affordable, age-friendly housing for older adults is required to encourage forward planning.

Aims/objectives: To understand the views of middle and older aged adults and individuals with older relatives, about home safety, ageing in place and housing accessibility.

Material and methods: A qualitative descriptive approach, using reflexive thematic analysis was used. Data were gathered through semi-structured interviews with 16 participants, comprising eight middle- older aged people and eight individuals with older relatives.

Results: Seven themes were identified. Most participants accepted the ageing process and could recognise home environment hazards and potential future housing needs. Others were determined to remain independent at home and resistant to making future changes until necessary. Participants were interested in obtaining more information about how to improve home safety or services to support ageing-in-place.

Conclusion: Most older adults are open to conversations about planning for ageing-in-place and would like further information on home safety and home modifications. Educational forums and tools (such as flyers or checklists) which assist older people to plan future housing needs are recommended.

Significance: Many older people are living in homes that present hazards and limited accessibility as they age. Earlier planning could lead to home modifications which will improve the capacity to age in place. Action to provide earlier education is needed as the population ages and suitable housing for older people is limited.

KEY POINTS FOR OCCUPATIONAL THERAPY

- Decision-making around home safety among the ageing population can be compromised by lack of awareness, inadequate access to information and the sudden onset of age-related changes.
- An education guide or tool to support forward planning and housing decisions may improve early awareness among the ageing population.

Introduction

Globally, the proportion of older adults aged 65 and over is projected to increase steadily over the coming decades resulting in a population of 2.1 billion older adults across the world by 2050 [1]. Ageing leads to biological, physical and cognitive changes and increased risk of disease [1]. As age increases, the person's ability to move within and function independently within their own home environment can become increasingly difficult [2]. Most people want to age at home and remain in their own homes for as long as possible [3–6] which is often referred to as 'ageing in place' [7]. Pani-Herreman et al. [7] define 'ageing in place' where the house is more than just a place, but a home connected to social networks, identity and supportive technology. Research conducted with older people reveals that they prefer to stay at home for several reasons including a sense of

attachment to the home, the high costs of moving, and a desire to maintain existing social and community networks [3–6]. Home is considered by older adults to be a place of comfort and safety where independence can be preserved [3,4,8,9]. Strong community networks enable older adults to cope with age-related changes and prevent isolation [10–12]. Similarly, being surrounded by important possessions or memories is reported to be linked to the quality of life [9].

The ability to 'age in place' is dependent not only on age-related changes but on the design and environment of the home and the availability of other housing options [13]. Few homes are designed or built with consideration of the needs of older people and the development of age-friendly housing has remained a relatively low priority worldwide [14,15]. According to Severinsen et al. [16] many older people are living in houses which are unsuitable. As a marker of housing suitability, Australian data shows that approximately three-quarters (75%) of older people lived in a house with two or more *spare* bedrooms [17].

As a person ages, home modifications or relocation may be required [18]. Relocation may be avoided if the home can be modified to meet the needs of the older person. Occupational therapists often conduct home assessments to identify environmental hazards and suggest possible modifications to improve the safety of the home (e.g. installation of ramps, grabrails or decluttering of bedrooms) [19]. Evidence from randomised controlled trials suggests occupational therapy home assessments can lead to improved functional performance, reduced risk of falls and lower demands on caregivers [19]. However, access to occupational therapy home assessments may be limited in both urban and rural areas and is usually available only after injury or illness [13,20,21]. Home assessments can take considerable time with one study suggesting an average duration of 80 min per home assessment [22].

Solutions which lead to accessible, age-friendly homes for the increasing number of older adults are required. It is possible that, in future, digital health tools may play a role in enhancing the home assessment process [13]. A scoping review by Ninnis et al. [13] identified 14 studies which used technology to enhance the occupational therapy home assessment process. These studies involved either the development of specialised tools or the application of off-the-shelf technologies. Findings from studies conducted to date suggest that remote assessments were less

likely to identify potential hazards than assessments when the therapist was in the home [13, 23]. Despite the rapid advances in technology clinical practice have not changed substantially and traditional in-home assessments remain preferable [13].

Much of the research in this field to date has focussed on older adults with existing diseases and disabilities who require home modifications. Less research has been conducted with older adults who remain relatively fit and independent but who may be considering the future changes that may be required to improve their chances of successfully ageing in place. Providing members of the public with education regarding age-friendly design and home modifications may assist with future planning, thereby potentially preventing injury, reducing the fiscal pressures on the health care system and compensating for workforce shortages in health and aged care.

This qualitative study is part of a research program which seeks to develop a tool which enables older people (or their families) to self-assess their own homes. This tool will be available both in hard copy and as a digital tool and will be used to promote and support future planning in terms of the home environment. The first step in tool development is to conduct a needs assessment to understand the gaps between the 'current state' of older adults living at home and the 'desired state' of supporting ageing in place [24]. This involves gathering data from older adults to gain a deeper understanding of ageing in place and home safety. As relatives often become involved in the housing decisions of older people and are potential users of the tool, we also wanted to understand their perspectives. Therefore, the aim of this qualitative study was to investigate the following research questions: (1) what are the perspectives of middle-aged and older people in relation to their own home environment, home safety and ageing in the home; (2) what are the experiences of individuals with older relatives and the difficulties their older relatives face as they age in place.

Methods

Ethics

This study was approved by the Flinders University of South Australia Human Research Ethics Committee (ID: 1949). Eligible participants were provided with information about the study and provided informed consent. Interviews were conducted individually with the person over the phone (while they were in their own home) at a time convenient to the participant.

Audio-recordings were transcribed and de-identified and data presented in a way that ensures participants remain anonymous. Participants were assured that they could choose not to answer questions if they felt uncomfortable and could end the interview at any time.

Research design

A qualitative descriptive method was used [25]. The qualitative descriptive methodology was applied in order to understand descriptions of experiences and perceptions [25,26]. This methodology aims to collate the 'who, what, and where of events or experiences' from a subjective perspective [27]. Semi-structured interviews were the preferred approach as it allows the researcher to address topics in their own terms pertinent to them and clarify views based on the development of answers [28]. To ensure rigorous reporting of the methodology, this paper was written in accordance with the Consolidated Criteria for Reporting Qualitative Research (COREQ). See supplementary material [29].

Participants

We recruited participants to represent one of two categories. The first category involved people considered as 'middle or older aged people' invited to talk about their own personal experiences and plans for housing as they age. The second category involved people who had older relatives and we sought to understand the experience of being a family member providing support during the ageing process. Relatives (especially children) often become involved in the housing decisions of older people as they provide increasing support to ageing family members. The two groups were recruited separately so that participants in the first category were not known to those in the second category. Inclusion criteria for the first group were as follows: (a) aged 55–75 years old; (b) live in their own home; (c) speak fluent English; (d) cognitively intact. This age criterion was chosen to explore the views of adults who were likely to be relatively healthy and independent and thinking about planning for the future and these are the target end users of the tool in development.

The second group were: (a) aged 50 and over; (b) have parents who are still alive (c) live in their own homes; (d) speak fluent English; (e) cognitively intact. All participants were from metropolitan Adelaide, Australia and were identified and invited to participate through their membership of an online research panel hosted by a market and social research company (McGregor Tan, Adelaide, Australia) assisted only with the recruitment phase. The company manages a panel of over 20,000 respondents and identified panel members who met the eligibility criteria and agreed to participate in an interview.

Data collection

Semi-structured interviews were conducted by one of the authors (KL), over a one-month period. A semi-structured interview guide with open-ended questions was used to explore participant's perceptions and opinions of complex or emotionally sensitive issues [30]. The question guide for the second group of participants (children) was slightly altered to seek their experiences and perspectives of having an older relative and family views and discussions about long-term housing decisions. Interviews started by giving participants (middle and older-aged people) opportunities to explain their overall thoughts about staying at home as they aged. Whereas the people with older relatives were asked about their experiences with ageing parents. For this study, individual semi-structured interviews were conducted until the data reached a point of saturation, (i.e. when further information no longer generated new ideas or understandings) [31]. Probes were used to follow up on responses and promote discussion with each participant. No field notes were taken, nor were observations written regarding individual behaviours. Questions covered for both categories are detailed in Appendix 1 (wording modification to be made for the second category). All interviews were conducted one to one *via* phone due to restrictions associated with the Covid-19 pandemic. The interviews took approximately 30 mins each until their natural conclusion were audiotaped and transcribed verbatim.

Data analysis

Recorded audio interviews were transcribed by an independent company. Data analysis was conducted by two investigators: RD and KL. All data were entered into NVivo 12 (software), Interviews were analysed inductively using thematic analysis. This study used reflexive thematic analysis to fully embrace the skills of the researcher and the qualitative research values [32,33]. Reflexive thematic analysis is used for research questions needing to describe the 'lived experience of particular social groups' or 'to examine

293

the factors' that influence a particular phenomenon [34]. The principal investigator familiarised themselves with the data and then coded the interview text independently (in NVivo). For example, the text, *"They don't want to let go of their independence, and I get it,"* was assigned the code, "want to remain independent". Codes were then reviewed to check for duplication and similar codes were grouped together as initial themes [32,33]. The investigators discussed, reviewed, and refined the themes until a consensus about their nature and relationship with other themes was reached. Socio-economic status was categorised according to the Australian Bureau of Statistics index of relative socio-economics advantage and disadvantage (IRSAD) [35]. Each socio-economic area is given a score for a statistical area level, based on postcode (e.g. SA1) through the addition of weighted characteristics. The scores ranged from a low index score (more disadvantaged, SA1) to a high index score (most advantaged, SA5) [35].

Results

A total of 16 participants were interviewed as presented in Table 1. Eight middle and older aged people discussed their own home environments and future housing plans and eight individuals with older relatives provided perspectives on the home environment and future planning for a relative. Four out of the eight middle and older aged people were males, while the remaining four were females. The middle and older aged people were aged between 67–76. Four of the individuals with older relatives were also males and the remaining four were females. Individuals with older relatives were aged between 52–65.

In total, seven themes represented participants' perceptions of home safety, ageing in the home and the information older people need to assess their own home for safety emerged (Figure 1).

These were: (i) experiencing and accepting the ageing process; (ii) no place like home; (iii) push for independence; (iv) recognising future housing needs; (v) recognition of home environment risks; (vi) resistance to change; (vii) access to services and education.

Theme 1: experiencing and accepting the ageing process

Individuals with older relatives and middle/older aged adults identified how a positive attitude towards ageing and being receptive to change and new information supported successful ageing in place and changes in behaviour. This is reflected by an individual with an older relative and a middle/older aged person:

Certainly at this point they've always been very positive and accepting that it's okay. Individual with an older relative, Interview 16.

You have to be in the mindset to accept the information that's presented to you. Middle/older aged adult, Interview 13.

The acceptance of ageing and the changes associated created further opportunities for middle and older aged adults to accept help at home and the home safety features required to support ageing in place.

I suppose in the future, you might have to have the usual bars to help you, assist, and all the rest of it, which we don't have at the moment. Middle/older aged adult, Interview 6.

You're responsible, so it's up to you to take the initiative and the responsibility. Put it this way. I would have no problem, if things did get a bit difficult, in asking for help. Middle/older aged adult, Interview 2.

Table 1. Characteristics of participants.

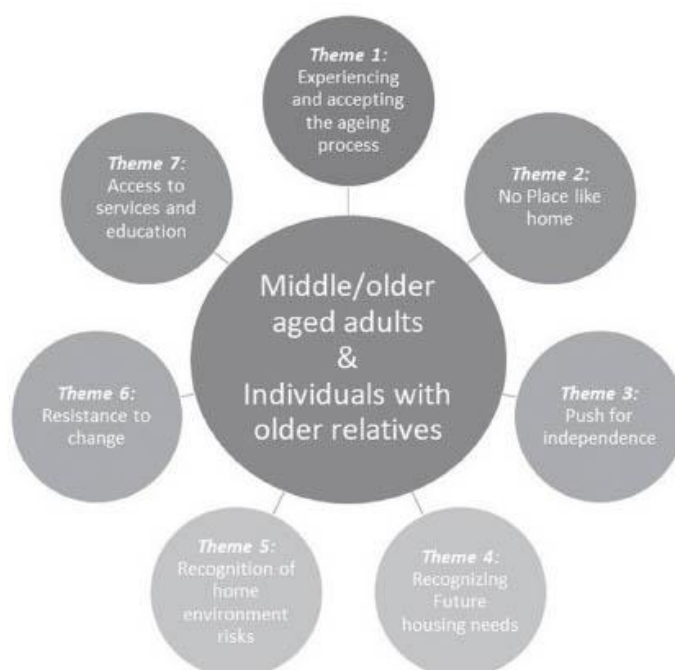| Participant number	Group	Age	Gender	Socioeconomic status	Occupation
1	Individual with older relatives	59	Female	SA4	Tutor
2	Middle/older aged person	71	Female	SA4	Retired
3	Individual with older relatives	52	Female	SA2	Home duties
4	Individuals with older relatives	51	Male	SA2	Office manager
5	Middle/older aged person	75	Male	SA5	Retired manager
6	Middle/older aged person	69	Female	SA2	Retired
7	Middle/older aged person	66	Male	SA5	Building designer
8	Individual with older relatives	62	Female	SA5	Accountant
9	Middle/older aged person	75	Female	SA4	None
10	Individual with older relatives	64	Female	SA5	Retired
11	Middle/older aged person	71	Male	SA3	Retired maths teacher
12	Individual with older relatives	55	Male	SA3	Delivery driver
13	Middle/older aged person	66	Male	SA4	Retired public servant
14	Middle/older aged person	66	Female	SA3	Retired
15	Individual with older relatives	62	Male	SA4	Stone mason
16	Individual with older relatives	62	Male	SA1	Teacher

Figure 1. Themes representing participants' perceptions of home safety and ageing in the home.

Middle/older aged adults who accepted the change and saw benefits to change were more open to home safety interventions such as home modifications, having an occupational therapist visit to install safety features or conducting home assessments:

> I'm well controlled and everything's not too bad, but, yes, I certainly would consider some modifications, not at the moment, but in the future. Middle/older aged adult, Interview 14.

> My wife's going to have hip replacement in a couple of weeks. So we're putting in some suction handles and things like that, just to facilitate ease for her for that. And obviously those sorts of things can be made permanent down the track. Middle/older aged adult, Interview 13.

> I would certainly say that this experience now that she's used the handrails and everything, she's agreed that they're actually good [occupational therapists]. So she's probably a bit more open, but she's still very distrustful and we still have to work very hard at her. Individual with an older relative, Interview 4.

Meanwhile, others were also open to the idea, however this depended on costs.

> If I was living alone, depends on the price of course, but I'd be amenable to having some professional look at it. Middle/older aged adult, Interview 11.

> I think a lot of people don't want to get professional help to come in because they're concerned that it's going to cost them too much or that they're not going to get the answer they want. Middle/older aged adult, Interview 7.

Theme 2: no place like home

For all middle and older aged adults, their houses were their homes. Three out of eight middle and older aged adults planned to remain in their homes for as long as possible. When discussing her husband, one participant said:

> He's going to go out of this house is in his coffin. Middle/older aged adult, Interview 2.

> Personally, I'd like to stay in my home. I mean, we've been in here 40 odd years. I'd like to stay here as long as possible, really. Middle/older aged adult, Interview 6.

> My preference is to stay where I am as long as I can. Middle/older aged adult, Interview 7.

Some participants reported that there was fear of losing their homes and relocating to residential aged care facilities.

> She's [mother] just got this notion, she's scared of losing the house. She thinks the nursing home's going

to take the house. We're telling her, "No, they don't," but yeah. Individual with an older relative, Interview 3.

Matter of moving into an aged care unit or something like that. I don't think that would work. Middle/older aged adult, Interview 9.

There's no way that she would accept going into a nursing home. So, yes, it's difficult now. Yes. Individual with an older relative, Interview 1.

One individual with an older relative talked about their mother wanting to remain at home due to the worries of becoming a burden. This participant discussed how her mother has become a burden because she not allowing her to help make ageing in place easier:

She's worried about contributing to the burden... And although, so we're getting a little less tactful these days saying, "Mom, you are the burden because you're not allowing us to just make it easy." Individual with an older relative, Interview 4.

Theme 3: push for independence

Participants strongly wanted to remain independent. Middle and older aged people reported that they currently felt active enough to continue living at home and not require assistance or home modifications. Five out of eight individuals with older relatives described the desire of their relative to remain independent; this was linked to pride and dignity.

They are fiercely independent. They have been serious travelers all of their lives. Individual with older relatives, Interview 8.

It's like a self-preservation thing you just don't want to admit, I suppose, to anyone let alone yourself. Middle/older aged adult, Interview 14.

We're both mid to late 60s, so we're quite fit. Middle/older aged adult, Interview 13.

At the moment, I think I can manage pretty much everything. Middle/older aged adult, Interview 9.

Some individuals attempted to encourage their older relatives to be more proactive in seeking help, assistance and home modifications however had difficulty persuading their older family members.

I've tried to be proactive in helping mum, but she hasn't been interested. Individual with older relatives, Interview 10.

Whilst other individuals tried to encourage their older relatives to live with them without the need to relocate.

I said to her, "Would you like to come and live with me when you're older?" And she's not open to that either, which is probably a good thing, but it was out. I put it out there just in case. "No, no," she said. "No, no, I wouldn't, I wouldn't like to do that." Individual with older relatives, Interview 1.

When I was young, you looked after your olds. They came and lived with you. You don't anymore. It's sad. Middle/older aged adult, Interview 2.

More than once we've had the conversation, "Well yeah mom, when we were kids and we needed you, you were there. And that was fantastic. But the reality is you're in your 90s now, and now the tables have turned. We're here to help you." Individual with older relatives, Interview 4.

Participants spoke about the importance of being able to choose what they do, how they spend their time in their homes, having control of their own routines and how this desire for autonomy played a role in their housing decisions.

Like I've even suggested to mum, at least, like I've said before, just if she does the bathroom and the vacuuming, and then you can do the other things. But she's still not happy about that." Individual with older relatives, Interview 1.

I think we're okay here. We're reasonably close to shops. Middle/older aged adult, Interview 2.

Theme 4: recognizing future housing needs

Participants who were planning for future housing discussed either what modifications may be required over time or the possible need for relocation. Five out of eight middle/older aged adults identified the need to consider future housing plans. Some participants expressed the need to be proactive about future housing plans and discussed safety at home, for both now and the future:

We've been thinking about it, my wife and I. Five years, we've been sort of working out what we're going to do about it. And on top of everything, she's a physiotherapist. Middle/older aged adult, Interview 7.

Middle and older aged participants discussed awareness of relocation options, communication with families around what may be needed in the future and how they had already implemented minor home modifications:

I actually worked in an aged care facility, but I am aware of a lot of the modifications and frames and chairs and all sorts of things that's around, yeah. Middle/older aged adult, Interview 14.

I know several years ago we had to get some cementing done at the back. And I do remember my

296

husband saying we should make this a slope just in case we have to have a wheelchair or anything like that in the future, which we have done. Middle/older aged adult, Interview 6.

Individuals encouraged their older relatives to make early changes, either to move to lower maintenance homes or to a retirement village, rather than waiting for a crisis. One individual stated:

We can't just walk in and say, "Oh, I think we should do this. It'll make your life easier." She wouldn't just go, "Oh yeah, make it happen." We'd have to spend another hour on it to explain it all. Individual with older relatives, Interview 4.

Other individuals with older relatives discussed the disinterest their older family members had towards home modifications. One individual stated:

Yes. I did talk to them about seeing an occupational therapist or a physio or someone and getting the right measurements, but they weren't interested in that. Individual with older relatives, interview 10.

Six participants had been thinking about changing their homes to improve home safety and avoid relocation. One middle-aged adult (who was a building designer) stated:

I have over the years been involved in putting handicap rails and that sort of thing in houses where someone's had a stroke or something as an older person, and then they just need bits and pieces fixed into the bathroom Middle aged person, Interview 7.

Another participant suggested that grab rails and assistive equipment would probably be installed in the foreseeable future:

Look, I would say probably showers and things like … because I live with my husband and he's a little bit older than me and he has rheumatoid arthritis which is controlled at the moment. But I would say in the future, we'll probably look at grab rails in the bathrooms, maybe shower chairs and we've also got a sunken lounge and both of us are quite capable of getting into and out of it at the moment, but in the future that could pose a problem. Middle/older aged person, Interview 14.

Most participants identified grab rails as being one of the key changes that could be made to the house to improve accessibility and safety. Some considered the use of temporary grab rails (e.g. suction rails) to compensate for short-term changes in function (e.g. after surgery). Six out of sixteen middle or older-aged adults discussed being aware of the different types of home modifications that were available, either due to their experience in their jobs or their experiences with family and peers:

In fact, my first husband became very ill with a brain tumor, and we had a friend who was a carpenter and he actually put some rails in the shower and the toilet for him while he was ill. That was a bit of a preview of that sort of thing. Middle/older aged adult, Interview 9.

Overall, data showed that early recognition of home safety was important for ageing adults and their relatives.

Theme 5: recognition of home environment risks

Six out of eight middle and older-aged adults and one individual with an older relative were able to distinguish current home hazards and age-related changes that could potentially affect their ability to age in place.

We might have to make some minor alterations to maybe where we've got steps, I suppose. But apart from that, everything's fairly safe. Middle/older aged adult, Interview 6.

I've got little steps and things to use, long tongs to help me grab things. That's really not a modification. Sometimes in the shower, if I think the floor could be a wee bit slippery, and I'm sometimes a bit worried that I might need a grab rail or something in there at some point in time. Middle/older aged adult, Interview 9.

The only thing I did think that maybe would be a help if PowerPoints were more a hip level. Not down. But that's the way the house was built. Middle/older aged adult, Interview 5.

Four out of eight individuals identified no current home modifications in the houses of their older relatives.

I think nothing else has been done, as in modifications, stuff like that. Handrails and stuff like that, she hasn't got any. Individual with older relatives, Interview 3.

So, as far as home modifications, regardless of boarder or not, I'm quite independent and can be at home with no real worries. Individual with older relatives, Interview 11.

Three individuals with older relatives described their experience with home modifications as having noticed their older parent struggling to mobilise or due to modifications already being in place.

They've got a rail there now. But dad put it in. My dad put it in, which is fine…. I think it was because I fell… They were afraid that other people might hurt themselves rather than them. Individual with older relatives, Interview 10.

The identification of home hazards may have been influenced by a middle/older aged person's cultural

background. One middle/older aged person described no issues that could be foreseen as issues

I don't think houses in this country ... I mean, obviously I'm form the UK, where you've got steps that are Everest-like. Middle/older aged person, Interview 2.

Factors such as health crises and age-related changes were identified as triggers for individuals with older relatives or middle and older aged adults to make home environment and housing decisions.

Theme 6: resistance to change

Individuals with older relatives spoke of resistance amongst their relatives to make changes or modifications. There was resistance to home modifications, assistance at home or the thought of relocation in the future.

Very resistant to the idea. The OT [occupational therapist] that came out, I mean, he was pretty understanding of the challenges quite often, but there's usually a lot of pushback on, "It's my house. I've never had these for the last 60 years. Why do I need now?" Individual with an older relative, Interview 4.

The fear of strangers attending to their home, home alterations not being suited to visitors, the stigma of ageing/disability and modifications being visually unappealing were all reasons for this resistance to change. Individuals preferred to be given the choice regarding home modifications to suit their aesthetics and function.

Because a lot of the equipment is very obviously clunky looking, awkward looking and it's not streamlined looking. Middle/older aged adult, Interview 14.

This middle/older aged adult also wanted modifications to be:

Aesthetically nicer looking but still functional. Middle/older aged adult, Interview 14.

Middle/older aged adults sometimes felt changes to their house were not a priority, either because they were not 'open' to the thought, or other individuals with older relatives tried to make their homes safer, but they were not interested. As depicted by one individual with an older relative:

[They're] not open to that yet ... I think they're taking it like a, it's more like a day-by-day approach. Individual with an older relative, Interview 1.

Waiting until a crisis occurred was common. A total of five middle/older aged adults and four individuals with older relatives described housing

decision-making approaches being altered only after a crisis or an age-related change occurred.

They would wait for a trigger. So both of them, really. Mom ... Especially my dad. Individual of an older relative, Interview 15.

I guess they may make some further changes that they might need. Individual of an older relatives, Interview 16.

I think people tend to leave it till they really need it or, till they need it. Yeah. Middle/older aged adult, Interview 6.

I'm not really worried about my safety in the home. If I trip over, I am probably getting clumsier. But I'll figure I can sort of crawl out, yell out stuff. Middle/older aged adult, Interview 11.

But the point would be that you started to feel that it was a bit risky or you felt a little bit like you needed it at that point. Middle/older aged adult, Interview 14.

Theme 7: access to services and education

Individuals with older relatives reported that there was not enough information being shared or promoted about ageing in place, especially about home modifications and where you could obtain these. These individuals described many issues with the system, especially with the feeling of the lack of information being shared:

No, I don't think there is a lot. I knew nothing until My Aged Care [government funded aged care support service] came on board. But even then, to me, I didn't think there was enough information, but then I thought it might've been because I was new to all this because of mom. Middle/older aged person, Interview 16.

Three individuals with an older relative were uncertain of the current services available for their older relatives. One individual expressed there was still a lot to learn about 'the system':

Mom actually had an ACAT assessment [assessment of aged care support needs] done, and I rather gather her and my sister and I are still sort of learning the ropes a little bit on this one. We find understanding that system to be a little bit of a minefield. Individual with an older relative, Interview 4.

Despite this, seven out of eight individuals with older relatives and all eight middle and older-aged adults were open towards receiving more education about ageing in place. All participants felt that education that showed older people 'how to age safely within their home' would be useful for future planning:

298

I think it would be a good idea because especially you think of things, but there may be something that someone else knows about that you hadn't even thought of. So I suppose some assistance might help in some areas. Yeah. Middle/older aged person, Interview 6.

I think many of those sorts of things are probably common sense, but yeah, there may be some things that we haven't considered and there is an actual document of sorts. So yeah, we ... certainly I wouldn't be ... against that. I don't think, they wouldn't mind being ... assessing the house and just making some comments, see the certain things or ... for example, the shower is probably one that is of concern given the nature of showers and wet areas. Individual with an older relative, Interview 16.

But I think mum would be interested. And I think she'd be surprised at the things that could be done, and that might give her a kickstart into actually talking to someone about getting it done. Individual with an older relative, Interview 10.

Educational guides that were in a 'paper-based form' were most preferred. Five middle/older aged people and four individuals with older relatives described feeling less comfortable with technology (mobile phones, table computers or computer software programs).

So for her, she'd never used any form of computer or mobile phone. She probably would look at something in the form of a printed document, she'd be open to that, for sure. She would look at it, might not admit to us that she has, but she would. Kat and I would use anything, printed form, anything, app really, just don't care as long as it gets the result. Individual with an older relative, Interview 4.

I think at the moment, for the older age group, I'm 71, I'd say probably the majority of people over 75 or 80 would go for the paper. Middle/older aged person, Interview 2.

Whereas four individuals with older relatives and three middle/older aged people preferred electronic or online educational guides, depending on their comfortability and experience with technology:

Apps work really well for me, obviously, because I'm computer literate, but obviously I've got a stepmother who's just not computer literate at all so she'd need a written one. But for purpose it would be an app. Middle/older aged person, Interview 14.

Six individuals with older relatives and middle/older aged adults reported that they would go to their General Practitioner (GP) or a known health professional such as their physiotherapist as their first point of contact if they required further education or access to home modifications.

GP's the most trusted sort of source of information. Middle/older aged person, Interview 2.

Other individuals with older relatives and middle/older aged adults reported that they had attempted to seek information through online health service portals, their social networks, private organisations for modifications, the council or retail shops such as hardware stores.

Well, now that I'm being assessed, I'd probably go to My Aged Care. Middle/older aged person, Interview 5.

Maybe supermarket or Bunning's. Middle/older aged person, Interview 5.

An independent living organization. And I'm not necessarily thinking straight away of a particular shop or retail outlet in that respect, because they've got their own barrows to push. Middle/older aged person, Interview 13.

With my Mum's condition, she does go to a local council service that they provide. Individual with an older relative, Interview 16.

Discussion

Older adults reported a strong desire to remain independent and in their own homes. Relatives supported their family members although were sometimes concerned about the safety of the older person in their home environment and had difficulty convincing them to make changes to improve the safety or accessibility of the home. Both older people and family members reported some knowledge of home modifications that could be made although participants agreed that more information and tools to help with future planning would be beneficial. Participants had mixed opinions as to the preferred format with some preferring paper-based tools and others identifying digital health tools as being appropriate. The challenge remains regarding how to implement home assessment and modification at the right time as while some participants reported being proactive and planning ahead, others were reluctant to take action until essential, such as due to a health crisis.

The World Health Organisation's vision is a society comprising age-friendly environments [36]. To achieve this, middle and older aged people need to be engaged and involved in the process of designing, building, and adapting their own homes. However, involvement relies on the older person having the knowledge, tools, and resources to do so. The views and preferences of older people and their families should be included when planning and designing tools for older people to self-assess their own homes.

This sentiment was echoed by Ollevier et al. [37] who identified the importance of older adults being engaged in the development and evaluation of technology to support ageing, especially in home environments.

Age-related changes to one's physical function influenced participants' views on ageing in place. Feeling physically and emotionally strong led to an improved acceptance of the ageing process [38]. Consistent with the findings from Shaw and Langman [39], most older people who accepted their ageing trajectory, took the necessary steps to maintain and enhance their physical and mental health to remain at home. Whereas those who refused to accept a decline in ability, frustrated family members with older relatives [40]. Participants in this study were also frustrated when older relatives were reluctant to accept changes or modifications.

Decisions regarding modification or relocation are complex and can be overwhelming and expensive. We found that older people in this study knew changes were needed to remain at home, had reasonable awareness of what modifications were possible and wanted more ways to make their home age-friendly. However, participants expressed a desire for more access to education. Similarly, Wang et al. [41] described the need for more information and education about the home environment to inform older adults' decisions as access to home modifications is one of the most critical factors as to why older people stayed or moved from their home rather than move into a residential care home [42,43]. Overall, individuals have the desire and willingness to participate in education and were interested in education and tools that could support this [41].

Participants often reported waiting for a crisis to occur before making major housing decisions. Our findings were similar to Safran-Norton [44] and colleagues who reported that older adults were still reluctant to make changes, even when there were factors that would trigger housing adjustments, such as living in two-story home with no bathroom on the first level. Changes to the home or moving seemed to be overwhelming or for some, it may have been considered too late due to the sudden change in health [45]. Davey [46] reported that older people were aware of the safety issues as they aged and thought about adaptations but were still hoping that they will be ok. Receiving education and tools from people with influence, such as family members, health professionals or the person's GP may promote earlier decision-making. Although there has been a shift towards digital health tools, our participants had mixed views with some preferring digital tools but most preferring paper-based guides due to inexperience with technology. Other studies have found that older people were generally more accepting of digital health tools if they were provided with training [47,48]. Technology has the potential to facilitate conversations about the home environment between patients and their family members [21].

Understanding the perspective of individuals with ageing relatives is important as families are often involved in managing health crises and decisions about housing. In 2018, 34% of older people reported relying on their spouse for support, 21% relied on a daughter and 17% relied on a son [49]. As the population ages, the number of older people hoping to remain in their own homes will continue to grow and a decline in family support is expected due to families living further away and having limited capacity to assist due to their own work and family commitments [50]. Involving both older people and family members in designing solutions as to how to successfully age in place is critical and family members may play a key role in bringing forward decision-making regarding housing.

Future recommendations

Older adults and families are open to receiving education about home safety and potential adaptations and modifications. Educational workshops and tools may increase awareness about options available and assist people to assess their own homes thereby prompting changes earlier, rather than later. Results of this study suggest that family involvement, linking with the community (e.g. GP, council) and having both digital and paper-based tools will increase uptake.

Limitations

This study showed the importance of consulting with middle and older aged people and family members. Whilst semi-structured interviews can provide rich data and provide multiple perspectives there are limitations. Although data collection reached a natural conclusion, the lengths of the interviews or depth may have been influenced by external factors, impacting data saturation, and understanding. It is possible that some data may have been overlooked during analysis and the small sample size may not encapsulate the perspectives of the broader population. In particular, recruitment *via* an online research panel may

have resulted in a sample who were more technology literate with higher levels of education. Furthermore, there may be potential bias due to interviews and analyses being conducted by an occupational therapist.

Conclusion

This study provides insight into the knowledge and support middle and older aged adults may need to assess their homes and approaches that might successfully promote ageing in place. Some participants accepted the ageing process, which promoted a positive outlook towards future housing decisions. Whereas those that waited for crises did not recognise the need to alter their homes. Despite this, middle and older aged people are open to education and would like access to information on home safety including home modifications. A tool (in both paper and digital form) which provides education and facilitates decision-making is acceptable and likely to be beneficial.

Disclosure statement

No potential conflict of interest was reported by the author(s).

Funding

References

[1] World Health Organisation [Internet]. Ageing and Health. 2022 [cited 2021]. Available from: https://www.who.int/news-room/fact-sheets/detail/ageing-and-health.
[2] Productivity Commission. Housing Decisions of Older Australians. Productivity commission Research paper. Canberra; 2015.
[3] Tanner B, Tilse C, de Jonge D. Restoring and sustaining home: the impact of home modifications on the meaning of home for older people. J Hous Elderly . 2008;22(3):195–215.
[4] Hatcher D, Chang E, Schmied V, et al. Exploring the perspectives of older people on the concept of home. J Aging Res. 2019;2019:2679680.
[5] Stones D, Gullifer J. At home it's just so much easier to be yourself': older adults' perceptions of ageing in place. Ageing Society. 2014;36(3):449–481.
[6] Kramer C, Pfaffenbach C. Should I stay or should I go? Housing preferences upon retirement in Germany. J Hous Built Environ. 2015;31(2):239–256.

[7] Pani-Harreman KE, Bours GJJW, Zander I, et al. Definitions, key themes and aspects of 'ageing in place': a scoping review. Ageing Society. 2021;41(9):2026–2059.
[8] Aplin T, Canagasuriam S, Petersen M, et al. The experience of home for social housing tenants with a disability: security and connection but limited control. Housing Society. 2020;47(1):63–79.
[9] Coleman T, Wiles J. Being with objects of meaning: cherished possessions and opportunities to maintain aging in place. Gerontologist. 2020; 60(1):41–49.
[10] Glass AP, Vander Plaats RS. A conceptual model for aging better together intentionally. J Aging Studies. 2013;27(4):428–442.
[11] Courtin E, Knapp M. Social isolation, loneliness and health in old age: a scoping review. Health Social Care. 2017;25(3):799–812.
[12] Victor C, Grenade L. Boldy D. Measuring loneliness in later life: a comparison of differing measures. Rev Clin Gerontol. 2005;15(1):63–70.
[13] Ninnis K, Van Den Berg M, Lannin NA, et al. Information and communication technology use within occupational therapy home assessments: a scoping review. Br J Occup Ther. 2018;82(3):141–152.
[14] Podgórniak-Krzykacz A, Przywojska J, Wiktorowicz J. Smart and age-friendly communities in Poland. An analysis of institutional and individual conditions for a new concept of smart development of ageing communities. Energies. 2020;13(9):1–23.
[15] Novek S, Menec VH. Older adults' perceptions of age-friendly communities in Canada: a photovoice study. Ageing Society. 2014;34(6):1052–1072.
[16] Severinsen C, Breheny M, Stephens C. Ageing in unsuitable places. Housing Studies. 2016;31(6):714–728.
[17] Australian Institute of Health and Welfare [Internet]. Older Australians; 2021. Available from: https://www.aihw.gov.au/reports/older-people/older-australians/contents/housing-and-living-arrangements.
[18] Godfrey M, Cornwell P, Eames S, et al. Pre-discharge home visits: a qualitative exploration of the experience of occupational therapists and multidisciplinary stakeholders. Aust Occup Ther J. 2019;66(3):249–257.
[19] Stark S, Keglovits M, Arbesman M, et al. Effect of home modification interventions on the participation of community-dwelling adults with health conditions: a systematic review. Am J Occup Ther 2017;71(2):7102290010p1.
[20] van Gaans D, Dent E. Issues of accessibility to health services by older Australians: a review. Public Health Reviews. 2018;39(1):1.
[21] Read J, Jones N, Fegan C, et al. Remote home visit: exploring the feasibility, acceptability and potential benefits of using digital technology to undertake occupational therapy home assessments. Br J Occup Ther. 2020;83(10):648–658.
[22] Lannin NA, Clemson L, McCluskey A. Survey of current pre-discharge home visiting practices of occupational therapists. Aust Occup Ther J. 2011;58(3):172–177.

[23] Sim S, Barr C, George S. Comparison of equipment prescriptions in the toilet/bathroom by occupational therapists using home visits and digital photos, for patients in rehabilitation. Australian Occup Ther J. 2015;62(2):132–140.

[24] Stefaniak J. Needs assessment for learning and performance: theory, process, and practice. New York: Routledge; 2020.

[25] Doyle L, McCabe C, Keogh B, et al. An overview of the qualitative descriptive design within nursing research. J Res Nurs. 2020;25(5):443–455.

[26] Sandelowski M. What's in a name? Qualitative description revisited. Res Nurs Health. 2010;33(1):77–84.

[27] Kim H, Sefcik JS, Bradway C. Characteristics of qualitative descriptive studies: a systematic review. Res Nurs Health. 2017;40(1):23–42.

[28] Flick U. An introduction to qualitative research. London: Sage Publications Ltd; 2022.

[29] Tong A, Sainsbury P, Craig J. Consolidated criteria for reporting qualitative research (COREQ): a 32-item checklist for interviews and focus groups. Int J Qual Health Care. 2007;19(6):349–357.

[30] Kallio H, Pietila AM, Johnson M, et al. Systematic methodological review: developing a framework for a qualitative semi-structured interview guide. J Adv Nurs. 2016;72(12):2954–2965.

[31] DeJonckheere M, Vaughn LM. Semistructured interviewing in primary care research: a balance of relationship and rigour. Fam Med Community Health. 2019;7(2):e000057.

[32] Braun V, Clarke V. One size fits all? What counts as quality practice in (reflexive) thematic analysis? Qual Res Psychol. 2020;18(3):328–352.

[33] Braun V, Clarke V. Reflecting on reflexive thematic analysis. Qual Res Sport Exerc Health. 2019;11(4):589–597.

[34] Braun V, Clarke V. Can I use TA? Should I use TA? Should I not use TA? Comparing reflexive thematic analysis and other pattern-based qualitative analytic approaches. Couns Psychother Res. 2020;21(1):37–47.

[35] Australian Bureau of Statistics [Internet]. Census of Population and Housing: Socio-Economic Indexes for Areas (SEIFA), Australia, 2016 2018; 2018. [cited 2022 2022 Nov 30]. Available from: abs.gov.au/ausstats/abs@.nsf/Lookup/by%20Subject/2033.0.55.001~2016~Main%20Features~IRSD%20Interactive%20Map~15.

[36] World Health Organisation [Internet]. UN decade of healthy ageing 2021–2023; 2020. Available from: https://www.who.int/initiatives/decade-of-healthy-ageing.

[37] Ollevier A, Aguiar G, Palomino M, et al. How can technology support ageing in place in healthy older adults? A systematic review. Public Health Rev. 2020/11/23;41(1):26.

[38] Bosch-Farre C, Mc M-A, Ballester-Ferrando D, et al. Healthy ageing in place: enablers and barriers from the perspective of the elderly. A qualitative study [Research Support, Non-U.S. Gov't]. Int J Environ Res Public Health. 2020;17(18):04.

[39] Shaw R, Langman M. Perceptions of being old and the ageing process. Ageing International. 2017;42(1):115–135.

[40] Macdonald J, McDermott D, Woods M, et al. editors. A salutogenic approach to men's health: challenging the stereotypes. 12th Australian National Health Promotion Conference, Melbourne; 2000.

[41] Wang S, Bolling K, Mao W, et al. Technology to support aging in place: older adults' perspectives. Healthcare. 2019;7(2):60.

[42] Davey JA, de Joux V, Nana G, et al. Accommodation options for older people in Aotearoa/New Zealand. Centre for Housing Research Christchurch; 2004.

[43] Hwang E, Cummings L, Sixsmith A, et al. Impacts of home modifications on aging-in-Place. J Hous Elderly. 2011; 25(3):246–257.

[44] Safran-Norton CE. Physical home environment as a determinant of aging in place for different types of elderly households. J Hous Built Environ. 2010; 2010/05/2524(2):208–231.

[45] Molinsky J, Forsyth A. Housing, the built environment, and the good life. Hastings Center Report. 2018;48: s 50–S56.

[46] Davey J. Ageing in place": the views of older homeowners on maintenance, renovation and adaptation. Soc Policy J NZ. 2006;27:128.

[47] Tsertsidis A, Kolkowska E, Hedström K. Factors influencing seniors' acceptance of technology for ageing in place in the post-implementation stage: a literature review. Int J Med Inf. 2019; 2019/09/01;129:324–333.

[48] Klimova B, Poulova P, editors. Older people and technology acceptance. Human aspects of IT for the aged population. Acceptance, communication and participation; 2018. Cham: Springer International Publishing.

[49] Australian Bureau of Statistics [Internet]. Disability, ageing and carers, Australia: summary of findings: Abs; 2018. Available from: https://www.abs.gov.au/statistics/health/disability/disability-ageing-and-carers-australia-summary-findings/latest-release.

[50] Gaugler J, Schulz R. Bridging the family care gap. Innovation in Aging. 2021;5(Supplement_1):267–267.

Appendix 1

Interview questions designed for group of older people with slight modification to wording for the second group who represent children of older people.

Introduction: "Research shows that most people want to remain in their own homes for as long as possible. But over time people might need some modifications to help with safety"

1. What are your main concerns about staying in your own home environment as you age?
2. Are you familiar with modifications that may be made to the home?
3. Have you had any modifications to your own home? What type and who made them?

4. Where have you received information about the types of modifications that are available? And do you know much about the costs of modifications?
5. What are your thoughts about having a professional assess for these and make recommendations? Or is it something you think you could do yourself (ie common sense)?
6. What do you think about having a professional make the modifications? Or would you ask a family member to help with this type of thing
   Information sharing: We are looking at designing a type of checklist which would help people (or their family members) to review their own home and identify the types of things that might be helpful to do in advance.
7. What are your thoughts about doing a self assessment? Would you like to do this or do you lack confidence in your knowledge and skills
8. What format might suit best? (eg online, mobile app, written)
9. Who would be the best person to distribute this? (eg local council, COTA, health department, GP)
10. Do you have any examples of good 'self assessments' that you've used before?
11. Is there any other information that you think would be helpful related to this topic?

303

Aclan, R., George, S., & Laver, K. (2023). Common home hazards among healthy older aged adults and potential modifications required for age-friendly housing. Aust Occup Ther J. https://doi.org/10.1111/1440-1630.12918

FEATURE ARTICLE

WILEY

Common home hazards among healthy older aged adults and potential modifications required for age-friendly housing

Roslyn Aclan[1] | Stacey George[2,3] | Kate Laver[1]

[1]College of Medicine and Public Health, Flinders University, Flinders Medical Centre, Adelaide, South Australia

[2]Healthy Ageing Support and Care, Australia

[3]Caring Futures Institute, Flinders University, College of Nursing and Health Sciences, Flinders University, Adelaide, South Australia

Correspondence
Roslyn Aclan, College of Medicine and Public Health, Flinders University, Flinders Medical Centre, GPO Box 2100, Adelaide 5001, South Australia.
Email: roslyn.dalistan@flinders.edu.au

Funding information
Australian Research Council, Grant/Award Number: DE200101494

Abstract

Introduction: The creation of age-friendly home environments enables middle-aged and older aged people to live independently at home while adapting to age-related changes. Little is currently known about existing home hazards that may potentially hinder healthy older people as they age.

Methods: Prospective cohort study of healthy adults who received an age-friendly home environment assessment conducted by an occupational therapist. Adults aged 60 and over, without significant disability, living in homes within metropolitan Adelaide, South Australia were recruited through community advertising.

Results: Sixty age-friendly home environment assessments were conducted. Common areas where potential hazards were identified, and modifications recommended were bathrooms, toilets and backyards. Gardens were commonly identified as potentially requiring modifications in the future. Participants were more likely to consider moving to new housing if additional modifications were needed to their homes.

Conclusion: Affordable and accessible age-friendly housing is required to support an ageing population. Education on age-friendly housing for healthy middle and older aged people is required enabling proactive planning rather than awaiting health crises.

KEYWORDS
Ageing, Domains of practice, Domains of practice, Home assessment/modification, Populations/Conditions, Safety

1 | INTRODUCTION

The world is facing an ageing population with one in six people expected to be 60 years and over by 2030 (World Health Organisation, 2022). Ageing can lead to changes in physical and cognitive capabilities and consequently reduced functional ability (World Health Organisation, 2022). However, functional ability is dependent not only on the intrinsic capacity of a person (such as their physical and cognitive capabilities) but also on the environment they live in and how they interact with that environment (Luciano et al., 2020).

The World Health Organisation supports healthy ageing and older adults being able to remain at home as long as possible, encouraging the establishment of age-friendly environments in homes and communities (Das et al., 2022; World Health Organisation, 2020). Transformation towards an age-friendly society requires the establishment of 'age-ready cities' and the promotion of housing solutions to enable older adults to age in place (Das et al., 2022). Most people have the desire to remain in their own homes for as long as possible; however, housing needs change over time (Hatcher et al., 2019; Kramer & Pfaffenbach, 2015; Productivity Commission, 2013; Stones & Gullifer, 2014; Tanner et al., 2008). Middle-aged adults, those aged 55 and over, may consider downsizing as children leave home or may be considering lower-maintenance accommodation for the years ahead (Australian Bureau of Statistics, 2020). Whilst older people, over the age of 65, maybe experiencing new or greater challenges associated with ageing (Office for the ageing & Government of South Australia, 2021). Existing research shows that the significance and meaning of the home increases over time with the relationship between people and their homes becoming more important (Löfqvist et al., 2017; Sixsmith et al., 2014). Hence, ageing in place has become a strategy for governments, to allow people to remain in their own homes for longer, reducing the need to relocate to residential care, whilst reducing public and private health spending (Lux & Sunega, 2014).

Home environment assessments and interventions have been used by occupational therapists to assess and improve safety and independence at home, allowing older adults to live in their own homes longer (Barras, 2005). Home environment assessment and interventions have been used by occupational therapists to assess, improve and facilitate a person's safety and independence within their own home (Clemson et al., 2019; Gitlin et al., 2009; Keglovits & Stark, 2020). Modifications such as the installation of ramps/grab rails, improved lighting, removal of rugs or the decluttering of rooms are commonly recommended by an occupational therapist following a home environment assessment. Home assessment and interventions conducted by an occupational therapist have benefited many ageing adults and have been shown to increase independence at home (Tanner et al., 2008). Older people have also reported modifications reducing the need to rely on others (community services or family members) to assist with everyday tasks (Tanner et al., 2008). However, home modifications are often completed following a health crisis or later in the ageing trajectory when older people may already be experiencing frailty. Existing home environment assessments or checklists designed by and used by occupational therapists have primarily focused on compensating for reduced mobility, safety and access. For example, the

Key Points for Occupational Therapy

- Occupational therapists have a role in promoting age-friendly environments and understanding potential home hazards among this population, to inform health and design professionals about future building, modification and housing needs for our ageing population.
- Addressing potential hazards early may result in age-friendly homes and communities, enabling older people to live at home for longer.
- Occupational therapists can provide education for ageing adults to help them proactively plan for ageing.

Westmead Home Safety tool was designed to be used by occupational therapists to identify a list of potential environmental hazards in the homes of people who were at risk of falling (Clemson et al., 1999; Clemson et al., 2014). Other tools are designed to be self-administered (such as the Home Falls and Accidents Screening (HOME FAST) Tool (Tzingounakis, 2012) and the Home Safety Self-Assessment Tool (Horowitz et al., 2016) although these tools were also designed primarily for falls prevention. In contrast, the Housing Enabler tool is a therapist-led tool used with this population to assess a person's functional limitations and potential home hazards (Iwarsson et al., 2012). In summary, most existing instruments have been designed by occupational therapists and used with people who already have physical limitations and are more focused from the therapist's perspective of falls. There is a need for tools, which are broader and address the needs of ageing adults who wish to age in place to identify potential future home hazards.

Our research shows older people consider both the home environment and the surrounding community as being important for successful ageing in place (Laver et al., 2022). In our workshops with older people, participants reported the importance of many other features of the home that contributed to comfort, such as ensuring the home was comfortable with access to fresh air, views, warmth, good community amenities and friendly neighbours (Laver et al., 2022). These characteristics of the home are not commonly assessed in existing home assessment tools. Participants also identified the need for existing self-assessment tools to use easy-to-understand language and be accessible via a website or mobile phone (Laver et al., 2022). These features also have been lacking in assessment tools to date. Working with people earlier in the ageing trajectory and providing personalised information and education about age-friendly environments

could be key in fostering healthy ageing and supporting people to stay home as long as possible (Davey et al., 2004; Hwang et al., 2011).

Existing studies have used home environment assessment tools to detail the common home environment issues faced by older people. For example, Fausset et al. (2011) described home maintenance tasks such as cleaning the gutters and household tasks as being the most demanding during ageing. In a separate study, Horowitz et al. (2013) identified a list of potential home hazards using a home safety self-assessment checklist among n = 28 participants aged between 69 and 87. They found a total of 30 environmental problems in 17 apartments. Common concerns were loose railings at the front of the house, torn carpet and a lack of grab rails, especially in the bathroom (Horowitz et al., 2013). More recently, a scoping review of fall hazards by Keglovits et al. (2020) identified 17 home environmental hazards among community-dwelling *older* adults. Hazards comprised loose throw rugs, clutter, items placed too low or too high, low toilets and inadequate lighting, heating and cooling. Hence, most of the research to date has examined home hazards and fall prevention among older people who already have impaired functional ability and disability (Horowitz et al., 2016; Ramulu et al., 2021). Less is currently known about the home hazards that may potentially hinder healthy older people in their ability to remain at home in future, particularly prior to the onset of age-related changes.

This study uses a novel home environment assessment tool which was co-designed with older people and addresses aspects of the home which are considered important for ageing in place. The tool was administered with a novel population consisting of older people who were not yet experiencing disability due to ageing. Understanding the potential home hazards of healthy older people can help build understanding about the support and environmental modification needs for people to successfully age in place in the future. The aim of this study was to understand existing potential home hazards in healthy older aged adults. The research question was 'What are the common home hazards among healthy older aged adults and what modifications may be required for age-friendly housing?'

2 | METHODS

2.1 | Study design

A prospective cohort study involved the use of a novel home assessment tool designed via a co-design process with older people (Laver et al., 2022) and intended for use by healthy older people wishing to plan ahead in regard to

ageing in place. The assessments were conducted between June 2022 and November 2022 and investigated the age-friendliness of the person's home and potential changes that may be needed over time. An experienced (more than 3 years post-graduation and trained in the use of the tool) occupational therapist assessed each commonly used area within the home, garden and community. The assessment was conducted by the same occupational therapist in person and involved observation of the environment and discussion. The assessment tool and questions were specifically designed for this research and based on a review of existing tools and co-design workshops with older people (Laver et al., 2022). According to the co-design workshop, older people reported the need to consider features of the home such as whether the home has access to the outdoors and fresh air rather than being primarily focused on safety and access (Laver et al., 2022). The assessment contained 89 questions and included questions about an individual's general safety, cleaning and maintenance, front entry and garden, hallways, kitchen, toilets, bedrooms, living rooms, bathrooms, laundry, backyard, internal steps and neighbourhood. Each question was scored either a yes (satisfactory and no changes required to the home), no (needs improvement to meet criteria) or non-applicable (not present or the participant does not use the home feature). For example, for questions related to the garden, these were marked 'not applicable' if there was no garden. Each participant also answered demographic questions relating to their socio-economic status, marital status, level of education, living status, housing type, ownership of housing, community services being received, and whether they considered relocating in the future recorded as a categorical variable as yes/no. Most homes differ and not all participant homes contained the same number of bedrooms, living areas, toilets and bathrooms. For this study, a maximum of two of each area were assessed and data was presented for ease of reporting (for example, a maximum of two bedrooms were assessed). A copy of the home environment assessment is presented as supplementary material.

2.2 | Participants

The study was conducted across metropolitan Adelaide, South Australia, Australia. Participants were eligible for inclusion if they were aged 60 years or older, living within their own home and did not have a significant level of disability, measured using the Modified Rankin Score (Broderick et al., 2017) where people must score <2: 'able to carry out all usual duties and activities' or 'unable to carry out all previous activities but able to look after own affairs without assistance').

2.3 | Recruitment

Participants were recruited through local council newsletters, the research department's registry of interested participants and existing networks. Participants who expressed interest in participating contacted the lead researcher (RD) via phone or email. They were provided with a copy of the study participant information sheet and written consent form. Participants involved were offered a small honorarium in recognition of their time (AU$20) and a copy of the completed home environment assessment at the end of the study.

2.4 | Data collection

Potentially eligible participants were screened against the eligibility criteria by the lead researcher as above. Upon obtaining informed consent, (via phone or email) a time and date for the home assessments were scheduled to visit the person in their own home. Prior to each home assessment, a pre-offsite risk assessment was completed ensuring there were no safety risks posed to the therapist (such as COVID-19 infection). Each home assessment was completed by the same registered occupational therapist and lead researcher (RD) and was completed in approximately one hour. For each of the items within the assessment, the possible responses that the occupational therapist could answer were either: yes (satisfactory), no (needs improvement) or non-applicable (not present). At the completion of each home assessment, the occupational therapist provided a home assessment summary comprising tips or solutions that may be considered for each section of the home. For example, if the occupational therapist considered their front paths not relatively flat and approximately 1,000 mm wide, the tip provided in the summary was to, 'consider landscaping to improve path gradient and width'. All tips or solutions for each item were pre-determined and generated automatically if the occupational therapist answered the question as 'no' (needs improvement).

2.5 | Data analysis

Data were entered into an Excel file and exported into IBM SPSS (IBM Corp, 2021). Descriptive analyses were performed by grouping each of the questions and responses in accordance with their specific rooms. The possible responses (yes, no, not applicable) were all categorised into their individual group. The total number and percentage for each of the responses to the questions were calculated using IBM SPSS (Table 2). Hazards were then determined based on the perception of the occupational therapist who completed each home environment assessment. The total number of 'no' responses was also calculated for each 'area' of the home to determine the most common areas needing improvement. Socio-economic status was categorised according to the Australian Bureau of Statistics index of relative socio-economic advantage and disadvantage (IRSAD) (Australian Bureau of Statistics, 2018). Each socio-economic area is given a score for a statistical area level (for e.g. SA1) through the addition of weighted characteristics. The scores ranged from a low index score (more disadvantaged, SA1) to a high index score (most advantaged, SA5). (Australian Bureau of Statistics, 2018). Statistical analyses determined the association between the measures. Pearson correlation coefficient, r, was used to investigate the relationship between the categorical variables of socio-economic status, level of education, intention to relocate and the total amount of changes suggested for each home, a continuous variable. Spearman's rank-order correlation coefficient, p, was used to analyse the relationship between the two continuous variables of age and the total amount of suggested changes per home. P was set at less than 0.05.

2.6 | Ethical considerations

This research was approved by the Flinders University Human Research Ethics Committee (Project number 5303).

3 | RESULTS

A total of 60 home environment assessments were completed. An overview of participant characteristics is presented in Table 1.

All home assessments were conducted within metropolitan Adelaide. Types of houses considered under 'other' were homes built within retirement villages or they were homes defined as an apartment by the participant. Results from the assessments are presented in Table 2 and summarised below.

At least 90% (n = 54/61) of participants reported living nearby shops, public transport and cafes. All participants had a front yard (n = 60/60; 100%) and 98% (n = 59/60) had a backyard or shared outdoor space attached to a townhouse or apartment. Most homes assessed contained at least one living room (n = 60/60, 100%), two bedrooms (n = 51/60, 85%). There was 35% (n = 21/60) of participants with three bedrooms, 15% (n = 9/60) had a four-bedroom house and only 3%

—WILEY 5

TABLE 1 Characteristics of participants (n = 60).

Demographics	Respondents (N, %)
Age, mean (SD), range	71 (7.041), 60–88
Living status	
Alone	15 (25%)
Living with spouse	38 (63%)
Living with family member	6 (10%)
Other	1 (1.7%)
Sex	
Male	27 (45%)
Female	33 (55%)
Marital status	
Married	39 (65%)
Not married	21 (35%)
Level of education	
High school	11 (18%)
Higher education	43 (72%)
Other	6 (10%)
Type of housing	
House	49 (82%)
Townhouse	1 (1.7%)
Unit	4 (6.7%)
Other	6 (10%)
Ownership	
Private owner	56 (93.3%)
Private rental	1 (1.7%)
Other	3 (5%)
Services	
Cleaning and gardening	2 (3.3%)
Cleaning	3 (5.0%)
Gardening	5 (8.3%)
None	50 (83.3)
Socioeconomic status	
SA1 (most disadvantaged)	5 (8.3%)
SA2	6 (10%)
SA3	16 (27%)
SA4	21 (35%)
SA5 (least disadvantaged)	12 (20%)
Considering relocation	
Yes	2 (3.3%)
No	48 (80%)
Considering	10 (17%)

(n = 2/60) had a five-bedroom house. Houses with more than two bedrooms were mainly used either for guests, grandchildren, as a study room or used for storage. A total of 80% (n = 48/60) of homes had two bathrooms, comprising of a main/guest bathroom and ensuite attached to their main bedroom. There were 48% (n = 29/60) of homes with two living areas, either defined as a rumpus room, formal lounge, or main sitting area to watch television whereas 18% (n = 11/60) of homes contained an internal step, either in a house, townhouse, retirement village or unit. Internal staircases within retirement villages were assessed under internal steps.

3.1 | Common areas with potential hazards

A mean of 23 actions or improvements to reduce potential hazards (SD = 10.8, range = 4–44) were recommended among 60 participants. Most participants (>80%) were able to safely check who was at their door (n = 51/60; 85% satisfactory), ensure they had access to a torch (n = 60/60; 100% satisfactory), or phone (n = 58/60; 97% satisfactory) and confirm a location or person who had access to spare keys to their home (n = 60/60; 100%). Among the cleaning and maintenance items, most participants had strategies to change light bulbs, clean gutters ((n = 45/60; 75% satisfactory) and a step stool in place (n = 55/60; 92% satisfactory). Few participants did not have front-loading machines (n = 22/60; 37% may need improvement). For 32 % (n = 19/60) of homes, it was recommended that they declutter to improve access and safety (as assessed by the occupational therapist).

Among the 60 participants, the most common areas that may require improvement in the future were: the bathroom with a mean of 3.3 (range = 0–8) actions recommended; the toilet with a mean of 1.4 (range = 0–3) actions recommended and backyard with a mean of 1.5 (range 0–5) actions recommended. An item which may require modifications in the future within the bathroom was the transition between the shower and the floor (n = 42/60; 70% may need improvement). All first bathrooms (main bathrooms used) assessed contained adequate ventilation (n = 60/60; 100%), and most contained a shower cubicle at least 900 mm by 900 mm (n = 49/60; 82% satisfactory) and had appropriate circulation space (n = 42/60; 70% satisfactory). Whilst in bathroom 1, 50% of the homes had nonslip tiles (n = 30/60), 45% of homes had thermostatically controlled water (n = 27/60) and 32% contained unsecured rugs acting as potential future trip hazards (n = 19/60). Similarly, toilet 1 also contained unsecured rugs (n = 17/60; 27% may need improvement) and low toilet seats (n = 29/60; 49% may need improvement). These toilets may benefit from a grab rail nearby or the consideration of equipment to assist with future transfers. Additionally, most toilet

TABLE 2 Results of assessments (n = 60)*.

Frequency	Satisfactory (yes) N (%)	Needs improvement (no) N (%)	Not applicable N (%)
General			
Safely check who is at the door	51 (85%)	9 (15%)	0 (0%)
Has a phone or mobile phone	58 (97%)	9 (3.0%)	0 (0%)
Smoke alarms working	57 (95%)	3 (5.0%)	0 (0%)
Sensor light in place to assist walking indoors & outdoors	46 (77%)	14 (23%)	0 (0%)
Electric safety switch installed	57 (95%)	3 (5.0%)	0 (0%)
Small fire blanket or fire extinguisher	42 (70%)	18 (30%)	0 (0%)
Access to spare keys	60 (100%)	0 (0%)	0 (0%)
Torches accessible	60 (100%)	0 (0%)	0 (0%)
Stocked first aid kit	50 (83%)	10 (17%)	0 (0%)
Cleaning and maintenance			
Accessible clothesline	49 (82%)	11 (18%)	0 (0%)
Irrigation system installed	28 (47%)	24 (40%)	8 (13%)
Strategies to change lightbulbs & gutters	45 (75%)	14 (23%)	1 (1.7%)
Long lasting lightbulbs installed	56 (93%)	2 (3.3%)	2 (3.3%)
Home clutter free	41 (68%)	19 (32%)	0 (0%)
Step stool in place	55 (92%)	4 (6.7%)	1 (1.7%)
Front garden and entry			
Paths flat and wide	40 (67%)	20 (33%)	0 (0%)
Non-slip paths & driveway	45 (75%)	15 (25%)	0 (0%)
Easy to open gate	39 (65%)	3 (5.0%)	18 (30%)
Suitable step heights	42 (70%)	13 (22%)	5 (8.3%)
Easy to unlock the front door & use door handle	51 (85%)	9 (15%)	0 (0%)
Lockable screen door in place & has access to fresh air	52 (87%)	5 (8.0%)	3 (5.0%)
Accessible letter box	45 (75%)	15 (25%)	0 (0%)
At least one way to access home without a step	24 (40%)	36 (60%)	0 (0%)
Hallways			
Hallways clutter free	47 (78%)	13 (22%)	0 (0%)
Floor coverings secure	42 (70%)	17 (28%)	1 (2.0%)
Free of internal steps	45 (75%)	15 (25%)	0 (0%)
Kitchen			
Easy to manoeuvre	60 (100%)	0 (0%)	0 (0%)
Benches clear	53 (88%)	7 (12%)	0 (0%)
Rugs and floor secure	42 (70%)	12 (20%)	6 (10%)
Easy to reach commonly used items	56 (93%)	4 (7%)	0 (0%)
Taps easy to turn on, off & adjust	59 (98%)	1 (2.0%)	0 (0%)
Appliance controls easily accessed	59 (98%)	1 (2.0%)	0 (0%)
Adequate space next to microwave & oven to place hot food			
Carbon monoxide detector installed	0 (0%)	58 (96.7%)	2 (3.3%)
Space to sit & prepare food	58 (97%)	2 (3.0%)	0 (0%)

-WILEY | 7

TABLE 2 (Continued)

Frequency	Satisfactory (yes) N (%)	Needs improvement (no) N (%)	Not applicable N (%)
Stool height & stable OK	29 (48%)	5 (8.0%)	26 (43%)
Microwave & oven height OK	43 (72%)	17 (28%)	0 (0%)
Bench height OK	60 (100%)	0 (0%)	0 (0%)
Bathroom 1			
Easy to manoeuvre	42 (70%)	18 (30%)	0 (0%)
Rugs and floor secure	16 (27%)	19 (32%)	25 (42%)
Adequate ventilation	60 (100%)	0 (0%)	0 (0%)
Flat between shower & floor	18 (30%)	42 (70%)	0 (0%)
Taps easy to turn on, off & adjust	39 (65%)	21 (35%)	0 (0%)
Shower hose in place	33 (55%)	27 (45%)	0 (0%)
Thermostatically controlled water	27 (45%)	29 (48%)	4 (7.0%)
Non-slip tiles	30 (50%)	30 (50%)	0 (0%)
Shower cubicle 900mmx900mm	49 (82%)	11 (18%)	0 (0%)
Bathroom 2[†]			
Easy to manoeuvre	23 (48%)	25 (52%)	0 (0%)
Rugs and floor secure	8 (17%)	24 (50%)	16 (33%)
Adequate ventilation	47 (98%)	1 (2.0%)	0 (0%)
Flat between shower & floor	10 (21%)	38 (79%)	0 (0%)
Taps easy to turn on, off & adjust	28 (58%)	20 (42%)	0 (0%)
Shower hose in place	26 (54%)	22 (46%)	0 (0%)
Thermostatically controlled water	26 (54%)	20 (42%)	2 (4.0%)
Non-slip tiles	29 (60%)	19 (40%)	0 (0%)
Shower cubicle 900mmx900mm	34 (72%)	14 (28%)	0 (0%)
Toilet 1			
Suitable height	31 (51%)	29 (49%)	0 (0%)
Rugs or mats secure	13 (22%)	17 (27%)	30 (51%)
Door swings outwards	4 (6.7%)	42 (70%)	14 (24%)
Toilet 2[‡]			
Suitable height	27 (53%)	23 (47%)	0 (0%)
Rugs or mats secure	7 (14%)	16 (31%)	27 (55%)
Door swings outwards	5 (10%)	34 (68%)	11 (22%)
Bedroom 1			
Accessible height	55 (92%)	5 (8.3%)	0 (0%)
Easy to manoeuvre	43 (72%)	17 (28%)	0 (0%)
Access to a light & phone	58 (97%)	2 (3.3%)	0 (0%)
Flooring secure	51 (85%)	7 (12%)	2 (3.3%)
Place to sit while dressing & putting on shoes	56 (93%)	3 (5.0%)	1 (2.0%)
Easy to access clothing & shoes	58 (97%)	2 (3.0%)	0 (0%)
Easy to close windows & blinds	50 (83%)	10 (17%)	0 (0%)
Temperature easily adjusted in bedroom	50 (83%)	9 (15%)	1 (2.0%)

(Continues)

TABLE 2 (Continued)

Frequency	Satisfactory (yes) N (%)	Needs improvement (no) N (%)	Not applicable N (%)
Bedroom 2[§]			
Accessible height	40 (78%)	9 (18%)	2 (3.9%)
Easy to manoeuvre	35 (69%)	14 (28%)	2 (3.9%)
Access to a light & phone	47 (92%)	2 (4.0%)	2 (4.0%)
Flooring secure	47 (92%)	4 (7.8%)	0 (0%)
Place to sit while dressing & putting on shoes	48 (94%)	1 (2.0%)	2 (4.0%)
Easy to access clothing & shoes	48 (94%)	0 (0.0%)	3 (6.0%)
Easy to close windows & blinds	36 (71%)	15 (29%)	0 (0%)
Temperature easily adjusted in bedroom	43 (84%)	8 (16%)	0 (0%)
Living 1			
Easy to manoeuvre	50 (83%)	10 (17%)	0 (0%)
Flooring secure	51 (85%)	9 (15%)	0 (0%)
Good storage so all items have a spot	58 (97%)	1 (2.0%)	1 (2.0%)
Free of cords	58 (97%)	2 (3.3%)	0 (0%)
Easy to access heating & cooling controls	56 (93%)	4 (7.0%)	0 (0%)
Easy to open & close windows and blinds	55 (92%)	5 (8.3%)	0 (0%)
Easily get in/out chairs	26 (43%)	34 (57%)	0 (0%)
Living 2[**]			
Easy to manoeuvre	20 (69%)	9 (31%)	0 (0%)
Flooring secure	21 (72%)	8 (28%)	0 (0%)
Good storage so items have a spot	24 (83%)	5 (17%)	0 (0%)
Free of cords	25 (86%)	4 (14%)	0 (0%)
Easy to access heating & cooling controls	25 (86%)	4 (14%)	0 (0%)
Easy to open & close windows and blinds	23 (80%)	6 (21%)	0 (0%)
Easily get in/out chairs	15 (52%)	13 (45%)	1 (3.0%)
Laundry			
Adequate bench space	36 (60%)	22 (37%)	2 (3.0%)
Appliances easily accessed and plugged in when needed	49 (82%)	10 (17%)	1 (2.0%)
Room to hang small items	54 (90%)	6 (10%)	0 (0%)
Front loading washing machine	46 (77%)	14 (23%)	0 (0%)
Backyard[††]			
Relatively flat footpaths	46 (78%)	11 (19%)	2 (3.0%)
Doorways 850 mm minimum wide	58 (98%)	1 (2.0%)	0 (0%)
Accessible clothesline without excessive reaching	31 (53%)	20 (34%)	8 (14%)
Garden low maintenance	20 (34%)	39 (66%)	0 (0%)
Shady areas outside to sit	53 (90%)	6 (10%)	0 (0%)
Outdoor furniture sturdy, comfortable & easily to get on/off	45 (76%)	11 (19%)	3 (5.0%)
Internal steps[‡‡]			
Sturdy rail in place	10 (91%)	1 (9.1%)	0 (0%)
Doorways minimum 850 mm	9 (82%)	2 (18%)	0 (0%)

TABLE 2 (Continued)

Frequency	Satisfactory (yes) N (%)	Needs improvement (no) N (%)	Not applicable N (%)
Neighbourhood			
Nearby public transport	54 (90%)	5 (8.0%)	1 (2.0%)
Nearby shops	56 (93%)	4 (7.0%)	0 (0%)
Neary local parks or pleasant walking areas	57 (95%)	2 (3.0%)	1 (2.0)
Nearby medical clinic & pharmacy	59 (98%)	1 (2.0%)	0 (0%)
Nearby local council facilities	54 (90%)	5 (8.0%)	1 (2.0%)
Nearby cafés and restaurants	58 (97%)	2 (3.0%)	0 (0%)
Footpaths present and in good condition	44 (73%)	16 (27%)	0 (0%)
Possible to safely cross main roads nearby	56 (93%)	4 (7.0%)	0 (0%)

*Total results & percentages may not add to 100% due to rounding.

†Total of 48 homes assessed with 2 bathrooms.

‡Total of 50 homes with 2 toilets.

§Total of 51 homes assessed with 2 bedrooms.

**Total of 29 homes assessed with 2 living rooms.

††Total of 59 homes assessed with a backyard or a shared outdoor space.

‡‡Total of 11 homes assessed with internal steps.

doors swung inwards (n = 42/60; 70% may need improvement), which may also act as a hazard in case of emergency.

Approximately two-thirds of homes contained high-maintenance gardens (n = 39/60; 66% may need improvement), suggesting it may be necessary to consider landscaping options in the future. Approximately 40% of homes had not yet installed an irrigation system (n = 24/60). Pathways leading towards their front entry may require further attention in the future (n = 20/60; 33% may need improvement), either widening paths or landscaping to improve the surface. These actions to reduce hazards may be taken in the front or back entry, especially if equipment (wheelchairs or mobility aids) is required to access the home. Letter boxes also required fixing, replacement or relocating (n = 15/60; 25% may need improvement). While 73% of participants (n = 46/60) were living in communities with flat and accessible footpaths, further community action may be required in other areas to improve access to parks and amenities.

Items in living areas, which may require future attention or modification, were low chair heights within living rooms (n = 34/60; 57% needed improvement), inadequate microwave and oven heights (n= 28% may need improvement), loose rugs and unsecured flooring in the kitchen (n = 12/60; 20% may need improvement) and steps to access the home (n = 36/60; 60% needed improvement). Most participants had not yet considered the use of carbon monoxide detectors (n = 58/60; 97%

needed improvement). Most participants (n = 50/60; 83% satisfactory) had a first aid kit, but most also indicated this was not always regularly checked for out-of-date medications. There were at least three participants (n = 3/60; 5% may need improvement) who did not have a working smoke alarm and eight participants (n = 8/60; 30% may need improvement) without a fire blanket or fire extinguisher.

Lower socio-economic status was not associated with more potential home hazards. (n = 60; Pearson's r = 0.044; P = 0.740). Similarly, level of education (n = 60; Pearson's r = 0.181; P = 0.166) and age (n = 60, Spearman's p = 0.118, P = 0.370) was also not correlated with number of potential home hazards. There however, was a medium, positive correlation between the number of potential home hazards and whether or not participants were planning to move, Pearson's r = 0.408, n = 60; P = 0.001); those with more hazards were more likely to be planning a move in the future.

4 | DISCUSSION

In this study, we assessed 60 homes to determine common potential hazards among healthy older adults and the potential modifications required to support ageing in place. Among the 60 homes, the most common areas requiring future improvement or modifications were the bathrooms, toilets and backyards. Other specific hazards needing future attention and possible modification

included chair heights, loose rugs, elimination, or improvement of steps to access the home and the consideration of carbon monoxide detectors. Our analysis showed that retirement villages and apartments were less likely to require modifications or improvements in the future due to the lower numbers of potential hazards identified. Furthermore, our results showed that those who stated they were considering relocating in the future were more likely to have potential hazards that required modifications.

The results of our study indicate that home environment assessments earlier in the course of ageing can help people to proactively plan for ageing in the home, address potential hazards and enable live longer in their own homes. Home environment assessments earlier in the course of ageing (e.g. at the age of 70) may result in a more proactive approach than is currently taken. As reported by Das et al. (2022) and Luciano et al. (2020), this may promote early planning to create age-friendly environments. In fact, older people have expressed the desire to access information on home safety that will support their desire to remain in their homes (Dalistan et al., 2023). Occupational therapists can work with individuals, communities and policymakers to create age-friendly communities and advocate for funds for assistive devices and modifications when necessary (Laver, 2022). Occupational therapists can also work with designers to create more aesthetically pleasing home modifications to promote independence.

Results suggested that people with fewer home hazards were less likely to consider moving in future. Retirement villages and apartments required fewer future improvements and were the most adequate in terms of safety and accessibility. These homes typically had home modifications already in place, smaller gardens, and no steps to access the home. Whilst other homes had toilets with low toilet heights, several loose rugs within the bathroom and backyards may require more maintenance in the future. To support the development of age-friendly homes and communities as suggested by World Health Organisation (2021), more purpose-built homes for older people may be required. These future homes may benefit from the consideration of non-slip flooring, grab rails within the bathroom and toilet and smaller backyards with irrigation systems that are lower to maintain. The creation of age-friendly homes such as these may also lead to economic and social benefits to society (Sinclair et al., 2020).

While home modifications can be beneficial, modifications have been reported as unaesthetically pleasing, "too clinical" and hospital-like (Bailey et al., 2019). Some older people have reported reluctance towards the idea that their homes look like a 'disabled bathroom' (Aplin et al., 2013). Houses are considered not just as buildings, but homes, where individuals can express themselves and create personal meaning (Tanner et al., 2008). Early education about a variety of options including those which suit their home décor may be beneficial in promoting changes earlier in the ageing trajectory.

Participants in this study were commonly found to have high-maintenance gardens. This may suggest that gardens are an enjoyable leisure and physical activity among many older adults. In Canada, older adults aged 65–86 described their gardens as being important in promoting their physical, mental and social health, especially during the COVID-19 pandemic (Corley et al., 2021; Finlay et al., 2015). However, as individuals age, their ability to perform more physically demanding gardening activities can be diminished (Horowitz et al. (2013)). Gardening activities may require modification over time so that the person's ability is aligned with the complexity of the task. With increasing disability, some elements of gardening may become too difficult or unsafe. Gardens which require high maintenance may also become a trigger to relocate. Findings from Davey (2006) indicated garden work as one of the main triggers to moving homes in the event of illness and frailty. Planning for the future can include the purchase of suitable outdoor seating, shade, irrigation systems in place for when they are required, evergreen plants to reduce the need for raking leaves, weed management and plants which do not require frequent pruning. The high prevalence of high-maintenance gardens in this study may be unique to Australians who tend to have large garden areas. Occupational therapists should consider the characteristics of the garden when advising clients on future planning.

Many participants described their inability to safely walk in the community via neighbourhood pathways and outdoor places, such as parks. With the rise of older adults living alone, the ability to age in place should consider both the nature of the home and the community environment (Australian Institute of Health and Welfare, 2021b). Data shows most (94%) older people report having participated in social activities (such as exercise, visiting relatives or friends) outside of their homes in the last three months (Australian Institute of Health and Welfare, 2021a). Similarly, access to green spaces and community gardens can promote healthy behaviours such as walking (Hong et al., 2018). Di Stefano et al. (2012) discuss the need for occupational therapists to consider all possible community mobility and access issues when working with clients regardless of their age or functional limitations. Home visit assessments may need to look beyond the home environment and consider community accessibility (i.e. accessible footpaths and parks).

Several limitations in this study should be acknowledged. We recruited through a variety of methods; however, participants were relatively homogenous in terms of level of social disadvantage. Convenience sampling may have resulted in the recruitment of more participants living within the metropolitan areas with higher socioeconomic status. The inclusion of rural and remote homes may therefore add further value to future study. We did not include participants with significant physical impairment as these people are more suited to an occupational therapy home assessment addressing their specific capabilities and needs and may potentially require the need for complex home modifications. The inclusion and uptake of smart home technologies were also not considered in this study. Smart devices (e.g. Google Homes, Amazon Alexa, smart lightbulbs, etc.) have been able to support functional independence (Demiris et al., 2004; Wang et al., 2019). Some research suggests that older adults may not necessarily see the benefits of having a smart home and feel technology is more intended for those who are younger or less healthy (Peek et al., 2014). However, smart home automation is likely to become more prevalent in future and should be considered in future research. Future research is also required to adapt the assessment to be applicable to varied populations, considering cultural diversity, geographical locations and social disadvantage.

5 | CONCLUSION

Common areas where potential hazards were identified were bathrooms, toilets and backyards. Specific hazards such as the transition between the shower cubicle and bathroom floor, the steps to access the home, low chair heights within the lounge rooms and loose rugs in the kitchen may require attention or modification in the future. Retirement villages or apartments were considered the most 'adequate' in terms of age-friendliness. Older people were more likely to be considering moving when there were more modifications needed to their homes. Gardens tended to be considered high maintenance and identified as possible areas to modify in future. The need for age-friendly housing is apparent and older people could be provided with information and education earlier to proactively plan for ageing in place, rather than waiting for a health crisis.

AUTHOR CONTRIBUTIONS

Development of research questions, drafting, revising, and approving manuscript: All Authors. Data analyses and interpretations of results: RA and KL.

ORCID
Roslyn Aclan https://orcid.org/0009-0009-0282-2677
Stacey George https://orcid.org/0000-0002-0859-0215
Kate Laver https://orcid.org/0000-0003-0259-2209

REFERENCES
Aplin, T., de Jonge, D., & Gustafsson, L. (2013). Understanding the dimensions of home that impact on home modification decision making. *Australian Occupational Therapy Journal, 60*(2), 101–109. https://doi.org/10.1111/1440-1630.12022

Australian Bureau of Statistics. (2018). *Census of Population and Housing: Socio-Economic Indexes for Areas (SEIFA), Australia, 2016*. Retrieved 30/11/22 from https://abs.gov.au/ausstats/abs@.nsf/Lookup/by%20Subject/2033.0.55.001%7E;2016%7E;Main%20Features%7E;IRSD%20Interactive%20Map%7E;15

Australian Bureau of Statistics. (2020). *Retirement and Retirement Intentions, Australia*. Retrieved 8/5/2020 from https://www.abs.gov.au/statistics/labour/employment-and-unemployment/retirement-and-retirement-intentions-australia/latest-release#key-statistics

Australian Institute of Health and Welfare. (2021a). *Older Australians*. Retrieved 1/2/2022 from https://www.aihw.gov.au/reports/older-people/older-australians/contents/feature-articles/older-aboriginal-and-torres-strait-islander-people#Demographic%20profile

Australian Institute of Health and Welfare. (2021b). Older Australians. https://www.aihw.gov.au/reports/older-people/older-australians/contents/housing-and-living-arrangements

Bailey, C., Aitken, D., Wilson, G., Hodgson, P., Douglas, B., & Docking, R. (2019). "What? That's for old people, that." Home adaptations, ageing and stigmatisation: A qualitative inquiry. *International Journal of Environmental Research and Public Health, 16*(24), 4989. https://doi.org/10.3390/ijerph16244989

Barras, S. (2005). A systematic and critical review of the literature: The effectiveness of occupational therapy home assessment on a range of outcome measures. *Australian Occupational Therapy Journal, 52*(4), 326–336. https://doi.org/10.1111/j.1440-1630.2005.00496.x

Broderick, J. P., Adeoye, O., & Elm, J. (2017). Evolution of the modified Rankin scale and its use in future stroke trials. *Stroke, 48*(7), 2007–2012. https://doi.org/10.1161/strokeaha.117.017866

Clemson, L., Donaldson, A., Hill, K., & Day, L. (2014). Implementing person-environment approaches to prevent falls: A qualitative inquiry in applying the Westmead approach to occupational therapy home visits. *Australian Occupational Therapy Journal, 61*(5), 325–334. https://doi.org/10.1111/1440-1630.12132

Clemson, L., Fitzgerald, M. H., Heard, R., & Cumming, R. G. (1999). Inter-rater reliability of a home fall hazards assessment tool. *The Occupational Therapy Journal of Research, 19*(2), 83–98. https://doi.org/10.1177/153944929901900201

Clemson, L., Stark, S., Pighills, A. C., Torgerson, D. J., Sherrington, C., & Lamb, S. E. (2019). Environmental interventions for preventing falls in older people living in the community. *The Cochrane Database of Systematic Reviews, 2019*(2), CD013258. https://doi.org/10.1002/14651858.CD013258

Corley, J., Okely, J. A., Taylor, A. M., Page, D., Welstead, M., Skarabela, B., Redmond, P., Cox, S. R., & Russ, T. C. (2021). Home garden use during COVID-19: Associations with physical and mental wellbeing in older adults. *Journal of Environmental Psychology, 73*, 101545. https://doi.org/10.1016/j.jenvp.2020.101545

Dalistan, R., George, S., & Laver, K. (2023). Considering the home environment and planning for the future: A qualitative exploration of the views of older adults and individuals with older relatives. *Scandinavian Journal of Occupational Therapy, 1-13*, 1167–1179. https://doi.org/10.1080/11038128.2023.2192027

Das, M. B., Yuko, A., Chapman, T. B., & Jain, V. (2022). Silver Hues Building Age-Ready Cities. Retrieved from https://www.worldbank.org/en/topic/urbandevelopment/publication/age-ready-cities

Davey, J. (2006). "ageing in place": The views of older homeowners on maintenance, renovation and adaptation. *Social Policy Journal of New Zealand, 27*, 128.

Davey, J. A., de Joux, V., Nana, G., & Arcus, M. (2004). Accommodation options for older people in Aotearoa/New Zealand. Centre for Housing Research Christchurch.

Demiris, G., Rantz, M. J., Aud, M. A., Marek, K. D., Tyrer, H. W., Skubic, M., & Hussam, A. A. (2004). Older adults' attitudes towards and perceptions of 'smart home' technologies: A pilot study. *Medical Informatics and the Internet in Medicine, 29*(2), 87–94. https://doi.org/10.1080/14639230410001684387

Di Stefano, M., Stuckey, R., & Lovell, R. (2012). Promotion of safe community mobility: Challenges and opportunities for occupational therapy practice. *Australian Occupational Therapy Journal, 59*(1), 98–102. https://doi.org/10.1111/j.1440-1630.2011.00993.x

Fausset, C. B., Kelly, A. J., Rogers, W. A., & Fisk, A. D. (2011). Challenges to aging in place: Understanding home maintenance difficulties. *Journal of Housing for the Elderly, 25*(2), 125–141. https://doi.org/10.1080/02763893.2011.571105

Finlay, J., Franke, T., McKay, H., & Sims-Gould, J. (2015). Therapeutic landscapes and wellbeing in later life: Impacts of blue and green spaces for older adults. *Health & Place, 34*, 97–106. https://doi.org/10.1016/j.healthplace.2015.05.001

Gitlin, L. N., Hauck, W. W., Dennis, M. P., Winter, L., Hodgson, N., & Schinfeld, S. (2009). Long-term effect on mortality of a home intervention that reduces functional difficulties in older adults: Results from a randomized trial.

Journal of the American Geriatrics Society, 57(3), 476–481. https://doi.org/10.1111/j.1532-5415.2008.02147.x

Hatcher, D., Chang, E., Schmied, V., & Garrido, S. (2019). Exploring the perspectives of older people on the concept of home. *Journal of Aging Research, 2019*, 2679680. https://doi.org/10.1155/2019/2679680

Hong, A., Sallis, J. F., King, A. C., Conway, T. L., Saelens, B., Cain, K. L., Fox, E. H., & Frank, L. D. (2018). Linking green space to neighborhood social capital in older adults: The role of perceived safety. *Social Science & Medicine, 207*, 38–45. https://doi.org/10.1016/j.socscimed.2018.04.051

Horowitz, B. P., Almonte, T., & Vasil, A. (2016). Use of the home safety self-assessment tool (HSSAT) within community health education to improve home safety. *Occupational Therapy in Health Care, 30*(4), 356–372. https://doi.org/10.1080/07380577.2016.1191695

Horowitz, B. P., Nochajski, S. M., & Schweitzer, J. A. (2013). Occupational therapy community practice and home assessments: Use of the home safety self-assessment tool (HSSAT) to support aging in place. *Occupational Therapy in Health Care, 27*(3), 216–227. https://doi.org/10.3109/07380577.2013.807450

Hwang, E., Cummings, L., Sixsmith, A., & Sixsmith, J. (2011). Impacts of home modifications on aging-in-place. *Journal of Housing for the Elderly, 25*(3), 246–257. https://doi.org/10.1080/02763893.2011.595611

IBM Corp. (2021). IBM SPSS Statistics for Windows. In

Iwarsson, S., Haak, M., & Slaug, B. (2012). Current developments of the housing enabler methodology. *British Journal of Occupational Therapy, 75*(11), 517–521. https://doi.org/10.4276/030802212X13522194759978

Keglovits, M., Clemson, L., Hu, Y.-L., Nguyen, A., Neff, A. J., Mandelbaum, C., Hudson, M., Williams, R., Silianoff, T., & Stark, S. (2020). A scoping review of fall hazards in the homes of older adults and development of a framework for assessment and intervention. *Australian Occupational Therapy Journal, 67*(5), 470–478. https://doi.org/10.1111/1440-1630.12682

Keglovits, M., & Stark, S. (2020). Home modifications to improve function and safety in the United States. *Journal of Aging and Environment, 34*(2), 110–125. https://doi.org/10.1080/26892618.2020.1743510

Kramer, C., & Pfaffenbach, C. (2015). Should I stay or should I go? Housing preferences upon retirement in Germany. *Journal of Housing and the Built Environment, 31*(2), 239–256. https://doi.org/10.1007/s10901-015-9454-5

Laver, K. (2022). Developing age-friendly homes in age-friendly communities. *Australian Occupational Therapy Journal, 70*, 1–2. https://doi.org/10.1111/1440-1630.12856

Laver, K., Davis, A., Gwilt, I., Dalistan, R., Lane, R., & Block, H. (2022). Self-assessment of the home environment to plan for successful ageing: Report from a digital health co-design workshop. *PLOS Digital Health, 1*(7), e0000069. https://doi.org/10.1371/journal.pdig.0000069

Löfqvist, C., Tomsone, S., Iwarsson, S., Horstmann, V., & Haak, M. (2017). Changes in home and health over nine years among very old people in Latvia-results from the ENABLE-AGE project. *Journal of Cross-Cultural Gerontology, 32*(1), 17–29. https://doi.org/10.1007/s10823-016-9311-3

Luciano, A., Pascale, F., Polverino, F., & Pooley, A. (2020). Measuring age-friendly housing: A framework. *Sustainability*, *12*(3), 848. https://doi.org/10.3390/su12030848

Lux, M., & Sunega, P. (2014). The impact of housing tenure in supporting ageing in place: Exploring the links between housing systems and housing options for the elderly. *International Journal of Housing Policy*, *14*(1), 30–55. https://doi.org/10.1080/14616718.2014.884880

Office for the ageing, & Government of South Australia. (2021). *Better Together: A Practical Guide to Effective Engagement with Older People*. Government of South Australia. Retrieved 22/4/2021 from https://www.sahealth.sa.gov.au/wps/wcm/connect/efc56a004efc69f1b7ccf79ea2e2f365/Better+Together++A+Practical+Guide+to+Effective+Engagement+with+Older+People.pdf?%20MOD=AJPERES&CACHEID=ROOTWORKSPACE-efc56a004efc69f1b7ccf79ea2e2f365-nwLmRMW

Peek, S. T. M., Wouters, E. J. M., van Hoof, J., Luijkx, K. G., Boeije, H. R., & Vrijhoef, H. J. M. (2014). Factors influencing acceptance of technology for aging in place: A systematic review. *International Journal of Medical Informatics*, *83*(4), 235–248. https://doi.org/10.1016/j.ijmedinf.2014.01.004

Productivity Commission. (2013). *An Ageing Australia: Preparing for the Future* (Australian Institute of Health and Welfare, Issue).

Ramulu, P. Y., Mihailovic, A., E, J. Y., Miller, R. B., West, S. K., Gitlin, L. N., & Friedman, D. S. (2021). Environmental features contributing to falls in persons with vision impairment: The role of home lighting and home hazards. *American Journal of Ophthalmology*, *230*, 207–215. https://doi.org/10.1016/j.ajo.2021.04.022

Sinclair, S., de Silva, A., Kopanidis, F., & Thomas, S. (2020). Housing and Ageing Well. In S. Awaworyi Churchill, L. Farrell, & S. Appau (Eds.), *Measuring, understanding and improving well-being among older people* (pp. 211–236). Springer Singapore. https://doi.org/10.1007/978-981-15-2353-3_10

Sixsmith, J., Sixsmith, A., Fänge, A. M., Naumann, D., Kucsera, C., Tomsone, S., Haak, M., Dahlin-Ivanoff, S., & Woolrych, R. (2014). Healthy ageing and home: The perspectives of very old people in five european countries [article]. *Social Science and Medicine*, *106*, 1–9. https://doi.org/10.1016/j.socscimed.2014.01.006

Stones, D., & Gullifer, J. (2014). 'At home it's just so much easier to be yourself': Older adults' perceptions of ageing in place. *Ageing and Society*, *36*(3), 449–481. https://doi.org/10.1017/s0144686x14001214

Tanner, B., Tilse, C., & de Jonge, D. (2008). Restoring and sustaining home: The impact of home modifications on the meaning of home for older people. *Journal of Housing for the Elderly*, *22*(3), 195–215. https://doi.org/10.1080/02763890802232048

Tzingounakis, A. (2012). Falls prevention: Investigating best practice for community occupational therapists. *Occupational Therapy Now*, *14*(3), 9–12.

Wang, S., Bolling, K., Mao, W., Reichstadt, J., Jeste, D., Kim, H.-C., & Nebeker, C. (2019). Technology to support aging in place: Older Adults' perspectives. *Health*, *7*(2), 60. https://doi.org/10.3390/healthcare7020060

World Health Organisation. (2020). *UN Decade of Healthy Ageing 2021–2023*. Retrieved 2022 from https://www.who.int/initiatives/decade-of-healthy-ageing

World Health Organisation. (2021). Decade of healthy ageing: baseline report. https://www.who.int/publications/i/item/9789240017900

World Health Organisation. (2022). *Ageing and Health*. https://www.who.int/news-room/fact-sheets/detail/ageing-and-health

SUPPORTING INFORMATION

Additional supporting information can be found online in the Supporting Information section at the end of this article.

APPENDIX R   Published paper: agreement (validity) study

Aclan, R., George, S., & Laver, K. (2023). A Digital Tool for the Self-Assessment of Homes to Increase Age-Friendliness: Validity Study. JMIR Aging, 6, e49500. https://doi.org/10.2196/49500

Original Paper

A Digital Tool for the Self-Assessment of Homes to Increase Age-Friendliness: Validity Study

Roslyn Aclan[1], BHth, MOT; Stacey George[2], BAS, MHsc, PhD; Kate Laver[1], BASc, MClinRehab, Phd

[1]College of Medicine and Public Health, Flinders University of South Australia, Adelaide, Australia

[2]Caring Futures Institute, College of Nursing and Health Sciences, Flinders University of South Australia, Adelaide, Australia

Corresponding Author:
Roslyn Aclan, BHth, MOT
College of Medicine and Public Health
Flinders University of South Australia
Flinders Drive, Bedford Park
Adelaide, 5001
Australia
Phone: 61 0425730839
Email: roslyn.dalistan@flinders.edu.au

Abstract

Background: Age-friendly environments in homes and communities play an important role in optimizing the health and well-being of society. Older people have strong preferences for remaining at home as they age. Home environment assessment tools that enable older people to assess their homes and prepare for aging in place may be beneficial.

Objective: This study aims to establish the validity of a digital self-assessment tool by assessing it against the current gold standard, an occupational therapy home assessment.

Methods: A cohort of adults aged ≥60 years living in metropolitan Adelaide, South Australia, Australia, assessed their homes using a digital self-assessment tool with 89 questions simultaneously with an occupational therapist. Adults who were living within their homes and did not have significant levels of disabilities were recruited. Cohen κ and Gwet AC_1 were used to assess validity.

Results: A total of 61 participants (age: mean 71.2, SD 7.03 years) self-assessed their own homes using the digital self-assessment tool. The overall levels of agreement were high, supporting the validity of the tool in identifying potential hazards. Lower levels of agreement were found in the following domains: steps (77% agreement, Gwet AC_1=0.56), toilets (56% agreement, κ=0.10), bathrooms (64% agreement, κ=0.46), and backyards (55% agreement, κ=0.24).

Conclusions: Older people were able to self-assess their homes using a digital self-assessment tool. Digital health tools enable older people to start thinking about their future housing needs. Innovative tools that can identify problems and generate solutions may improve the age-friendliness of the home environment.

Introduction

Background

Worldwide, people are living longer because of increased life expectancy and declining fertility rates [1]. Recent data show that the number of older people aged >60 years will increase from 1 billion in 2020 to 1.4 billion in 2030 [2]. By 2050, the number of older people aged ≥60 years will double, reaching 2.1 billion [2]. Aging leads to changes in intrinsic capacity (eg, physical and cognitive abilities) and functional ability. In turn, the environment in which the person lives may require adaptation. Over time, the home environment must be able to support a decline in both intrinsic capacity and functional ability [3].

The establishment of age-friendly environments in homes and communities will play an important role in optimizing the health and well-being of society [4]. Most people want to remain in their own homes as they age [5,6]. A survey of >10,000

Australians found that 80% of older people wanted to remain in their current homes [7]. Approximately 20% of older people preferred to live in long-term facilities [7]. In Canada, a population-wide survey of people aged 65 years found that >70% had not moved in the past 5 years [8,9]. In Hong Kong, research has found a strong preference among older people to stay at their homes, with family members, or in places that are familiar with their living environment [10]. Aging in place refers to the ability to remain at home for as long as possible, despite a decline in functional ability [11]. Supporting adults to age in place requires consideration of the house as not only a building but also a home [11]. Older people feel strongly connected with their homes and communities, as they provide security, comfort, and a place for self-reflection [5]. Homes are also considered a place to cherish memories and maintain a sense of belonging, which prevents loneliness [12,13]. The ability to age in place depends on the appropriateness of the home, the potential to make alterations to the home, cost and availability of suitable housing alternatives, and formal supports [14].

Occupational therapists often conduct home environment assessments and recommend modifications to improve safety and function in older people and reduce the risk of falls [15]. Examples of home modifications are the installation of grab rails in the shower, decluttering of overcrowded bedrooms, and installation of threshold ramps to eliminate trip hazards within the home [16]. Despite the proven benefits of home environment assessments, access is limited, particularly in rural areas, and assessments are usually available only after injury or illness [17-19]. Home environment assessments can take considerable time, averaging 80 minutes per home assessment [20]. Older adults have identified the potential benefits of adaptations and modifications earlier in the course of aging [21] and are receptive to more education about actions that can be taken to support aging in place [22].

To date, most home environment assessment tools have been developed for administration by occupational therapists [23]. Furthermore, most tools have been developed for use with older people with impaired functional ability, rather than those who are considering future needs to support aging in place [23]. A recent review of home accessibility assessment tools identified 7 home accessibility assessment tools that were considered promising; however, none of the tools had strong evidence supporting reliability and validity [24]. In recent years, home self-assessment tools have emerged. Ziebart et al [25] described the development of a self-assessment checklist that could be used by older adults to assess fall risks in the house [25]. The Home Safety Self-Assessment is another tool that includes a self-assessment checklist and has been shown to have good reliability and validity [26]. Further research aimed at developing and validating tools that can be used by older people to assess their homes to prepare for aging in place is required.

This Study

This project is part of a research program that seeks to develop a digital health tool to enable middle-aged and older people to self-assess their own homes to understand how to improve the accessibility and age-friendliness of the home environment. The tool was co-designed with older people and developed into a prototype. This study aimed to determine the validity of a home environment self-assessment tool and investigate the levels of agreement between completion by an occupational therapist and completion by an older adult. The research questions were as follows: (1) is it feasible for older people to self-assess their own home environment using a digital health tool? and (2) what are the levels of agreement between an occupational therapist and older person when using a home environment assessment tool?

Methods

Study Design

This study involved recruiting a cohort of older adults who completed the home environment self-assessment tool at the same time as an occupational therapist. The study design was used to establish the agreement (validity) of the self-assessment tool by assessing it against the current gold standard, an occupational therapy home assessment. This study was conducted across metropolitan Adelaide, South Australia, Australia.

Ethics Approval

This study was approved by the Flinders University Human Research Ethics Committee (project number 5303).

Participants

Participants were recruited if they met the following criteria: (1) being aged ≥60 years, (2) living within their own home either in a private dwelling or in a retirement village, (3) not having a significant level of disability (measured using the Modified Rankin Score, where people must score 2, which indicates that the participant is "able to carry out all usual duties and activities" or "unable to carry out all previous activities but able to look after own affairs without assistance") [27]. Participants were included if they were aged ≥60 years. Although the ages of 60 to 65 years are not classified as older age, it is at these ages that many people plan retirement and consider longer-term living options [28].

Recruitment

The participants were recruited from June to November 2022 through local council newsletters, the research department's registry of interested participants, and existing research networks. Individuals who expressed interest were contacted by the lead researcher (RD) via phone or email. They were provided with a copy of the participation information sheet and a written consent form. The included participants were offered an honorarium in recognition of their time (Aus $20; US $13) and a copy of their self-assessment results and the occupational therapy home assessment results at the end of the study.

Instrument

The self-assessment tool was specifically developed for this research program based on a review of existing tools and co-design workshops with older people [29]. In this study, the tool was made available via a website and displayed on a tablet computer (iPad; Apple, Inc). The self-assessment tool was developed using a co-design process led by an occupational

318

therapist (KL) and built by a website designer. The tool contains 89 questions within the following domains: general safety, cleaning and maintenance, front entry and garden, hallways, kitchen, toilets, bedrooms, living rooms, bathrooms, laundry, backyard, internal steps, and neighborhood. Each question comprised the following possible responses: yes (satisfactory), no (needs improvement), and not applicable (not present). Participants also answered demographic questions related to their socioeconomic status; marital status; level of education; living status; housing type; ownership of housing; community services received; and whether they considered relocating in the future, which was recorded as a categorical variable, that is, as yes, no, or not applicable. In this study, a maximum of 2 of each area were assessed and data presented for ease of reporting (eg, 2 bathrooms and 2 bedrooms).

Data Collection

Potentially eligible participants were screened against the eligibility criteria by the lead researcher and occupational therapist, as mentioned earlier. Upon obtaining consent via phone or email, a time and date were scheduled for each participant to complete the self-assessment and receive the standardized occupational therapy home assessment. Before each visit, an offsite previsit risk assessment was completed to ensure that there were no specific safety risks to the therapist and research assistant (eg, COVID-19 infection).

Self-Assessment Procedure

At each visit, the occupational therapist demonstrated the use of the self-assessment tool using a study iPad with an inbuilt Wi-Fi card for internet access. The occupational therapist used an adapted version of the self-assessment program using a second iPad (which reflects that the therapist is the administrator, rather than the participant). A copy of the self-assessment tool is available on the internet [30]. The participant and occupational therapist simultaneously completed the self-assessment using the study iPads. The participant and the occupational therapist walked through the home together, did not discuss the content of the assessment, and scored each question independently. If 2 people were living in the same house, the occupational therapist and research assistant ensured that the 2 people were not sharing answers to limit bias.

Data Analysis

Data were entered into Microsoft Excel (Microsoft Corp) and exported to SPSS (IBM Corp) and Stata (StataCorp) software [31,32]. Descriptive statistics were used to report categorical and continuous variables, including the participants' demographic characteristics, responses to questions regarding the type of housing they lived in, the ownership of their home, formal services received, their postcode, whether they considered relocating in the future, and level of confidence using digital technology. Socioeconomic status was categorized according to the Australian Bureau of Statistics Index of Relative Socioeconomic Advantage and Disadvantage [33]. Each socioeconomic area was given a score (eg, Statistical Area Level

1). The scores ranged from a low index score (more disadvantaged, Statistical Area Level 1) to a high index score (most advantaged, Statistical Area Level 5) [33].

The rooms of each home were assessed using a series of questions related to home safety, which could be given a "yes/no" response. A total of 7 possible responses were developed: yes-yes, no-no, no-yes, yes-no, not applicable-not applicable, yes-not applicable, and no-not applicable. The κ statistic measure of agreement was used to examine the interrater reliability and level of agreement between the participant and occupational therapist using the same self-assessment tool. The level of agreement was determined through individual items. κ scores were presented to provide the agreement between the raters. κ scores ranged from 0, which represented no agreement beyond what can be expected by chance, to 1, which represented perfect agreement between the raters [34]. For this analysis, Cohen κ guidelines of interpretation were applied as suggested by McHugh [34]; values 0 to 0.20 indicated no agreement, 0.21 to 0.39 indicated minimal agreement, 0.40 to 0.59 indicated weak agreement, 0.60 to 0.79 indicated moderate agreement, 0.80 to 0.90 indicated strong agreement, and >0.90 indicated almost perfect agreement. This analysis interpreted any $\kappa < 0.60$, suggesting inadequate agreement between the 2 raters [34].

Variations of κ were used to assess validity. Where the results showed a high agreement but the κ value was low, Gwet AC_1 was applied. Dettori and Norvell [35] suggested that there are limitations to κ; high agreement can result in low κ [35,36], and κ values depend on sample sizes, the number of categories, and distribution of responses. Gwet AC_1 was used to overcome these problems [35]. Wongpakaran et al [37] recommended that Gwet AC_1 be considered for interrater reliability analyses alongside Cohen κ.

Results

Participants

A total of 61 participants completed the self-assessment tool. Table 1 presents the demographic characteristics of these 61 participants. The mean age of the participants was 71.2 (SD 7.03) years. The sample consisted of slightly more female participants (34/61, 56%) than male participants (27/61, 44%). Among the 61 participants, 39% (n=24) lived with a spouse or family member and conducted the self-assessment independently but within the same home at the same time. A total of 59 (97%) participants were assessed as having no disability, 1 (2%) participant had no significant disability despite symptoms, and 1 (2%) participant had a slight disability but was able to look after their own affairs without assistance [27]. All self-assessments were conducted in metropolitan Adelaide. Houses that were considered as "other" were homes built within retirement villages or were defined as apartments by the participant. Almost all the participants (60/61, 98%) did not use a mobility aid at home.

XSL·FO

RenderX

319

Table 1. Demographic characteristics of the participants (N=61).

Demographics	Values
Age, mean (SD; range)	71.2 (7.03; 60-88)
Sex, n (%)	
Male	27 (44)
Female	34 (56)
Level of education, n (%)	
High school	9 (15)
Higher education	44 (72)
Other	6 (10)
Marital status, n (%)	
Married	40 (66)
Not married	21 (34)
Living status, n (%)	
Alone	15 (25)
Living with spouse	38 (62)
Living with family member	6 (10)
Other	1 (2)
Type of housing, n (%)	
House	50 (82)
Town house	1 (2)
Unit	4 (7)
Other	6 (10)
Ownership, n (%)	
Private owner	57 (93)
Private rental	1 (2)
Other	3 (5)
Services, n (%)	
Cleaning and gardening	2 (3)
Cleaning	3 (5)
Gardening	2 (3)
None	51 (84)
Socioeconomic status, n (%)	
SA[a]1 (most disadvantaged)	5 (8)
SA2	6 (10)
SA3	16 (26)
SA4	21 (34)
SA5 (least disadvantaged)	13 (21)
Considering relocation, n (%)	
Yes	2 (3)
No	49 (80)
Considering	10 (16)
Mobility aid use at home, n (%)	
Yes	1 (2)

320

Demographics	Values
No	60 (98)

[a]SA: Statistical Area.

The average time taken to complete the self-assessment tool was 23 (SD 8.12) minutes. Table 2 shows the responses on the use and confidence in the use of the self-assessment tool. A total of 16 (26%) out of the 61 participants had minor technical difficulties with the use of the self-assessment tool on the iPad.

These technical difficulties were due to accidentally exiting the self-assessment application and not knowing how to return to the original screen or being unable to scroll up or down the iPad. Despite technical difficulties, more than half (44/61, 72%) of the participants found the self-assessment tool easy to use.

Table 2. Responses to the questions on the self-assessment tool.

Responses to questions	Values
Time taken to complete the self-assessment tool (min), mean (SD; range)	23 (8.12; 11-60)
Was the self-assessment tool easy to use? (1: hard; 10: easy)	
10	44 (72)
9	14 (23)
8	1 (2)
7.5	1 (2)
7	1 (2)
Were there any technical difficulties?	
Yes	16 (26)
No	45 (74)

Levels of Agreement

Overview

Most participants (52/61, 85%) lived in homes with ≥2 bedrooms, 2 bathrooms, and 1 living room. In homes with >2 bedrooms, one of the bedrooms was used as a study room, for guests, for storage, or for grandchildren. Only 18% (11/61) of the homes had internal steps. Among the 61 participants, 11 (18%) had a 3-bedroom house, 7 (11%) had a 4-bedroom house,

and only 2 (3%) had a 5-bedroom house. Most participants (60/61, 98%) had a backyard or shared outdoor space within a retirement village or an apartment.

An overview of the levels of agreement between each participant and occupational therapist is outlined in Tables 3 and 4. Overall, all the "general" and "neighborhood"-related questions demonstrated an almost perfect agreement, as all these questions became a point of discussion related to the opinion of the participant.

321

Table 3. Agreement levels for cleaning, front access, hallways, and kitchen between the occupational therapist and participant.

Domain and questions asked between raters	Agreement (%)	Cohen κ	Gwet AC$_1$	95% CI
Cleaning				
1. Are clotheslines easy to access (height and location)?	85	0.34[a]	0.81	0.76-0.94
2. Is there an irrigation system in place with ease of watering?	93	0.89	0.91	0.87-1.00
3. Are there strategies to change lightbulbs, access high cupboards and clean gutters which don't require use of a ladder?	89	0.69[a]	0.86	0.80-0.97
4. Are long lasting lightbulbs (LED) installed to reduce the need for frequent changing?	97	0.66[a]	0.97	0.92-1.00
5. Is the home largely clutter free?	90	0.75	0.84	0.82-0.98
6. Is there a supportive step stool available to access items which are just out of reach	95	0.70	0.95	0.90-1.00
Front access				
1. Are paths relatively flat and approximately 1000mm wide?	72	0.19[a]	0.60	0.61-0.84
2. Do paths and driveways have a non-slip texture and are they free of moss?	79	0.24[a]	0.71	0.68-0.89
3. Is the gate easy to open?	85	0.68[a]	0.81	0.76-0.94
4. Are steps a suitable height (115-190mm) and depth (240mm-355mm) and stable?	79	0.51	0.73	0.68-0.89
5. Is it easy to unlock the front door and use the door handle?	89	0.33[a]	0.86	0.80-0.97
6. Is a lockable screen door in place to enable access to fresh air and maintain security?	87	0.57[a]	0.85	0.78-0.96
7. Is there space within the garage or carport to easily open the car door and get out?	93	0.57[a]	0.93	0.87-1.00
8. Is the letterbox easy to access and open?	75	0.00[a]	0.69	0.64-0.87
9. Is there at least one way to access the home without a step?	77	0.56	0.54	0.66-0.88
Hallways				
1. Are hallways free of clutter and unnecessary furniture?	87	0.50[a]	0.82	0.78-0.96
2. Are floor coverings secure and in good condition?	79	0.36[a]	0.74	0.68-0.89
3. Is the house free of internal steps?	97	0.91	0.95	0.92-1.00
Kitchen				
1. Is there room within the kitchen to easily manoeuvre?	100	1.00	1.00	1.00-1.00
2. Are benches clear?	82	0.38[a]	0.75	0.72-0.92
3. Are rugs and floor coverings secure and in good condition?	79	0.46	0.74	0.68-0.89
4. Are you able to easily reach or commonly used items without tiptoes, a stepladder, or bending too low?	92	0.40[a]	0.91	0.85-0.99
5. Are taps easy to turn on, off and adjust?	98	0.00[a]	0.98	0.95-1.00
6. Can appliance controls easily be accessed?	100	1.00	1.00	1.00-1.00
7. Is there space next to the microwave, oven, and stove top to place hot food?	80	0.46[a]	0.70	0.70-0.91
8. Is there a carbon monoxide detector installed to detect carbon monoxide and prevent poisoning?	93	0.48[a]	0.93	0.87-1.00
9. Is there a space in the kitchen areas where you could sit if needed to prepare food?	89	0.18[a]	0.87	0.80-0.97
10. Are stools a comfortable height and stable?	84	0.70	0.78	0.74-0.93
11. Are the oven and microwave located at a suitable height? With Access between knee and shoulder?	77	0.23[a]	0.68	0.66-0.88
12. Are bench tops a suitable height (850mm to 1050mm)?	100	1.00	1.00	1.00-1.00

[a]Where the results showed a high agreement but the κ value was low, Gwet AC$_1$ was applied.

XSL·FO
RenderX

322

Table 4. Agreement levels for internal steps, bathroom, toilet, bedroom, lounge area, laundry, and backyard between the occupational therapist and participant.

Domain and questions asked between raters	Agreement (%)	Cohen κ	Gwet AC$_1$	95% CI
Internal step				
1. Do internal stairs have a sturdy rail in place?	91	0.62	0.88	0.71-1.00
2. Are doorways a minimum of 850mm wide?	100	1.00	1.00	1.00-1.00
3. Are door handles lever style?	82	0.68	0.75	0.55-1.00
4. Can doors and windows be easily opened to allow for fresh air?	73	−0.06[a]	0.68	0.41-1.00
Bathroom 1				
1. Is there room within the bedroom to easily manoeuvre?	78	0.29[a]	0.67	0.66-0.88
2. Are rugs or mats secure and in good condition?	64	0.46	0.48	0.52-0.76
3. Is there adequate ventilation with presence of a fan or easily opened window?	100	1.00	1.00	1.00-1.00
4. Is the transition between the floor and shower flat?	61	0.27	0.22	0.48-0.73
5. Is a shower hose in place?	82	0.84	0.89	0.85-0.99
6. Are taps easy to turn on, off and adjust?	66	0.08[a]	0.49	0.53-0.78
7. Is water thermostatically controlled to a delivery temperature of 45 degrees?	84	0.70	0.77	0.74-0.93
8. Is the floor surface non-slip?	67	0.33	0.38	0.55-0.79
9. Is the shower cubicle a minimum of 900×900mm?	92	0.70	0.90	0.85-0.99
Bathroom 2				
1. Is there room within the bathroom to easily manoeuvre?	56	0.14	0.25	0.42-0.71
2. Are rugs or mats secure and in good condition?	46	0.29	0.19	0.31-0.61
3. Is there adequate ventilation with presence of a fan or easily opened window?	94	−0.04[a]	0.93	0.86-1.00
4. Is the transition between the floor and shower flat?	54	0.20	0.11	0.39-0.69
5. Is a shower hose in place?	92	0.84	0.89	0.83-1.00
6. Are taps easy to turn on, off and adjust?	63	0.14[a]	0.40	0.48-0.77
7. Is water thermostatically controlled to a delivery temperature of 45 degrees?	90	0.80	0.86	0.80-1.00
8. Is the floor surface non-slip?	71	0.33	0.49	0.57-0.84
9. Is the shower cubicle a minimum of 900×900mm?	79	0.41	0.75	0.67-0.92
Toilet 1				
1. Is the toilet a suitable height (460mm-480mm)?	55	0.10	0.27	0.40-0.71
2. Are rugs or mats secure and in good condition and necessary?	70	0.53	0.58	0.59-0.82
3. Does the door swing outwards?	90	0.79	0.87	0.82-0.98
Toilet 2				
1. Is the toilet a suitable height (460mm-480mm)?	55	0.01[a]	0.27	0.40-0.71
2. Are rugs or mats secure and in good condition and necessary?	62	0.42	0.45	0.46-0.80
3. Does the door swing outwards?	89	0.79	0.86	0.78-1.00
Bedroom 1				

323

Domain and questions asked between raters	Agreement (%)	Cohen κ	Gwet AC_1	95% CI
1. Is the bed a comfortable height to access and rise from?	93	0.31[a]	0.93	0.87-1.00
2. Is there space to easily manoeuvre within the bathroom?	75	0.16[a]	0.67	0.64-0.87
3. Is there access to light and phone next to the bed?	97	0.65[a]	0.96	0.92-1.00
4. Are floor covering secure and in good condition?	84	0.38[a]	0.81	0.74-0.93
5. Is there somewhere to sit while dressing and putting on shoes?	92	0.51[a]	0.91	0.85-0.99
6. Is it easy to access clothing and shoes without excessive reaching or bending?	93	−0.03[a]	0.93	0.87-1.00
7. Is it easy to open and close windows and blinds?	85	0.12[a]	0.82	0.76-0.94
8. Can the temperature in the bedroom be easily adjusted?	92	0.72	0.90	0.85-0.99
Bedroom 2				
1. Is the bed a comfortable height to access and rise from?	85	0.39[a]	0.83	0.74-0.95
2. Is there space to easily manoeuvre within the bedroom?	81	0.47[a]	0.77	0.70-0.92
3. Is there access to light and phone next to the bed?	90	0.41[a]	0.90	0.82-0.99
4. Are floor covering secure and in good condition?	90	0.58[a]	0.89	0.82-0.99
5. Is there somewhere to sit while dressing and putting on shoes?	94	0.65[a]	0.93	0.88-1.00
6. Is it easy to access clothing and shoes without excessive reaching or bending?	96	0.73[a]	0.96	0.91-1.00
7. Is it easy to open and close windows and blinds?	75	0.22[a]	0.64	0.63-0.87
8. Can the temperature in the bedroom be easily adjusted?	90	0.62	0.89	0.82-0.99
Living area 1				
1. Is there space to easily manoeuvre within the living area?	87	0.29[a]	0.84	0.78-0.96
2. Are floor covering secure and in good condition?	80	0.09[a]	0.78	0.70-0.90
3. Is there good storage so that all items have a spot?	95	0.38[a]	0.95	0.90-1.00
4. Is the room free of cords in walkways which may cause trips?	97	0.00[a]	0.97	0.92-1.00
5. Is it easy to access heating and cooling controls?	93	0.53[a]	0.93	0.87-1.00
6. Is it easy to open and close windows and blinds?	90	−0.03[a]	0.89	0.82-0.98
7. Are chairs in the room easy to get in and out of?	44	0.02	0.04	0.31-0.57
Living area 2				
1. Is there space to easily manoeuvre within the living area?	87	0.65	0.78	0.73-1.00
2. Are floor covering secure and in good condition?	73	0.13[a]	0.69	0.57-0.90
3. Is there good storage so that all items have a spot?	87	0.52[a]	0.84	0.74-1.00
4. Is the room free of cords in walkways which may cause trips?	90	0.37[a]	0.88	0.79-1.00
5. Is it easy to access heating and cooling controls?	100	1.00	1.00	1.00-1.00

XSL·FO
RenderX

324

Domain and questions asked between raters	Agreement (%)	Cohen κ	Gwet AC$_1$	95% CI
6. Is it easy to open and close windows and blinds?	77	0.15[a]	0.73	0.61-0.93
7. Are chairs in the room easy to get in and out of?	53	0.07[a]	0.42	0.34-0.73
Laundry				
1. Is there adequate bench space in the laundry?	84	0.65	0.79	0.74-0.93
2. Can all appliances be easily accessed and plugged in when needed?	85	0.40[a]	0.83	0.76-0.94
3. Is there room in the house to hang small items of laundry to dry when needed?	97	0.78	0.96	0.92-1.00
4. Is the washing machine front-loading?	100	1.00	1.00	1.00-1.00
Back garden				
1. Are paths relatively flat and approximately 1000mm wide?	78	0.24[a]	0.75	0.68-0.89
2. Are doorways a minimum of 850mm wide?	100	1.00	1.00	1.00-1.00
3. Is it possible to access the clothesline without excessive reaching?	63	0.29[a]	0.52	0.51-0.76
4. Is the garden low maintenance in terms of watering requirements, lawn mowing and management of autumn leaves?	55	0.24	0.39	0.42-0.68
5. Are there shady areas outside to sit?	93	0.57[a]	0.92	0.87-1.00
6. Is outdoor furniture sturdy, comfortable and easy to get on/off?	83	0.40[a]	0.81	0.74-0.93

[a]Where the results showed a high agreement but the κ value was low, Gwet AC$_1$ was applied.

Among the 61 participants, the domains that demonstrated the lowest agreement levels between the occupational therapist and participant were the front garden and entry (72% to 93% agreement), bathrooms (46% to 100% agreement), toilets (54% to 92% agreement), and backyards (55% to 100% agreement).

Front Access

Items that showed a moderate level of agreement were paths being flat and wide (72% agreement, Gwet AC$_1$=0.60), paths and driveways having a nonslip texture and being free of moss (79% agreement, Gwet AC$_1$=0.71), and the letter box being easy to access and open (75% agreement, Gwet AC$_1$=0.69). Items with weak agreement were related to the front steps of the house. For example, steps being of a suitable height and depth and stable demonstrated 79% agreement (κ=0.51), and whether the home had at least 1 way to access it without a step demonstrated 77% agreement (Gwet AC$_1$=0.56). No participant assessed the front steps as being unsuitable and unstable, as opposed to the occupational therapist, who assessed 17 front steps as being unsuitable and unstable.

Hallways

The item that showed a strong agreement was the hallways being free of clutter and unnecessary furniture (87% agreement, Gwet AC$_1$=0.82). A total of 13 floor coverings within the hallways were assessed by the occupational therapist as being unsafe; by contrast, no participant assessed the floor coverings as being unsafe.

Kitchen

The responses to a total of 12 questions regarding the kitchen were compared for levels of agreement between the occupational therapist and participant. There was an overall weak to almost perfect level of agreement, as shown in Table 3. The occupational therapist assessed the oven and microwave to be at an unsuitable height on 14 (23%) out of 61 occasions; by contrast, no participant assessed the oven or microwave to be at an unsuitable height.

Bathroom 1

For the 9 questions regarding bathrooms, the levels of agreement varied from minimal to almost perfect, as shown in Table 4.

Both the occupational therapist and participant agreed (100% agreement, κ=1.00) that there was adequate ventilation with the presence of a fan or window. There was moderate agreement (78% agreement, Gwet AC$_1$=0.67) for bathroom 1 being easy to maneuver in and for the shower cubicle being a minimum of 900×900 mm in size (92% agreement, κ=0.70). There was a weaker level of agreement for rugs or mats being secure (64% agreement, κ=0.46) and for taps being easy to turn on, turn off, and adjust (66% agreement, κ=0.49). Moreover, there was minimal agreement for the transition between the floor and shower being flat (61% agreement, κ=.27) and for the floor surfaces being nonslip (67% agreement, κ=0.33). Most participants did not believe that "shower lips" and "shower alcove tracks" were home hazards and commonly considered these transitions to be flat.

325

Toilet 1

For the 3 questions regarding toilets, the levels of agreement varied from no agreement to strong agreement, as shown in Table 4. Toilet 1's height had the lowest agreement (no agreement between the occupational therapist and participant; 56% agreement, $\kappa=0.10$) among the items. Both the occupational therapist and participant agreed that the toilet heights were suitable on 31 (51%) out of 61 occasions, whereas on 27 (44%) out of 61 occasions, the occupational therapist assessed the toilet height as being unsuitable. Participants commonly indicated the toilet height as currently manageable and not an area of concern.

Bedroom 1

For the 8 questions regarding bedrooms, the levels of agreement varied from moderate to almost perfect, as shown in Table 4.

The participants and occupational therapist both highly agreed that there was easy access to light and phone next to the bed (97% agreement, Gwet $AC_1=0.96$). Other items that indicated a high level of agreement were the bed being of a comfortable height to access and rise from (93% [almost perfect] agreement, Gwet $AC_1=0.93$), clothing and shoes being easy to access (93% [almost perfect] agreement, Gwet $AC_1=0.93$), having a place to sit when dressing and putting on shoes (92% [almost perfect] agreement, Gwet $AC_1=0.91$), and the temperature in the bedroom being easily adjustable (92% [almost perfect] agreement, $\kappa=0.72$). Although the participants were asked to assess bed heights, most participants (56/92, 61%) interpreted the bed height question as "was the bed comfortable," rather than whether the bed was at a "comfortable height."

Living Areas

Living areas 1 and 2 were classified by the participants as their main living areas where they watch television, rumpus rooms, or sitting areas.

For the 7 questions regarding living areas, the levels of agreement varied from no agreement to almost perfect agreement, as shown in Table 3.

An almost perfect level of agreement was evident for the following items: the walkways in the lounge area being free of cords (97% agreement, Gwet $AC_1=0.97$), the lounge area having good storage capacity (95% agreement, Gwet $AC_1=0.95$), and having easy access to heating and cooling controls (93% agreement, Gwet $AC_1=0.93$). A strong agreement level was illustrated for there being enough circulation space (90% agreement, Gwet $AC_1=0.84$) and for the windows or blinds being easy to open (90% agreement, Gwet $AC_1=0.89$) within the living area.

Floor coverings in the lounge area seemed to indicate "lower" levels of agreement (80% [moderate] agreement, Gwet $AC_1=0.78$). The occupational therapist disagreed with the participant and indicated that 8 (13%) out of 61 lounges had unsafe floor coverings.

Among the items assessing living area 1, the lowest level of agreement was for whether the chairs in the room were easy to get in and out of (no agreement between the occupational therapist and participant; 44% agreement, $\kappa=0.02$).

Backyard

For the 6 questions regarding the backyard, the levels of agreement varied from minimal agreement to almost perfect agreement, as shown in Table 3.

There was an almost perfect level of agreement between the participants and occupational therapist for whether the back garden doorway was a minimum of 850 mm wide (100% agreement, $\kappa=1.00$) and for whether there were shady areas outside to sit (93% agreement, Gwet $AC_1=0.92$). Whether the outdoor furniture was sturdy, comfortable, and easy to get on and off also had a high level of agreement (83% [strong] agreement, Gwet $AC_1=0.81$).

There was a moderate level of agreement for the paths being relatively flat and approximately 1000 m wide (78% agreement, Gwet $AC_1=0.75$). Here, the occupational therapist disagreed on 9 (15%) out of 60 occasions, and there was agreement between the raters on only 2 (3%) occasions. Among the items regarding the backyard, the lowest agreement levels were observed for whether it was possible to access the clothesline without excessive reaching (63% [weak] agreement, Gwet $AC_1=0.52$) and whether the garden was low maintenance ($\kappa=0.24$, minimal agreement with 55%).

Discussion

Principal Findings

In this study, a digital home environment self-assessment tool was tested with older people, and its validity was determined through an assessment of the levels of agreement between an occupational therapist and older person. The overall levels of agreement were high, supporting the validity of the tool in identifying potential hazards. Lower levels of agreement were found between the occupational therapist and older participants in the following domains: steps, toilets, bathrooms, and backyards. Items regarding the height of toilets; height of chairs in the lounge; loose rugs, mats, or floor coverings; height of kitchen appliances; and transition between shower alcoves and bathroom flooring also displayed lower levels of agreement. Lower levels of agreement likely occurred owing to (1) the subjective nature of some questions, such as "is there at least one way to access the home without a step?" and (2) the more critical lens through which an occupational therapist assesses the home environment. There were no items where participants were more likely to identify hazards than the occupational therapist.

Participants found the tool to be relatively simple and quick to complete, and overall, there were high levels of agreement. The study conducted by Ali and Kumar [38] also found that older people were able to self-assess potential risk factors at home. They also found that self-assessments led to older people being able to initiate minor modifications to their homes, including the removal of throw rugs and the reorganization of kitchen appliances. Other research has shown that older people prefer self-assessment approaches that go beyond identifying hazards

326

and provide them with potential solutions to ensure that their home is safe and comfortable [39]. Checklists and recommendations for improving the age-friendliness of the home environment may also be useful for architects and designers to help them gain insights into the practical needs of older people.

Although older people were able to self-assess their homes, there were often occasions of disagreement between the perspective of the occupational therapist and that of the participant. In particular, the assessments of steps, toilets, bathrooms, and the backyard showed conflicting results. Occupational therapists have extensive training in environmental assessments with an emphasis on safety [29]. Another study has also shown that occupational therapists are more critical of the environment than other people [40]. Lower levels of agreement were commonly observed for items assessing bathrooms and toilets. These areas have been shown to be particularly hazardous for older people. Gell et al [41] found that bathroom modifications were common and usually increased after multiple falls. Similarly, Wellecke et al [42] found that bathroom modifications were frequently required to support aging in place. Their study also found that large step-free showers and bathrooms on the ground floor were beneficial [42]. It was clear from the participants in this study that bathrooms and toilets were not an area of concern for them yet. Bathroom and toilet modifications, such as the addition of grab rails, may be a key feature to consider in the design of new buildings in an age-ready city.

We also found a difference in agreement levels for items regarding the backyard, with many participants indicating that their gardens did not require high maintenance, despite the occupational therapist believing they did. Research shows that gardening stimulates a greater level of well-being, better physical and mental health, and better sleep quality among older people [43]. However, as aging takes place, older people have also described concerns about maintaining large gardens [44]. Suitable gardening solutions, such as landscaping options and irrigation systems for reducing maintenance, may facilitate age-friendly environments. Given that most older people experience a sense of connection with their homes [12,13],

practical support for gardening or access to parks and gardens within walking distance can support the development of healthy aging cities.

Limitations

This study has several limitations that should be acknowledged. Participants were recruited through a variety of methods, and the use of convenience sampling may have influenced the results, as the population was not representative of the general population. Most participants (50/82, 61%) lived in metropolitan areas with high socioeconomic status. These living conditions may differ from those in other countries and those of other older populations. Further research should include participants with a lower socioeconomic status and those living in rural or remote areas.

The results may have been influenced by the variations in the interpretation of the questions. For example, some participants indicated that some questions were ambiguous. For example, the interpretation of the question "is the home largely clutter free?" depended on the person's perception of clutter. Some of our participants (eg, spouses or family relatives) lived in the same house; however, the assessments were completed independently and without consultation between the cohabitants. Finally, our CIs may have been narrower with a larger sample size.

Conclusions

In conclusion, older people were able to self-assess their own homes using a digital health tool. The purpose of the digital tool was to enable people to start thinking about future housing decisions. This study showed that although agreement levels were generally high, older people and occupational therapists may still have different views on the safety of home environments. In particular, the items regarding steps, toilets, bathrooms, and backyards were subject to different perspectives. Following this research, the digital tool will be slightly modified to address questions for which there was a higher level of disagreement. Attempts will be made to reduce the ambiguity of some questions. Tools that identify potential problems and generate solutions are likely to be of value in supporting future housing decisions as populations age.

Conflicts of Interest

None declared.

References

1. Ageing: global Population. World Health Organization. 2010 Oct. URL: https://www.who.int/news-room/q-a-detail/population-ageing [accessed 2021-08-03]
2. Ageing and health. World Health Organization. 2022 Oct 01. URL: https://www.who.int/news-room/fact-sheets/detail/ageing-and-health [accessed 2021-08-03]

XSL·FO

RenderX

327

3. Silver hues: building age-ready cities. The World Bank. 2022 Apr 05. URL: https://www.worldbank.org/en/topic/urbandevelopment/publication/age-ready-cities [accessed 2023-04-15]

4. Decade of healthy ageing: baseline report. World Health Organization. 2021 Jan 14. URL: https://www.who.int/publications/i/item/9789240017900 [accessed 2021-08-03]

5. Hatcher D, Chang E, Schmied V, Garrido S. Exploring the perspectives of older people on the concept of home. J Aging Res 2019 Jun 18;2019:2679680 [FREE Full text] [doi: 10.1155/2019/2679680] [Medline: 31316834]

6. Kramer C, Pfaffenbach C. Should I stay or should I go? Housing preferences upon retirement in Germany. J Hous Built Environ 2016;31(2):239-256 [FREE Full text] [doi: 10.1007/s10901-015-9454-5]

7. What Australians think of ageing and aged care. Royal Commission into Aged Care Quality and Safety. 2020 Jul 13. URL: https://agedcare.royalcommission.gov.au/sites/default/files/2020-07/research_paper_4_-_what_australians_think_of_ageing_and_aged_care.pdf [accessed 2021-08-03]

8. Northcott HC, Petruik CR. The geographic mobility of elderly Canadians. Can J Aging 2011 Sep;30(3):311-322 [doi: 10.1017/S0714980811000262] [Medline: 21801470]

9. Health care in Canada, 2011: a focus on seniors and aging. Canadian Institute for Health Information. URL: https://publications.gc.ca/collections/collection_2011/icis-cihi/H115-15-2011-eng.pdf [accessed 2022-07-10]

10. Chui E. Ageing in place in Hong Kong—challenges and opportunities in a capitalist Chinese city. Ageing Int 2008;32(3):167-182 [FREE Full text] [doi: 10.1007/s12126-008-9015-2]

11. Pani-Harreman KE, Bours GJ, Zander I, Kempen GI, van Duren JM. Definitions, key themes and aspects of 'ageing in place': a scoping review. Ageing Soc 2020 Mar 18;41(9):2026-2059 [FREE Full text] [doi: 10.1017/s0144686x20000094]

12. Coleman T, Wiles J. Being with objects of meaning: cherished possessions and opportunities to maintain aging in place. Gerontologist 2020 Jan 24;60(1):41-49 [doi: 10.1093/geront/gny142] [Medline: 30452643]

13. Glass AP, Vander Plaats RS. A conceptual model for aging better together intentionally. J Aging Stud 2013 Dec;27(4):428-442 [doi: 10.1016/j.jaging.2013.10.001] [Medline: 24300063]

14. Older Australians. Australian Institute of Health and Welfare. 2021 Feb. URL: https://www.aihw.gov.au/reports/older-people/older-australians/contents/summary [accessed 2022-02-01]

15. Stark S, Keglovits M, Arbesman M, Lieberman D. Effect of home modification interventions on the participation of community-dwelling adults with health conditions: a systematic review. Am J Occup Ther 2017;71(2):7102290010p1-7102290010p1 [doi: 10.5014/ajot.2017.018887] [Medline: 28218595]

16. Stark S, Landsbaum A, Palmer JL, Somerville EK, Morris JC. Client-centred home modifications improve daily activity performance of older adults. Can J Occup Ther 2009 Jul;76 Spec No:235-245 [FREE Full text] [doi: 10.1177/000841740907600s09] [Medline: 19757729]

17. Ninnis K, Van Den Berg M, Lannin NA, George S, Laver K. Information and communication technology use within occupational therapy home assessments: a scoping review. Br J Occup Ther 2018 Jul 12;82(3):141-152 [FREE Full text] [doi: 10.1177/0308022618786928]

18. Read J, Jones N, Fegan C, Cudd P, Simpson E, Mazumdar S, et al. Remote home visit: Exploring the feasibility, acceptability and potential benefits of using digital technology to undertake occupational therapy home assessments. Br J Occup Ther 2020 Oct;83(10):648-658 [FREE Full text] [doi: 10.1177/0308022620921111]

19. van Gaans D, Dent E. Issues of accessibility to health services by older Australians: a review. Public Health Rev 2018 Jul 16;39(1):20 [FREE Full text] [doi: 10.1186/s40985-018-0097-4] [Medline: 30027001]

20. Lannin NA, Clemson L, McCluskey A. Survey of current pre-discharge home visiting practices of occupational therapists. Aust Occup Ther J 2011 Jun;58(3):172-177 [doi: 10.1111/j.1440-1630.2010.00911.x] [Medline: 21599682]

21. Renaut S, Ogg J, Petite S, Chamahian A. Home environments and adaptations in the context of ageing. Ageing Soc 2014 Mar 27;35(6):1278-1303 [FREE Full text] [doi: 10.1017/s0144686x14000221]

22. Dalistan R, George S, Laver K. Considering the home environment and planning for the future: a qualitative exploration of the views of older adults and individuals with older relatives. Scand J Occup Ther (Forthcoming) 2023 Mar 27:1-13 [doi: 10.1080/11038128.2023.2192027] [Medline: 36972682]

23. Barras S. A systematic and critical review of the literature: the effectiveness of occupational therapy home assessment on a range of outcome measures. Aust Occup Ther J 2005 Dec;52(4):326-336 [FREE Full text] [doi: 10.1111/j.1440-1630.2005.00496.x]

24. Patry A, Vincent C, Duval C, Careau E. Psychometric properties of home accessibility assessment tools: a systematic review. Can J Occup Ther 2019 Jun;86(3):172-184 [doi: 10.1177/0008417418824731] [Medline: 31023068]

25. Ziebart C, Dewan N, Tuazon J, MacDermid J. Development of the home fall hazard checklist. Rehabil Res Pract 2021 May 31;2021:5362197 [FREE Full text] [doi: 10.1155/2021/5362197] [Medline: 34158978]

26. Tomita MR, Saharan S, Rajendran S, Nochajski SM, Schweitzer JA. Psychometrics of the Home Safety Self-Assessment Tool (HSSAT) to prevent falls in community-dwelling older adults. Am J Occup Ther 2014 Nov;68(6):711-718 [doi: 10.5014/ajot.2014.010801] [Medline: 25397766]

27. Broderick JP, Adeoye O, Elm J. Evolution of the Modified Rankin Scale and its use in future stroke trials. Stroke 2017 Jul;48(7):2007-2012 [doi: 10.1161/strokeaha.117.017866]

328

28. Gibler KM, Tyvimaa T. Middle-aged and elderly Finnish households considering moving, their preferences, and potential downsizing amidst changing life course and housing career. J Hous Elderly 2015;29(4):373-395 [FREE Full text] [doi: 10.1080/02763893.2015.1055029]

29. Laver K, Davis A, Gwilt I, Dalistan R, Lane R, Block H. Self-assessment of the home environment to plan for successful ageing: report from a digital health co-design workshop. PLOS Digit Health 2022 Jul 7;1(7):e0000069 [FREE Full text] [doi: 10.1371/journal.pdig.0000069] [Medline: 36812550]

30. Flinders University. URL: https://home-check.co/ [accessed 2023-10-18]

31. IBM SPSS statistics for Windows. IBM Corp. 2021. URL: https://www.ibm.com/products/spss-statistics [accessed 2022-02-24]

32. Stata statistical software in release 17. StataCorp LLC. 2021. URL: https://www.stata.com/stata-news/news36-2/ [accessed 2022-03-23]

33. Census of population and housing: socio-economic indexes for areas (SEIFA), Australia, 2016. Australian Bureau of Statistics. 2018. URL: https://www.abs.gov.au/ausstats/abs@.nsf/mf/2033.0.55.001 [accessed 2022-11-30]

34. McHugh ML. Interrater reliability: the kappa statistic. Biochem Med (Zagreb) 2012;22(3):276-282 [FREE Full text] [Medline: 23092060]

35. Dettori JR, Norvell DC. Kappa and beyond: is there agreement? Global Spine J 2020 Jun 03;10(4):499-501 [FREE Full text] [doi: 10.1177/2192568220911648] [Medline: 32435572]

36. Feinstein AR, Cicchetti DV. High agreement but low kappa: I. The problems of two paradoxes. J Clin Epidemiol 1990 Jan;43(6):543-549 [doi: 10.1016/0895-4356(90)90158-l] [Medline: 2348207]

37. Wongpakaran N, Wongpakaran T, Wedding D, Gwet KL. A comparison of Cohen's Kappa and Gwet's AC1 when calculating inter-rater reliability coefficients: a study conducted with personality disorder samples. BMC Med Res Methodol 2013 Apr 29;13(1):61 [FREE Full text] [doi: 10.1186/1471-2288-13-61] [Medline: 23627889]

38. Ali N, Kumar S. Assessing the physical needs and creating a barrier free environment at home for the person with challenging conditions and elderly. Int J Convergence Healthc 2022 Jul 30;2(2):80-16 [FREE Full text] [doi: 10.55487/ijcih.v2i2.28]

39. Lorraine James B, Saville-Smith K. Designing housing decision-support tools for resilient older people. Archit Sci Rev 2018 Aug 02;61(5):305-312 [FREE Full text] [doi: 10.1080/00038628.2018.1505597]

40. Mackenzie L, Byles J, Higginbotham N. Reliability of the home falls and accidents screening tool (HOME FAST) for identifying older people at increased risk of falls. Disabil Rehabil 2002 Mar 20;24(5):266-274 [doi: 10.1080/09638280110087089] [Medline: 12004972]

41. Gell NM, Brown H, Karlsson L, Peters DM, Mroz TM. Bathroom modifications, clutter, and tripping hazards: prevalence and changes after incident falls in community-dwelling older adults. J Aging Health 2020 Dec;32(10):1636-1644 [doi: 10.1177/0898264320949773] [Medline: 32776813]

42. Wellecke C, D'Cruz K, Winkler D, Douglas J, Goodwin I, Davis E, et al. Accessible design features and home modifications to improve physical housing accessibility: a mixed-methods survey of occupational therapists. Disabil Health J 2022 Jul;15(3):101281 [FREE Full text] [doi: 10.1016/j.dhjo.2022.101281] [Medline: 35292211]

43. Corley J, Okely JA, Taylor AM, Page D, Welstead M, Skarabela B, et al. Home garden use during COVID-19: associations with physical and mental wellbeing in older adults. J Environ Psychol 2021 Feb;73:101545 [FREE Full text] [doi: 10.1016/j.jenvp.2020.101545] [Medline: 36540294]

44. Coleman T, Kearns RA, Wiles J. Older adults' experiences of home maintenance issues and opportunities to maintain ageing in place. Hous Stud 2016 Sep 28;31(8):964-983 [FREE Full text] [doi: 10.1080/02673037.2016.1164834]

XSL·FO
RenderX

329

Roslyn's Gantt Chart: *Start date- 6th of April 2021*

YEAR ONE- Masters 1, 2021

PROJECT NAMES + TASK TITLES	COMPLETE	START DATE	END DATE	# of Days
Part 1: Systematic review *(chap 2)*		6-Apr-21	25-Jun-22	319
Protocol	✓	28-Apr-21	12-May-21	11
Protocol draft to supervisor	✓	12-May-21	12-May-21	1
Draft Amendments	✓	21-Apr-21	12-May-21	16
Send protocol to Kate to validate protocol with Research Now	✓	16-Apr-21	16-Apr-21	1
Look into training for sys reviews	✓	8-Jun-21	10-Jun-21	3
Informal Search	✓	6-Apr-21	3-May-21	20
Meet with librarian + finalise search strategy	✓	22-Apr-21	19-May-21	20
Article screening + Full text screening	✓	1-Jun-21	19-Aug-21	58
Conduct systematic RV + writing	✓	7-Jun-21	27-Dec-21	146
Ax of methodological quality using JBI SUMARI	✓	6-Sep-21	6-Oct-21	23
Data extraction	✓	6-Sep-21	6-Oct-21	23
Data synthesis	✓	6-Sep-21	6-Oct-21	23
Assess certainty in findings	✓	6-Sep-21	6-Oct-21	23
Intro	✓	17-Jun-21	10-Aug-21	39
Methods	✓	21-Jun-21	13-Aug-21	40
Results	✓	6-Sep-21	20-Sep-21	11
Discussion	✓	6-Sep-21	31-Oct-21	40
Conclusion	✓	14-Sep-21	14-Mar-22	130
Draft Amendments		10-Jan-22	27-Jun-22	121
Part 2: Qualitative Study *(chap 3)*		4-Jul-21	27-Jun-22	256
Become Familiar w ethics application (completed by su	✓	3-May-21	14-Jun-21	31
Read COREQ checklist	✓	6-May-21	6-May-21	1
Develop analysis plan	✓	6-May-21	6-May-21	1
Training in NVIVO	✓	25-May-21	25-May-21	1
Conduct qual analysis (with Kate)	✓	5-May-21	5-May-21	1
Read transcripts- hardcopy	✓	11-May-21	10-Jun-21	23
NVIVO - analysis	✓	23-Jun-21	31-Oct-21	93
Intro	✓	14-Jun-21	4-Nov-21	104
Methods	✓	14-Sep-21	14-Oct-21	23
Results	✓	14-Sep-21	11-Nov-21	43
Discussion	✓	11-Nov-21	14-Mar-22	88
Conclusion	✓	11-Nov-21	14-Mar-22	88
Draft Amendments	✓	10-Jan-22	27-Jun-22	121

Roslyn's Gantt Chart: *Start date- 6th of April 2021*

PROJECT NAMES + TASK TITLES	COMPLETE	START DATE	END DATE	# of Days
Begin application to transfer to PhD	✓	3-Feb-22	23-Feb-22	11
MID-CANDIDATURE +upgrade to PhD *Should start by 30/1/22*	✓	21-Feb-22	23-Feb-22	
Part 3: Validation of a self assessment tool to assess the home environment		6-Jan-22	19-Dec-22	248
Apply for ethics	✓	28-Feb-22	28-Mar-22	21
Recruitment of participants	✓	28-Feb-22	16-May-22	56
Assessment procedure	✓	18-Apr-22	27-Jun-22	56
Meet with statistician	✓	30-May-22	30-May-22	1
Data collection	✓	30-May-22	15-Aug-22	56
Data analysis	✓	30-May-22	15-Aug-22	56
Common issues identified in the homes of older people using a digital self-assessment tool *(Chap 4)*		12-Sep-22	30-Jan-23	101
Introduction	✓	22-Aug-22	19-Sep-22	21
Methods	✓	22-Aug-22	19-Sep-22	21
Results	✓	26-Sep-22	14-Nov-22	36
Discussion	✓	26-Sep-22	14-Nov-22	36
Conclusion	✓	26-Sep-22	14-Nov-22	36
Submit for publication	✓	9-Jan-23	30-Jan-23	16
Draft Amendments	✓	21-Nov-22	30-Jan-23	51
The Agreement (validity) and validation of a digital tool for self-assessment of the home environment *(chap 5)*		12-Sep-22	29-Jun-23	209
Introduction	✓	1-Mar-23	30-Mar-23	22
Methods	✓	1-Mar-23	17-Mar-23	13
Results	✓	3-Apr-23	24-Apr-23	16
Discussion	✓	4-Apr-23	25-Apr-23	16
Conclusion	✓	4-Apr-23	25-Apr-23	16
Submit for publication	✓	19-Jun-23	19-Jun-23	1
Draft Amendments	✓	20-Jun-23	20-Jun-23	1
FINAL THESIS REVIEW	✓	11-Dec-23	2-Feb-24	40
INTENTION TO SUBMIT	✓	15-Dec-23	3-Mar-24	56
THESIS SUBMISSION *Should start by 23/2/23*	✓	23-Jan-24	6-Apr-24	54

Timeline header (Y3Q1 / Y3Q2): Jan, Feb, March, April, May, June — weekly columns: 9/1/23, 16/1/23, 23/1/21, 30/1/23, 6/2/23, 13/2/23, 20/2/23, 27/2/23, 6/3/23, 13/3/23, 20/3/23, 27/3/23, 3/4/23, 10/4/23, 17/4/23, 24/4/23, 1/5/23, 8/5/23, 15/5/23, 22/5/23, 29/3/23, 5/6/23, 12/6/23, 19/6/23, 19/6/23, 26/6/23, 3/7…

Timeline of PHD studies

2021

Commenced PhD studies & enrolled in Masters by Research

2022

-Upgraded to PhD and gained ethics approval for agreement (validity) study
-Completed study 1: qualitative meta-analysis-
-Completed study 2: qualitative study data analysis

2023

-Data collection completed for study 4: prospective cohort study & study 5: agreement (validity) study-
-Completed study 4 & 5-
-Thesis write up

2024

Completion of thesis write up and PhD submission

Flinders University